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Supplemental
Phase II Environmental Site Assessment

951 Gladstone Avenue and
145 Loretta Avenue North
Ottawa, Ontario

Prepared For

TIP Gladstone LP

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Report: PE4613-1R

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EXECUTIVE SUMMARY

Assessment

A Supplemental Phase II ESA was conducted for the properties addressed 951 Gladstone Ave and 145 Loretta Avenue North, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the areas of potential environmental concern (APECs) that were identified on the Phase II Property in the 2017 Phase I ESA prepared by DST.

A Phase II ESA was prepared by DST in 2017, which consisted of drilling 14 boreholes (BH2017-01 through BH2017-13 and BH2017-5A), 10 of which were instrumented with groundwater monitoring wells (BH2017-02 through BH2017-11) to address several APECs. Soil samples were submitted for analytical testing of BTEX, PHCs (F1-F4), PAHs, Metals and VOCs. Groundwater samples were collected and submitted for BTEX, PHC (F1-F4), Metals and VOC analyses. The findings of the Phase II ESA identified several contaminants (BTEX, PHCs, PAHs, VOCs and metals) in the soil samples analyzed in excess of the selected MECP Table 3 Residential Standards. Groundwater was also impacted with BTEX, PHCs and VOCs.

This Supplemental Phase II ESA consisted of drilling five (5) boreholes on the Phase II Property, all of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of fill material (silty sand with crushed stone, some shale, cobbles and traces of organics), underlain by silty clay, followed by glacial till, overlying limestone interbedded with shale. The boreholes were terminated at depths ranging from approximately 6.17 to 12.24 m below the ground surface (mbgs). Some staining and hydrocarbon odours were noted during the field program in soil samples BH2-20-SS3 and BH2-20-SS6 to SS8. Soil samples were selected based on a combination of the results of the vapour screening, visual and olfactory screening, sample depth and/or sample location.

Nine (9) soil samples were submitted for BTEX, PHC (fractions 1 to 4), PAHs, VOCs and/or metal analyses. Based on the analytical results from 2017 and 2020, BTEX, PHCs, PAHs, VICs and metal concentrations were identified in excess of the selected MECP Table 3 Residential Standards.

Groundwater samples were recovered from monitoring wells BH1-20 through BH5-20. No free-phase product was observed the during the groundwater sampling event. The groundwater samples were submitted for PHC (F1-F4) and VOCs (which include BTEX) analysis.

Based on the 2017 and 2020 analytical results, Metals complied with the selected MECP Table 3 Standards, while VOCs, BTEX and PHCs were identified beneath the Phase II Property in excess of the selected MECP Table 3 Standards.

Recommendations

Soil

Based on the 2017 and 2020 analytical results, the fill and some of the native soils are impacted with either BTEX, PHCs, metal, PAHs and VOCs in excess of the selected MECP Table 3 Residential Standards as well as the Table 1 Background Standards.

It is our understanding that the Phase II Property will be redeveloped in the future for residential purposes and as such the offsite disposal of impacted soil from the building footprints will occur. The excavation of the contaminated soil from the property should be monitored and confirmed by Paterson. Testing of the fill and underlying native soil will be required in conjunction with the excavation program to segregate clean soil from impacted soil and for final confirmatory purposes. Soil/fill in excess of the MECP Table 3 Residential Standards will need to be disposed of at an approved waste disposal facility.

Groundwater

Remediation of the groundwater using a licenced pumping hauling company from the excavation may be a viable option, depending upon the groundwater level at the time of the remediation, however, if a significant volume of water is anticipated, a pump and treat system would likely be more economical.

Due to the change in land use to a more sensitive use (commercial to residential) a record of site condition (RSC) will be required of the subject site. Based on the soil and groundwater quality data accrued at this time a Risk Assessment based Record of Site Condition is recommended to be filed for the site.

Monitoring Wells

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

1.0 INTRODUCTION

At the request of TIP Gladstone LP, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the properties addressed 951 Gladstone Ave and 145 Loretta Avenue North, in the City of Ottawa, Ontario, herein referred to as the Phase II Property. The purpose of this Phase II ESA was to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the 2017 Phase I ESA conducted by DST.

1.1 Site Description

Address:	951 Gladstone Ave and 145 Loretta Avenue North, in Ottawa Ontario.
Location:	The site is located on the northeast quadrant at the intersection of Gladstone Avenue and Loretta Avenue North, in the City of Ottawa, Ontario. For the purpose of this assessment, Gladstone Avenue is assumed to run in an east-west direction. Refer to Figure 1 - Key Plan in the Figures section following the text.
PINs:	04107-0276 and 04107-0013
Legal Description:	Lots 1-3, west side of Champagne Ave, Block C, Plan 73, Lots 1-4, east side of Loretta Ave, Block C, Plan 73, Block C, Plan 73 and Part of Champagne Ave, Plan 17 as in N620724; and, Lots 5-8, Block C Plan 73, east side of Loretta Ave, in the City of Ottawa.
Latitude and Longitude:	45°24’ 13.67" N, 75° 42’ 53.11" W
Zoning:	IG1 – Industrial Zone
Configuration:	Irregular
Area:	9,900 m^2 (approximately)

1.2 Property Ownership

Paterson was engaged to conduct this Phase II-ESA by Mr. Oz Drewniak, of CLV Group, in partnership with TIP Gladstone LP. The head office of CLV Group is located at 485 Bank Street, Ottawa, Ontario.

1.3 Current and Proposed Future Uses

The Phase II Property is currently occupied by two (2) commercial buildings that were originally constructed from circa 1924 to the 1950s.

It is our understanding that the Phase II Property will be redeveloped with high-rise residential buildings with commercial/retail spaces, ground surface parking lot and two levels of below ground parking, sewers and water pipes installation.

Due to the change in land use to a more sensitive use (commercial to residential) a record of site condition (RSC) will be required of the subject site. Based on the soil and groundwater quality data accrued at this time a Risk Assessment based Record of Site Condition is recommended be filed for the site

1.4 Applicable Site Condition Standard

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

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

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property 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.

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

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

Due to the change in land use to a more sensitive use (commercial to residential) a record of site condition (RSC) will be required of the subject site. Based on the

soil and groundwater quality data accrued at this time a Risk Assessment based Record of Site Condition is recommended be filed for the site

A comparison of the soil test data to the MECP Table 1 Standards was also conducted. The Table 1 standards are considered to be indicative of typical Ontario background concentrations and are commonly used to assess whether soil is clean for off-site disposal purposes.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated in an urban area consisting of both commercial and residential land use. The site topography is approximately 64 meters above sea level (masl). The regional topography appears to slope downwards towards the northwest. Site drainage mainly occurs through sheet flow to catch basins located on-site and eventually drains to the municipal sewer system or infiltration into the landscaped areas on-site.

There are no surface water bodies within a 250-m radius of the subject site. The Ottawa River is the closest natural body of water, located approximately 1.0 km to the northwest of the Phase II Property. Based on the regional topography and location of the nearest surface water body, the inferred direction of the regional shallow groundwater flow is to the northwest.

2.2 Past Investigations

A Phase I ESA was conducted for the Phase I Property by DST Consulting Engineers (DST) in August 2017. According to the Phase I ESA report, the subject site is occupied by two (2) multi-tenant commercial/light industrial buildings at 145 Lorretta Avenue North and at 951 Gladstone Avenue.

The building at 145 Loretta Avenue North is a 2-storey structure with a single-level basement situated on the north portion of the lot, which was constructed circa 1952.

The subject building associated with 951 Gladstone Avenue consists of three (3) separate sections. The northern portion of the building consists of a 2-storey brick building with no basement, constructed 1924. The central portion consists of a single-storey concrete block building with no basement, constructed in the early 1950s. The eastern portion consists of a 3-storey structure with a single-

level basement/parking garage, which was constructed circa 1924. Exterior areas of the subject site consist of asphalt-paved surface parking and driveway areas, concrete walkways, or landscaped areas.

Based on the findings of the Phase I ESA, several on- and off-site potentially contaminating activities (PCAs) were considered to result in areas of potential environmental concern (APECs) on the Phase I Property, as presented in Table 1 (DST, 2017).

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	Across the Phase I Property	PCA 30 – Importation of fill material of an unknown quality	On-site	Metals PAHs	Soil
APEC 2 Above ground fuel tank (AST)	Northeastern portion of the Phase I Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater
APEC 3 Former retail fuel outlet (RFO)	Southwestern portion of the Phase I Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4) Metals	Soil and/or groundwater
APEC 4 Former underground storage tank (UST)	Central-west portion of the Phase I Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater
APEC 5 Former AST	Southeastern portion of the Phase I Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater

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 6 Former automotive repair garage	Central portion of the Phase I Property	PCA 27 – Garage and maintenance and repair of railcars, marine, vehicles and aviation vehicles	On-site	BTEX PHCs (F_1-F_4) VOCs	Soil and/or groundwater
APEC 7 Former printing facility	Southeast portion of the Phase I Property	PCA 31 – Ink manufacturing, processing and bulk storage	On-site	BTEX PHCs (F_1-F_4) PAHs Metals VOCs	Soil and/or groundwater
APEC 8 Former rail spur	Southeastern portion of the Phase I Property	PCA 48 – Rail yards, tracks and spurs	On-site	BTEX PHCs (F_1-F_4) PAHs Metals	Soil and/or groundwater
APEC 9 Presence of UST	Northern portion of the Phase I Property	PCA 28 – Gasoline and associated products storage in fixed tanks	Off-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater
APEC 10 Rail tracks	Eastern side of the Phase I Property	PCA 48 – Rail yards, tracks and spurs	Off-site	BTEX PHCs (F_1-F_4) PAHs Metals	Soil and/or groundwater
APEC 11 Former ordnance depot	Eastern side of the Phase I Property	PCA 38 – Ordnance use	Off-site	BTEX PHCs (F_1-F_4) PAHs Metals VOCs	Soil and/or groundwater
APEC 12 Private fuel outlet	Southeastern portion of the Phase I Property	PCA 28 – Gasoline and associated products storage in fixed tanks	Off-site	BTEX PHCs (F_1-F_4) Metals	Soil and/or groundwater

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 13 Printing facility	Western side of the Phase I Property	PCA 31 – Ink manufacturing, processing and bulk storage	Off-site	BTEX PHCs (F_1-F_4) PAHs Metals VOCs	Soil and/or groundwater

DST conducted a subsequent Phase II ESA to address the APECs identified on the Phase I Property.

The subsurface investigation consisted of drilling 14 boreholes, 10 of which were constructed with groundwater monitoring well installations.

Soil samples were obtained from the boreholes and submitted for laboratory analysis of BTEX, PHCs (F1-F4), PAHs, VOCs and/or metals. Based on the analytical results, some BTEX, PHCs, PAHs, VOCs and metals parameters concentrations were in excess of the selected MECP Table 3 Residential Standards.

Groundwater samples were collected and submitted for BTEX, PHCs, VOCs and metals analyses. Based on the analytical results, several BTEX, PHCs and VOC parameters concentrations were in excess of the selected MECP Table 3 Standards.

Based on the findings of the Phase II ESA, the extent of contamination in soil and groundwater will require lateral and vertical delineation, followed by a site remediation program such that, soil and groundwater meet the applicable site standards. No further work has been completed since the 2017 Phase I ESA and Phase II ESA reports.

This Phase II ESA has been conducted to delineate the extent of soil and groundwater contamination on the Phase II Property.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted during the interim of September 14 to September 23, 2020. The field program consisted of drilling five (5) boreholes, all of which were instrumented with groundwater monitoring wells. The boreholes were drilled to a maximum depth of 12.24m 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 this media is based on the Contaminants of Potential Concern (CPCs) identified in the Phase I ESA. These CPCs include petroleum hydrocarbons (PHC, F_1-F_4), Volatile Organic Compounds (VOCs, which include BTEX), Polycyclic Aromatic Hydrocarbons (PAHs) and/or metals in soil and/or groundwater.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of interbedded limestone and shale of the Verulam Formation. The overburden thickness of ranges from 2 to 6 m and consists of plain till.

Groundwater is expected to flow in a northwesterly direction towards the Ottawa River.

Existing Buildings and Structures

The Phase I Property is occupied by three (3) buildings that are used for commercial purposes, while the remaining parts of the site are asphaltic concreted paved parking areas along the eastern, southern and northern portions of the site.

Areas of Natural Significance and Water Bodies

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

Neighbouring Land Use

The Phase I Property is situated in an urban area that consists of both commercial and residential land use.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utilities at the Phase I Property generally consisted of storm drains within paved areas and floor drains inside the commercial buildings, underground hydro, communication lines, and water and sanitary connections.

Based on the reported groundwater level, approximately 4.8 mbgs (by DST, 2017) it is not anticipated that underground utilities are present in the vicinity of the shallow groundwater table, and therefore it is unlikely that underground utilities will affect contaminant distribution and transport.

Drinking Water Wells

No potable water wells were identified on the Phase I Property, nor are there expected to be any on-site.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 2.2, of the Phase I ESA report, several on- and off-site PCAs were considered to result in APECs on the Phase I Property. These APECs have been summarized in Table 1, along with their respective location and contaminants of potential concern (CPCs) on the Phase I Property.

Contaminants of Potential Concern

As per the APECs identified in Section 2.2 of the Phase I ESA Report, the contaminants of potential concern (CPCs) in soil and/or groundwater include:

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

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

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I-ESA is considered to be sufficient to conclude that there are PCAs that have resulted in APECs on the Phase I Property.

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

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report.

3.5 Impediments

Overhead electric lines along Loretta Avenue limited placing any boreholes along the southwestern property boundary.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted during the interim of September 14 to September 23, 2020, during which five (5) boreholes (BH1 through BH5) were placed across the site to address the potential environmental concerns as well as to gain coverage for geotechnical purposes. The boreholes were drilled to a maximum depth of 12.24 mbgs. All five (5) boreholes were completed as monitoring wells to access the groundwater table. All boreholes were completed using a track mounted drill rig provided by Downing Drilling Ltd. of Hawksbury, Ontario, under the full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE4613-1 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 50 soil samples were obtained from the recent boreholes by means of grab sampling from auger flights and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which auger samples and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**" on the Soil Profile and Test Data Sheets appended to this report.

The soil profile generally consisted of fill material (silty sand and with gravel, cobbles and traces of wood/organics), followed by silty clay, underlain by glacial till, followed by interbedded limestone and shale.

4.3 Field Screening Measurements

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

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

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to ambient temperature

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

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated/manipulated gently as the measurements were taken. The peak reading registered within the first 15 seconds was recorded as the vapour measurement.

The vapour readings were found to range from 0.1 ppm to 280 ppm. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

Some staining and hydrocarbon odours were noted during the field program in soil samples BH2-20-SS3 and BH2-20-SS6 to SS8. Soil samples were selected based on a combination of the results of the vapour screening, visual and olfactory screening, sample depth and/or sample location.

4.4 Groundwater Monitoring Well Installation

Five (5) groundwater monitoring wells were installed on the Phase II Property as part of the current subsurface investigation. The monitoring wells consisted of 32 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1. A summary of the monitoring well construction details is provided below in Table 2.

TABLE 2: Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	64.97	11.07	8.07-11.08	6.40-11.08	0.15-6.40	Flushmount
BH2	66.79	6.17	3.17-6.17	2.44-6.17	0.15-2.44	Flushmount
BH3	64.24	12.24	9.24-12.24	8.99-12.24	0.15-8.99	Flushmount
BH4	64.46	10.67	7.67-10.67	7.25-10.67	0.15-7.25	Flushmount
BH5	64.92	11.91	10.42-11.91	10.05-11.91	0.15-10.05	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater samples were collected on September 30, 2020. The water levels were the only parameter measured in the field during the sampling event.

4.6 Groundwater Sampling

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

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

4.7 Analytical Testing

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

TABLE 3: Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth (m) and Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	Metals	PHCs (F1-F4)	PAHs	VOCs	
September 14, 2020							
BH1-20-SS2/SS3	0.76-2.13m Fill				X		Assess the quality of the fill material.
BH2-20-SS2	0.76-1.37m Fill				X		Assess the quality of the fill material.
BH2-20-SS7	4.57-5.18m Till	X		X			Delineate potential impact due the former retail fuel outlet
September 22, 2020							
BH3-20-SS2	0.76-1.37m Fill		X		X		Assess the quality of the fill material.
BH3-20-SS6	3.81-4.41m Silty clay				X		Delineate PAH impact in the native soil
BH3-20-SS11	7.62-7.87m Till					X	Delineate potential VOC impact in the native soil
BH4-20-SS5	3.05-3.66m Fill		X		X		Assess the quality of the fill material.

TABLE 3: Soil Samples Submitted and Analyzed Parameters							
Sample ID	**Sample Depth (m) and Stratigraphic Unit**	**Parameters Analyzed**					**Rationale**
		BTEX	**Metals**	**PHCs (F1-F4)**	**PAHs**	**VOCs**	
September 23, 2020							
BH5-20-SS2	0.76-1.37 Fill				X		Assess the quality of the fill material.
BH5-20-SS10	6.86-6.93m Till					X	Delineate potential VOC impact in the native soil

TABLE 4: Groundwater Samples Submitted and Analyzed Parameters				
Sample ID	**Screened Interval (m) and Stratigraphy Unit**	**Parameters Analyzed**		**Rationale**
		PHCs (F1-F4)	**VOCs**	
September 30, 2020				
BH1-20-GW1	8.07-11.07m		X	Assess the potential VOC impact the groundwater
BH2-20-GW1	3.17-6.17m	X	X	Assess the potential groundwater impacts
BH3-20-GW1	9.24-12.24m	X	X	Assess the potential groundwater impacts
BH4-20-GW1	7.67-10.67m	X	X	Assess the potential groundwater impacts
BH5-20-GW1	10.42-11.91m		X	Assess the potential VOC impact the groundwater
DUP (BH4-20)	7.67-10.67m		X	Duplicate sample for QA/QC purposes.

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

4.8 Residue Management

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

4.9 Elevation Surveying

The borehole locations were selected by Paterson for both environmental and geotechnical purposes. Boreholes were located and surveyed in the field by Paterson to geodetic elevations.

The locations and elevations of the boreholes are presented on Drawing PE4613-1 – Test Hole Location Plan, appended to this report.

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils generally consisted of fill material (silty sand with crushed stone, some shale, cobbles and traces of organics), underlain by alternating layers of silty clay, followed by glacial till, overlying limestone interbedded with shale.

Groundwater was encountered within either the fill or native soil at depths ranging from approximately 4.18-5.05 mbgs. Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling events on September 30, 2020 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

TABLE 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	64.97	5.03	59.94	September 30, 2020
BH2	66.79	5.05	61.74	September 30, 2020
BH3	64.24	4.18	60.06	September 30, 2020
BH4	64.46	4.60	59.86	September 30, 2020
BH5	64.92	4.82	60.10	September 30, 2020

Based on the groundwater elevations measured during the sampling event, a groundwater contour plan was completed. The groundwater contour mapping is shown on Drawing PE4613-1 – Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property is in a northerly direction. A horizontal hydraulic gradient of approximately 0.027 m/m was calculated.

5.3 Fine-Course Soil Texture

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

5.4 Soil: Field Screening

Field screening of the soil samples collected resulted in vapour readings ranging from 0.1 ppm to 280 ppm.

Some staining and hydrocarbon odours were noted during the field program in soil samples BH2-20-SS3 and BH2-20-SS6 to SS8. Soil samples were selected based on a combination of the results of the vapour screening, visual and olfactory screening, sample depth and/or sample location. The 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

Nine (9) soil samples were submitted for BTEX, PHC (F_1-F_4), PAHs, VOCs and/or metals analyses. The results of the analytical testing are presented in Tables 6 through 9. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 6: Analytical Test Results – Soil – BTEX and PHCs (F1-F4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) September 14, 2020 BH2-20-SS7	MECP Table 3 Residential Standards (µg/g)
Benzene	0.02	nd	3.1
Ethylbenzene	0.05	nd	0.21
Toluene	0.05	nd	2
Xylenes	0.05	nd	3.1
PHC F_1	7	nd	55
PHC F_2	4	nd	98
PHC F_3	8	nd	300
PHC F_4	6	nd	2800

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

No detectable BTEX or PHC concentrations were identified in the soil sample analyzed. The results comply with the selected MECP Table 3 Residential Standards as well as the Table 1, background standards.

TABLE 7: Analytical Test Results – Soils – Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) September 22, 2020		MECP Table 3 Residential Standards (µg/g)
		BH3-20-SS2	BH4-20-SS5	
Antimony	1.0	(5.9)	nd	7.5
Arsenic	1.0	**(56.6)**	**(20.7)**	18
Barium	1.0	(249)	109	390
Beryllium	0.5	0.6	0.7	4
Boron	5.0	12.0	11.9	120
Cadmium	0.5	1.1	nd	1.2
Chromium	5.0	(84.0)	30.3	160
Cobalt	1.0	6.4	9.7	22
Copper	5.0	(118)	26.1	140
Lead	1.0	**(484)**	46.1	120
Molybdenum	1.0	**(9.0)**	nd	6.9
Nickel	5.0	28.2	20.8	100
Selenium	1.0	(1.7)	nd	2.4
Silver	0.3	(0.8)	nd	20
Thallium	1.0	nd	nd	1
Uranium	1.0	1.4	nd	23
Vanadium	10.0	25.6	41.2	86
Zinc	20.0	**(374)**	77.3	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- **Bold and underlined** – Parameter exceeds selected MECP Standards
- (-) Exceeds the MECP Table 1 Standards

Metals concentrations were identified in excess of the selected MECP Table 3 Residential Standards in soil samples BH3-20-SS2 and BH4-20-SS5. Additional metals parameters were in excess of the background Table 1 Standards.

TABLE 8: Analytical Test Results – Soils – VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		September 22, 2020	September 23, 2020	
		BH3-20-SS11	BH5-20-SS10	
Acetone	0.50	nd	nd	16
Benzene	0.02	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	13
Bromoform	0.05	nd	nd	0.27
Bromomethane	0.05	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	2.4
Chloroform	0.05	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	2
Ethylene dibromide (dibromoethane, 1,2-)	0.05	nd	nd	0.05
Hexane	0.05	nd	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	nd	16
Methyl Isobutyl Ketone	0.50	nd	nd	1.7
Methyl tert-butyl ether	0.05	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	0.1
Styrene	0.05	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	0.28
Toluene	0.05	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	4
Vinyl Chloride	0.02	nd	nd	0.02
Xylenes, total	0.05	nd	nd	3.1

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

No detectable VOCs were identified in the soil samples analyzed. All VOCs concentrations comply with the selected MECP Table 3 Residential Standards.

TABLE 9: Analytical Test Results – Soils – PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		September 14, 2020		September 22, 2020	
		BH1-20-SS2/SS3	BH2-20-SS2	BH3-20-SS2	
Acenaphthene	0.02	0.02	0.04	(0.09)	7.9
Acenaphthylene	0.02	0.07	**(0.20)**	**(0.80)**	0.15
Anthracene	0.02	0.12	(0.21)	**(0.85)**	0.67
Benzo[a]anthracene	0.02	0.28	(0.40)	**(1.77)**	0.5
Benzo[a]pyrene	0.02	0.28	**(0.57)**	**(1.98)**	0.3
Benzo[b]fluoranthene	0.02	0.34	(0.64)	**(2.40)**	0.78
Benzo[g,h,i]perylene	0.02	0.18	0.32	(1.55)	6.6
Benzo[k]fluoranthene	0.02	0.18	0.37	**(1.31)**	0.78
Chrysene	0.02	0.26	0.51	1.97	7
Dibenzo[a,h]anthracene	0.02	0.05	0.08	**(0.41)**	0.1
Fluoranthene	0.02	0.54	**(0.81)**	**(3.90)**	0.69
Fluorene	0.02	0.02	0.03	(0.14)	62
Indeno[1,2,3-cd]pyrene	0.02	0.17	(0.29)	**(1.47)**	0.38
1-Methylnaphthalene	0.02	0.11	0.03	0.04	0.99
2-Methylnaphthalene	0.02	0.15	0.05	0.06	0.99
Methylnaphthalene (1&2)	0.04	0.26	0.08	0.10	0.99
Naphthalene	0.01	(0.10)	0.03	0.05	0.6
Phenanthrene	0.02	0.29	0.39	(1.44)	6.2
Pyrene	0.02	0.48	0.69	(3.08)	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- **Bold and underlined** – Parameter exceeds selected MECP Standards
- (-) Exceeds the MECP Table 1 Standards

TABLE 9 Continued: Analytical Test Results – Soils – PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		September 22, 2020		September 23, 2020	
		BH3-20-SS6	BH4-20-SS5	BH5-20-SS2	
Acenaphthene	0.02	0.02	0.02	(0.18)	7.9
Acenaphthylene	0.02	0.07	nd	**(0.67)**	0.15
Anthracene	0.02	0.09	0.05	**(1.09)**	0.67
Benzo[a]anthracene	0.02	0.25	0.11	**(2.29)**	0.5
Benzo[a]pyrene	0.02	**(0.32)**	0.12	**(2.26)**	0.3
Benzo[b]fluoranthene	0.02	0.37	0.15	**(2.25)**	0.78
Benzo[g,h,i]perylene	0.02	0.21	0.06	(1.13)	6.6
Benzo[k]fluoranthene	0.02	0.19	0.08	**(1.09)**	0.78
Chrysene	0.02	0.26	0.11	2.30	7
Dibenzo[a,h]anthracene	0.02	0.05	nd	**(0.35)**	0.1
Fluoranthene	0.02	0.54	0.23	**(5.15)**	0.69
Fluorene	0.02	0.03	nd	(0.30)	62
Indeno[1,2,3-cd]pyrene	0.02	0.20	0.07	**(1.17)**	0.38
1-Methylnaphthalene	0.02	0.03	nd	0.13	0.99
2-Methylnaphthalene	0.02	0.03	nd	0.16	0.99
Methylnaphthalene (1&2)	0.04	0.06	nd	0.29	0.99
Naphthalene	0.01	0.03	nd	(0.32)	0.6
Phenanthrene	0.02	0.28	0.19	(3.30)	6.2
Pyrene	0.02	0.45	0.19	(4.40)	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- **Bold and underlined** – Parameter exceeds selected MECP Standards
- (-) Exceeds the MECP Table 1 Standards

Several PAH concentrations were identified in excess of the selected MECP Table 3 Residential Standards in soil samples BH2-20-SS2, BH3-20-SS2, BH3-20-SS6 and BH5-20-SS2.

Additional PAH parameters were in excess of the background Table 1 Standards.

The maximum concentrations of analyzed parameters in the soil at the site are summarized in Table 10.

TABLE 10: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Antimony	(5.9)	BH3-20-SS2	0.76-1.37, Fill
Arsenic	**(56.6)**		
Barium	(249)		
Beryllium	0.7	BH4-20-SS5	3.05-3.66, Fill
Boron	12.0	BH3-20-SS2	0.76-1.37, Fill
Cadmium	1.1		
Chromium	(84.0)		
Cobalt	9.7	BH4-20-SS5	3.05-3.66, Fill
Copper	(118)	BH3-20-SS2	0.76-1.37, Fill
Lead	**(484)**		
Molybdenum	**(9.0)**		
Nickel	28.2		
Selenium	(1.7)		
Silver	(0.8)		
Uranium	1.4		
Vanadium	25.6		
Zinc	**(374)**		
Acenaphthene	(0.18)	BH5-20-SS2	0.76-1.37, Fill
Acenaphthylene	**(0.80)**	BH2-20-SS2	0.76-1.37, Fill
Anthracene	**(1.09)**	BH5-20-SS2	0.76-1.37, Fill
Benzo[a]anthracene	**(2.29)**		
Benzo[a]pyrene	**(2.26)**		
Benzo[b]fluoranthene	**(2.25)**		
Benzo[g,h,i]perylene	(1.55)	BH3-20-SS2	0.76-1.37, Fill
Benzo[k]fluoranthene	**(1.31)**		
Chrysene	2.30	BH5-20-SS2	0.76-1.37, Fill
Dibenzo[a,h]anthracene	**(0.41)**	BH3-20-SS2	0.76-1.37, Fill
Fluoranthene	**(5.15)**	BH5-20-SS2	0.76-1.37, Fill
Fluorene	(0.30)		
Indeno[1,2,3-cd]pyrene	**(1.47)**	BH3-20-SS2	0.76-1.37, Fill
1-Methylnaphthalene	0.13	BH5-20-SS2	0.76-1.37, Fill
2-Methylnaphthalene	0.16		
Methylnaphthalene (1&2)	0.29		
Naphthalene	(0.32)		
Phenanthrene	(3.30)		
Pyrene	(4.40)		

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- **Bold and underlined** – Parameter exceeds selected MECP Standards
- (-) Exceeds the MECP Table 1 Standards

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

5.6 Groundwater Quality

Groundwater samples were submitted for laboratory analysis of PHC (F_1-F_4) and/or VOC analyses. The groundwater samples were obtained from the screened intervals noted in Table 2. The results of the analytical testing are presented in Tables 11 and 12. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 11: Analytical Test Results – Groundwater – PHC (F1 – F4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Standards (µg/L)
		September 30, 2020			
		BH2-20-GW1	BH3-20-GW1	BH4-20-GW1	
PHC F1	25	**1940**	nd	nd	750
PHC F2	100	nd	nd	nd	150
PHC F3	100	nd	nd	nd	500
PHC F4	100	nd	nd	nd	500

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (i.e <MDL)
- **Bold and underlined** – Parameter exceeds selected MECP Standards

With the exception of PHC, F1 at BH2-20, all other PHC concentrations comply with the selected MECP Table 3 Standards.

TABLE 12: Analytical Test Results – Groundwater – VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Standards (µg/L)
		September 30, 2020			
		BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	
Acetone	5	nd	nd	nd	130000
Benzene	0.5	16.1	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	nd	1.8	2.4
Dibromochloromethane	0.5	nd	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	**4.5**	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	325	nd	2300
Ethylene dibromide	0.2	nd	nd	nd	0.25
Hexane	1	2.0	**52.0**	nd	51
Methyl Ethyl Ketone	5	nd	nd	nd	470000
Methyl Isobutyl Ketone	5	nd	nd	nd	140000
Methyl tert-butyl ether	2	44.3	nd	5.5	190
Methylene Chloride	5	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	8.8	nd	18000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1	nd	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes, total	0.5	nd	90.7	nd	4200

Notes:

- MDL - Method Detection Limit
- nd - Not Detected (i.e <MDL)
- **Bold and underlined** – Parameter exceeds selected MECP Standards

TABLE 12 Continued: Analytical Test Results – Groundwater – VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Standards (µg/L)
		September 30, 2020			
		BH4-20-GW1	BH5-20-GW1	DUP (BH4-20)	
Acetone	5	nd	nd	nd	130000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	**3.4**	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	**2.7**	nd	**2.7**	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2300
Ethylene dibromide	0.2	nd	nd	nd	0.25
Hexane	1	nd	nd	nd	51
Methyl Ethyl Ketone	5	nd	nd	nd	470000
Methyl Isobutyl Ketone	5	nd	nd	nd	140000
Methyl tert-butyl ether	2	15.7	nd	15.6	190
Methylene Chloride	5	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1	nd	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes, total	0.5	nd	nd	nd	4200

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (i.e <MDL)
- **Bold and underlined** – Parameter exceeds selected MECP Standards

VOC concentrations were identified in the groundwater samples in excess of the selected MECP Table 3 Standards. Chloroform in sample BH5-20-GW1 was identified in excess of the selected Table 3 Standards, however, the chloroform concentration is considered residual from the municipal water used for rock

coring and as such, it is expected that it will dissipate in the near future. Chloroform in this groundwater sample is not a contaminant.

The maximum concentrations of analyzed parameters in the groundwater beneath the site are summarized in Table 13.

TABLE 13: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Groundwater Sample	Screened Interval (m BGS)
PHC F1	**1940**	BH2-20-GW1	3.17-6.17
Benzene	16.1	BH1-20-GW1	8.07-11.07
Chloroform	**3.4**	BH5-20-GW1	10.42-11.91
1,2-Dichloroethane	**4.5**	BH1-20-GW1	8.07-11.07
Ethylbenzene	325	BH2-20-GW1	3.17-6.17
Hexane	**52**		
Methyl tert-butyl ether	44.3	BH1-20-GW1	8.07-11.07
Toluene	8.8	BH2-20-GW1	3.17-6.17
Xylenes, total	90.7		

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (i.e <MDL)
- **Bold and underlined** – Parameter exceeds selected MECP Standards

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

5.7 Quality Assurance and Quality Control Results

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

A duplicate groundwater sample (DUP) from BH4-20 was collected an analyzed for VOC concentrations as shown in Table 14.

TABLE 14: QA/QC Results – Groundwater - VOCs

Parameter	BH4-20-GW1	DUP	RPD (%)	QA/QC Results
1,4-Dichlorobenzene	2.7	2.7	0	Within the acceptable range
Methyl tert-butyl ether	15.7	15.6	0.64	Within the acceptable range

The remaining VOC parameters not shown in the above table were not detected above the laboratory detection limit.

Overall, the quality of the field data collected during this Phase II-ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As indicated in Section 2.2 of this report, several on- and off-site PCAs were considered to result in APECs on the Phase II Property. These APECs have been summarized in Table 15, along with their respective location and contaminants of potential concern (CPCs) on the Phase II Property.

Table 15: Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase II 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	Across the Phase II Property	PCA 30 – Importation of fill material of an unknown quality	On-site	Metals PAHs	Soil
APEC 2 Above ground fuel tank (AST)	Northeastern portion of the Phase II Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater
APEC 3 Former retail fuel outlet (RFO)	Southwestern portion of the Phase II Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4) Metals	Soil and/or groundwater

Table 15: Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase II 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 4 Former underground storage tank (UST)	Central-west portion of the Phase II Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater
APEC 5 Former AST	Southeastern portion of the Phase II Property	PCA 28 – Gasoline and associated products storage in fixed tanks	On-site	BTEX PHCs (F_1-F_4)	Soil and/or groundwater
APEC 6 Former automotive repair garage	Central portion of the Phase II Property	PCA 27 – Garage and maintenance and repair of railcars, marine, vehicles and aviation vehicles	On-site	BTEX PHCs (F_1-F_4) VOCs	Soil and/or groundwater
APEC 7 Former printing facility	Southeast portion of the Phase II Property	PCA 31 – Ink manufacturing, processing and bulk storage	On-site	BTEX PHCs (F_1-F_4) PAHs Metals VOCs	Soil and/or groundwater
APEC 8 Former rail spur	Southeastern portion of the Phase II Property	PCA 48 – Rail yards, tracks and spurs	On-site	BTEX PHCs (F_1-F_4) PAHs Metals	Soil and/or groundwater
APEC 9 Presence of UST	Northern portion of the Phase II Property	PCA 28 – Gasoline and associated products storage in fixed tanks	Off-site	BTEX PHCs (F_1-F_4)	Groundwater
APEC 10 Rail tracks	Eastern side of the Phase II Property	PCA 48 – Rail yards, tracks and spurs	Off-site	BTEX PHCs (F_1-F_4) PAHs Metals	Groundwater

Table 15: Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase II 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 11 Former ordnance depot	Eastern side of the Phase II Property	PCA 38 – Ordnance use	Off-site	BTEX PHCs (F_1-F_4) PAHs Metals VOCs	Groundwater
APEC 12 Private fuel outlet	Southeastern portion of the Phase II Property	PCA 28 – Gasoline and associated products storage in fixed tanks	Off-site	BTEX PHCs (F_1-F_4) Metals	Groundwater
APEC 13 Printing facility	Western side of the Phase II Property	PCA 31 – Ink manufacturing, processing and bulk storage	Off-site	BTEX PHCs (F_1-F_4) PAHs Metals VOCs	Groundwater

Contaminants of Potential Concern

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

- Benzene, ethylbenzene, toluene and xylenes (BTEX).
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4).
- Polycyclic Aromatic Hydrocarbons (PAHs).
- Metals.
- Volatile Organic Compounds (VOCs).

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. Underground utilities at the Phase I Property generally consisted of storm drains within paved areas and floor drains inside the commercial buildings, underground hydro, communication lines, and water and sanitary connections.

Physical Setting

Site Stratigraphy

The site stratigraphy consists of:

- An asphaltic concrete layer including crushed stone, overlying a fill layer was encountered in all of the boreholes except BH1-20. The fill material consisted of a silty sand with crushed stone, gravel, cobbles with traces of organics and sand, extending to depths ranging from 2.29 to 3.81 mbgs. Groundwater was encountered in this layer in BH2 and BH9.
- Silty sand to silty clay with some sandy silt was encountered in all of the boreholes and extended to depths ranging from 3.81 to 6.86 mbgs. Groundwater was encountered in this layer in BH1-20, BH3-20 and BH4-20.
- Glacial till consisting of silty clay with some gravel and cobbles was encountered in all of the boreholes and extended to depths ranging from 6.17 to 8.32 mbgs. Groundwater was encountered in this layer at BH2-20 and BH5-20.
- Bedrock consisted of limestone with interbedded shale was cored in BH1-20, BH3-20, BH4-20 and BH5-20. These boreholes were terminated in this layer at depths ranging from 10.67 to 12.24 mbgs.

Hydrogeological Characteristics

Groundwater at the Phase II Property was generally encountered in the native soils ranging at depths of approximately 4.18 to 5.05 mbgs. Groundwater flow was measured in a northerly direction with a hydraulic gradient of 0.027 m/m. Groundwater contours are shown on Drawing PE5033-3–Test Hole Location Plan.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 4.18 to 5.05 mbgs.

Approximate Depth to Bedrock

Bedrock was encountered beneath the Phase II Property at depths varying between 6.93 to 8.33 mbgs.

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.

Section 43.1 of the Regulation does not apply to the Phase II Property as it is not a shallow soil property.

Fill Placement

Based on the findings of the subsurface investigation, fill material was encountered across the entire site. The fill material consisted of silty sand with crushed stone, gravel, cobbles with some organics (wood) and traces of sand. The fill varied in thickness from 2.21 to 3.71 m.

Existing Buildings and Structures

The Phase II Property is occupied by three (3) buildings that are used for commercial purposes, while the remaining parts of the site are asphaltic concreted paved parking areas along the eastern, southern and northern portions of the site.

Proposed Buildings and Other Structures

It is our understanding that the Phase II Property will be redeveloped with high-rise residential buildings with commercial/retail spaces on the ground level, ground surface parking lot and two levels of below ground parking.

Due to the change in land use to a more sensitive use (commercial to residential) a record of site condition (RSC) will be required of the subject site. Based on the soil and groundwater quality data accrued at this time a Risk Assessment based Record of Site Condition will be filed for the site

Drinking Water Wells

No potable water wells were identified on the Phase II Property, nor are there expected to be any on-site.

Water Bodies and Areas of Natural Significance

No water bodies or areas of natural significance were identifed on the Phase II Property or within the 250 m search radius.

Neighbouring Land Use

The Phase II Property is situated in an urban area that consists of both commercial and residential land use.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical results from 2017 and 2020, BTEX, PHCs, PAHs, Metals and VOCs concentrations identified in the soil across the Phase II Property are in excess of the selected MECP Table 3 Residential Standards. The Metals an PAH impact appears be throughout the fill material while BTEX and PHC impacts are present in the underlying native soil. The analytical test plans are shown on Drawings PE4613-2 through PE4613-6.

PHCs and VOCs concentrations in the groundwater samples were identified in excess of the MECP Table 3 Standards. The groundwater contamination was noted beneath the southwest corner and the central portion of the Phase II Property.

Groundwater results from 2017 to 2020 are shown on Drawings PE4613-7 through PE4613-10.

Types of Contaminants

The soilcontaminants of concern include BTEX (benzene, ethylbenzene, toluene and xylenes), PHCs (F1-F3), Metals (Arsenic, Cobalt, Lead, Molybdenum, Vanadium and Zinc), VOCs (Di-chloroethylene, including BTEX), and PAHs (Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b/j)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene, Fluoranthene and Indeno(1,2,3-cd)pyrene).

The groundwater contaminants of concern include BTEX (xylenes), PHCs (F1-F3), VOCs (1,2-Dichloroethane, methyl-butyl ether, hexanes and xylenes). It should be noted that chloroform was identified in excess of the selected standards, however, it is considered residual from the municipal water used for coring and is expected to dissipate in the near future.

Contaminated Media

Based on the findings of the Phase II ESA, the fill material and some of the underlying native soil are impacted with BTEX, PHCs, VOCs and/or PAHs. The groundwater beneath the Phase II Property is contaminated with BTEX, PHCs and VOCs.

What Is Known About Areas Where Contaminants Are Present

The BTEX, PHCs and VOCs contamination in the fill material is localized to areas where the former retail fuel outlet, UST nest and spur lines were situated.

BTEX and PHC impacted groundwater is also present in these areas. VOC contaminated groundwater appears to be beneath the southwest and central east portions of the Phase II Property.

Distribution and Migration of Contaminants

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

Discharge of Contaminants

The BTEX, PHC and VOC impacts are suspected to be a result of the former use of the Phase II Property (i.e. retail fuel outlet, UST nest, former spur lines, print shop, garage, etc.)

Metals and PAH impacts are associated with the importation of fill material to the Phase II Property.

Climatic and Meteorological Conditions

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

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

Potential for Vapour Intrusion

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

6.0 CONCLUSIONS

Assessment

A Supplemental Phase II ESA was conducted for the properties addressed 951 Gladstone Ave and 145 Loretta Avenue North, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the areas of potential environmental concern (APECs) that were identified on the Phase II Property in the 2017 Phase I ESA prepared by DST.

A Phase II ESA was prepared by DST in 2017, which consisted of drilling 14 boreholes (BH2017-01 through BH2017-13 and BH2017-5A), 10 of which were instrumented with groundwater monitoring wells (BH2017-02 through BH2017-11) to address several APECs. Soil samples were submitted for analytical testing of BTEX, PHCs (F1-F4), PAHs, Metals and VOCs. Groundwater samples were collected and submitted for BTEX, PHC (F1-F4), Metals and VOC analyses. The findings of the Phase II ESA identified several contaminants (BTEX, PHCs, PAHs, VOCs and metals) in the soil samples analyzed in excess of the selected MECP Table 3 Residential Standards. Groundwater was also impacted with BTEX, PHCs and VOCs.

This Supplemental Phase II ESA consisted of drilling five (5) boreholes on the Phase II Property, all of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of fill material (silty sand with crushed stone, some shale, cobbles and traces of organics), underlain by silty clay, followed by glacial till, overlying limestone interbedded with shale. The boreholes were terminated at depths ranging from approximately 6.17 to 12.24 m below the ground surface (mbgs). Some staining and hydrocarbon odours were noted during the field program in soil samples BH2-20-SS3 and BH2-20-SS6 to SS8. Soil samples were selected based on a combination of the results of the vapour screening, visual and olfactory screening, sample depth and/or sample location.

Nine (9) soil samples were submitted for BTEX, PHC (fractions 1 to 4), PAHs, VOCs and/or metal analyses. Based on the analytical results from 2017 and 2020, BTEX, PHCs, PAHs, VICs and metal concentrations were identified in excess of the selected MECP Table 3 Residential Standards.

Groundwater samples were recovered from monitoring wells BH1-20 through BH5-20. No free-phase product was observed the during the groundwater

sampling event. The groundwater samples were submitted for PHC (F1-F4) and VOCs (which include BTEX) analysis. Based on the 2017 and 2020 analytical results, Metals complied with the selected MECP Table 3 Standards, while VOCs, BTEX and PHCs were identified beneath the Phase II Property in excess of the selected MECP Table 3 Standards.

Recommendations

Soil

Based on the 2017 and 2020 analytical results, the fill and some of the native soils are impacted with either BTEX, PHCs, metal, PAHs and VOCs in excess of the selected MECP Table 3 Residential Standards as well as the Table 1 Background Standards.

It is our understanding that the Phase II Property will be redeveloped in the future for residential purposes and as such the offsite disposal of impacted soil from the building footprints will occur. The excavation of the contaminated soil from the property should be monitored and confirmed by Paterson. Testing of the fill and underlying native soil will be required in conjunction with the excavation program to segregate clean soil from impacted soil and for final confirmatory purposes. Soil/fill in excess of the MECP Table 3 Residential Standards will need to be disposed of at an approved waste disposal facility.

Groundwater

Remediation of the groundwater using a licenced pumping hauling company from the excavation may be a viable option, depending upon the groundwater level at the time of the remediation, however, if a significant volume of water is anticipated, a pump and treat system would likely be more economical.

Due to the change in land use to a more sensitive use (commercial to residential) a record of site condition (RSC) will be required of the subject site. Based on the soil and groundwater quality data accrued at this time a Risk Assessment based Record of Site Condition is recommended to be filed for the site.

Monitoring Wells

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

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared under the supervision of a QP_{ESA}, 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 TIP Gladstone LP. Notification from TIP Gladstone LP. and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

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

Mark D'Arcy, P.Eng., QP_{ESA}

Report Distribution:

- TIP Gladstone LP.
- Paterson Group
-

FIGURES

FIGURE 1 – KEY PLAN

Drawing PE4613-1 –Test Hole Location Plan and Groundwater Contour Plan

Drawing PE4613-2 – Analytical Testing Plan – Soil (BTEX)

Drawing PE4613-2A – Cross section A-A' – Soil (BTEX)

Drawing PE4613-2B –Cross section B-B' – Soil (BTEX)

Drawing PE4613-3 – Analytical Testing Plan – Soil (Metals)

Drawing PE4613-3A – Cross section A-A' – Soil (Metals)

Drawing PE4613-3B –Cross section B-B' – Soil (Metals)

Drawing PE4613-4 – Analytical Testing Plan – Soil (PHC)

Drawing PE4613-4A – Cross section A-A' – Soil (PHC)

Drawing PE4613-4B –Cross section B-B' – Soil (PHC)

Drawing PE4613-5 – Analytical Testing Plan – Soil (VOCs)

Drawing PE4613-5A – Cross section A-A' – Soil (VOCs)

Drawing PE4613-5B –Cross section B-B' – Soil (VOCs)

Drawing PE4613-6 – Analytical Testing Plan – Soil (PAH)

Drawing PE4613-6A – Cross section A-A' – Soil (PAH)

Drawing PE4613-6B –Cross section B-B' – Soil (PAH)

Drawing PE4613-7 – Analytical Testing Plan - Groundwater (BTEX)

Drawing PE4613-7A –Cross section A-A' –Groundwater (BTEX)

Drawing PE4613-7B –Cross section B-B' –Groundwater (BTEX)

Drawing PE4613-8 – Analytical Testing Plan - Groundwater (Metals)

Drawing PE4613-8A –Cross section A-A' –Groundwater (Metals)

Drawing PE4613-8B–Cross section B-B' –Groundwater (Metals)

Drawing PE4613-9 – Analytical Testing Plan - Groundwater (PHC)

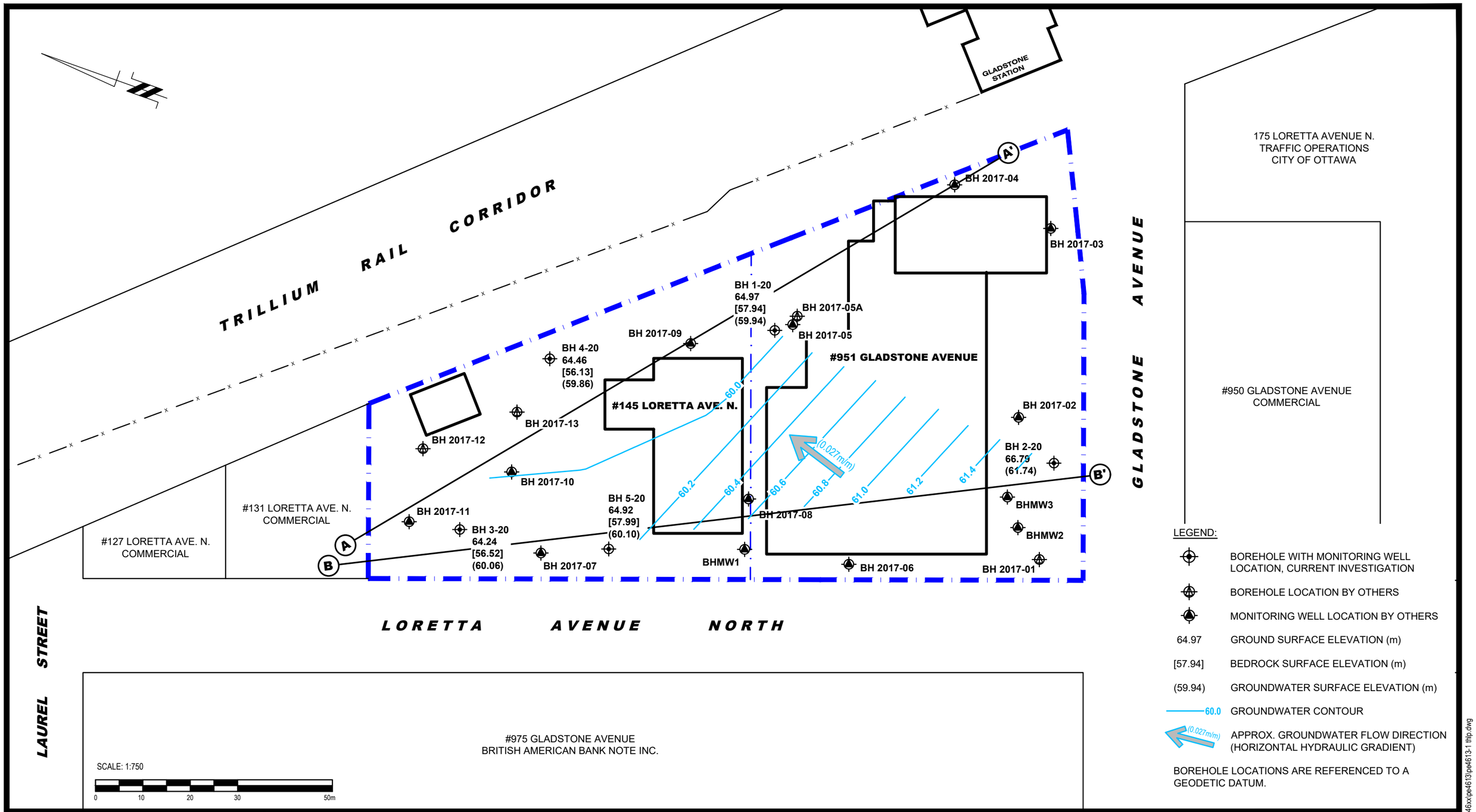
Drawing PE4613-9A –Cross section A-A' –Groundwater (PHC)

Drawing PE4613-9B–Cross section B-B' –Groundwater (PHC)

Drawing PE4613-10 – Analytical Testing Plan - Groundwater (VOCs)

Drawing PE4613-10A – Cross section A-A' –Groundwater (VOCs)

Drawing PE4613-10B– Cross section B-B' –Groundwater (VOCs)



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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-1
Approved by: MSD	Revision No.:

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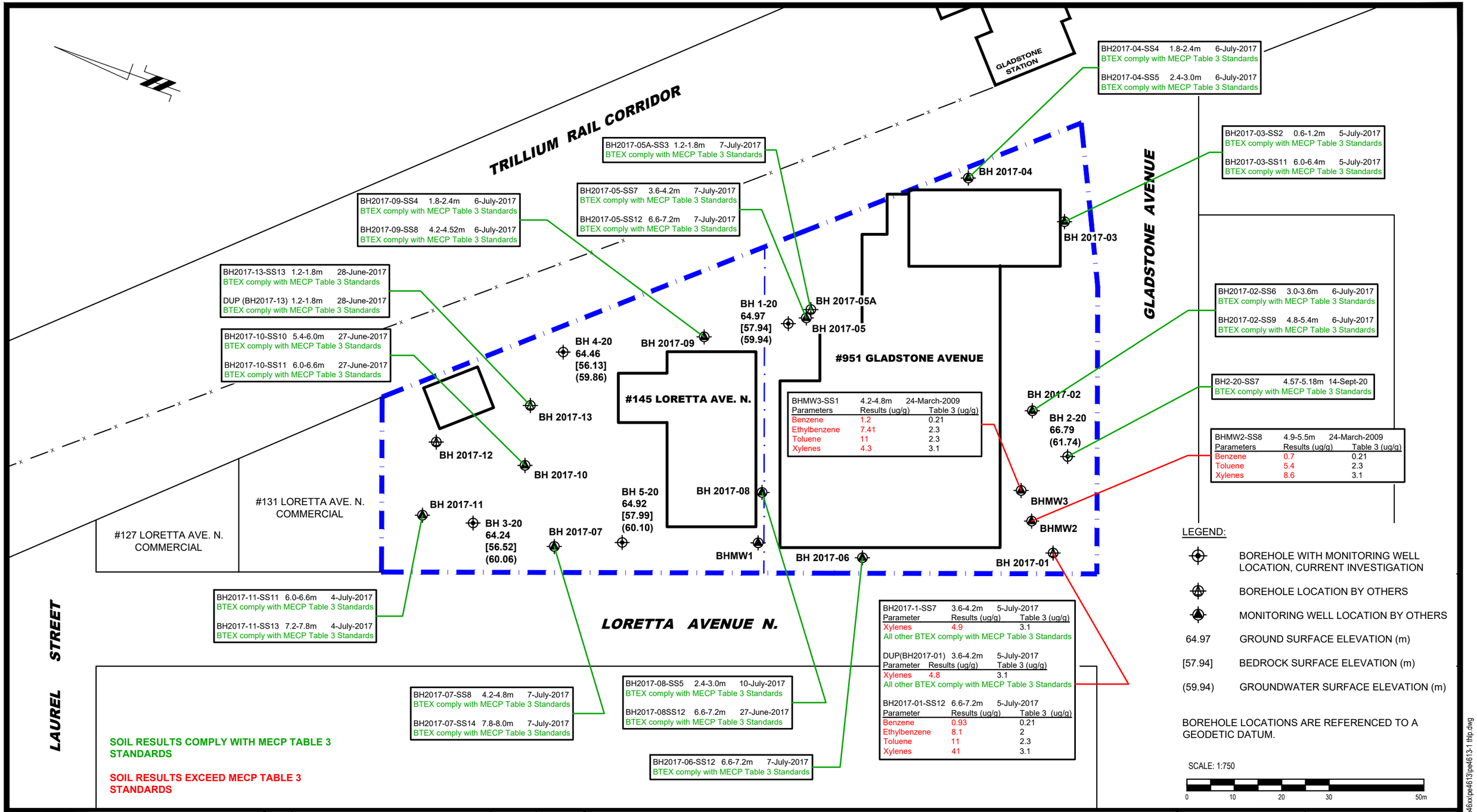

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951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (BTEX)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-2
Approved by: MSD	Revision No.:

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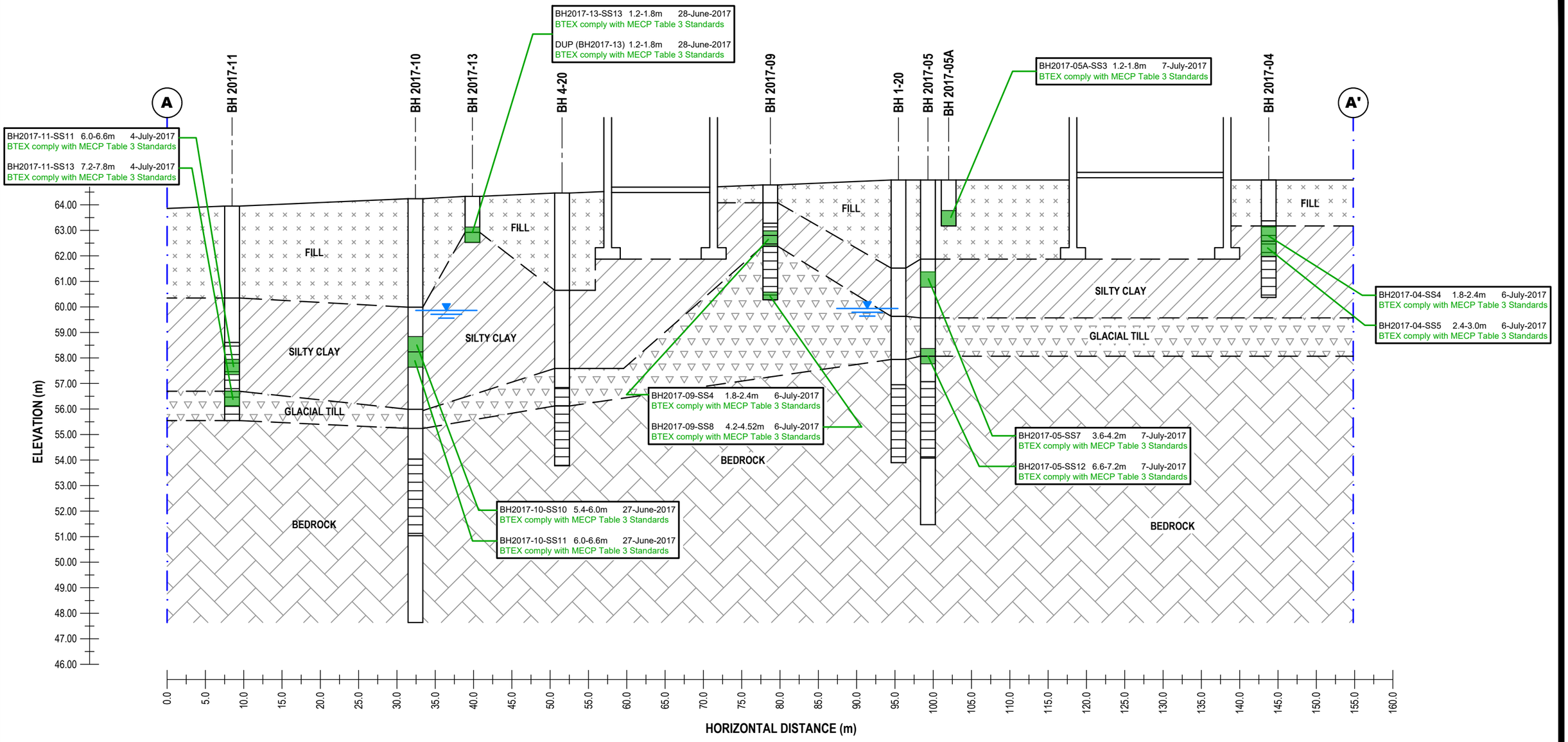

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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Title:

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

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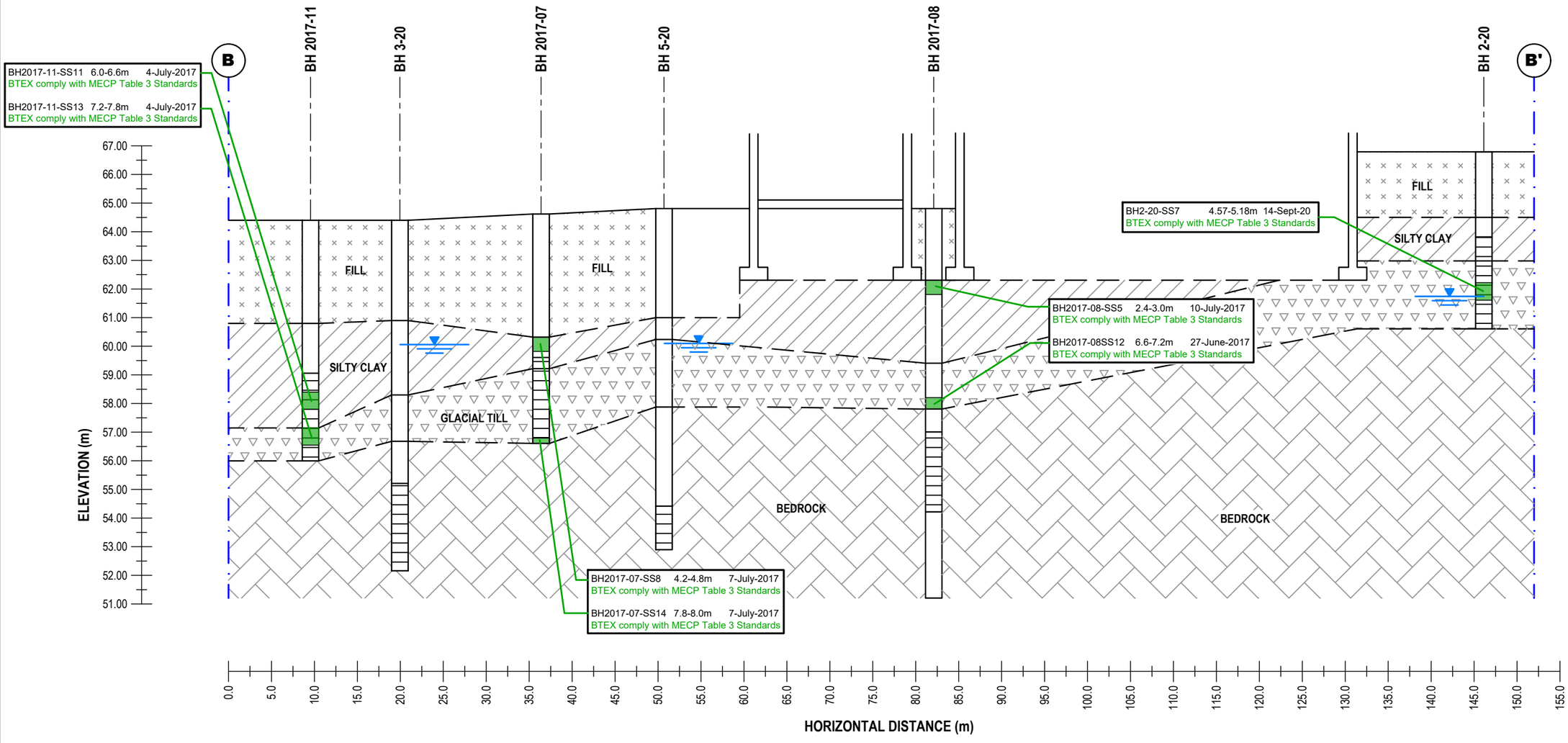

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Title:
CROSS-SECTION B-B' - SOIL (BTEX)

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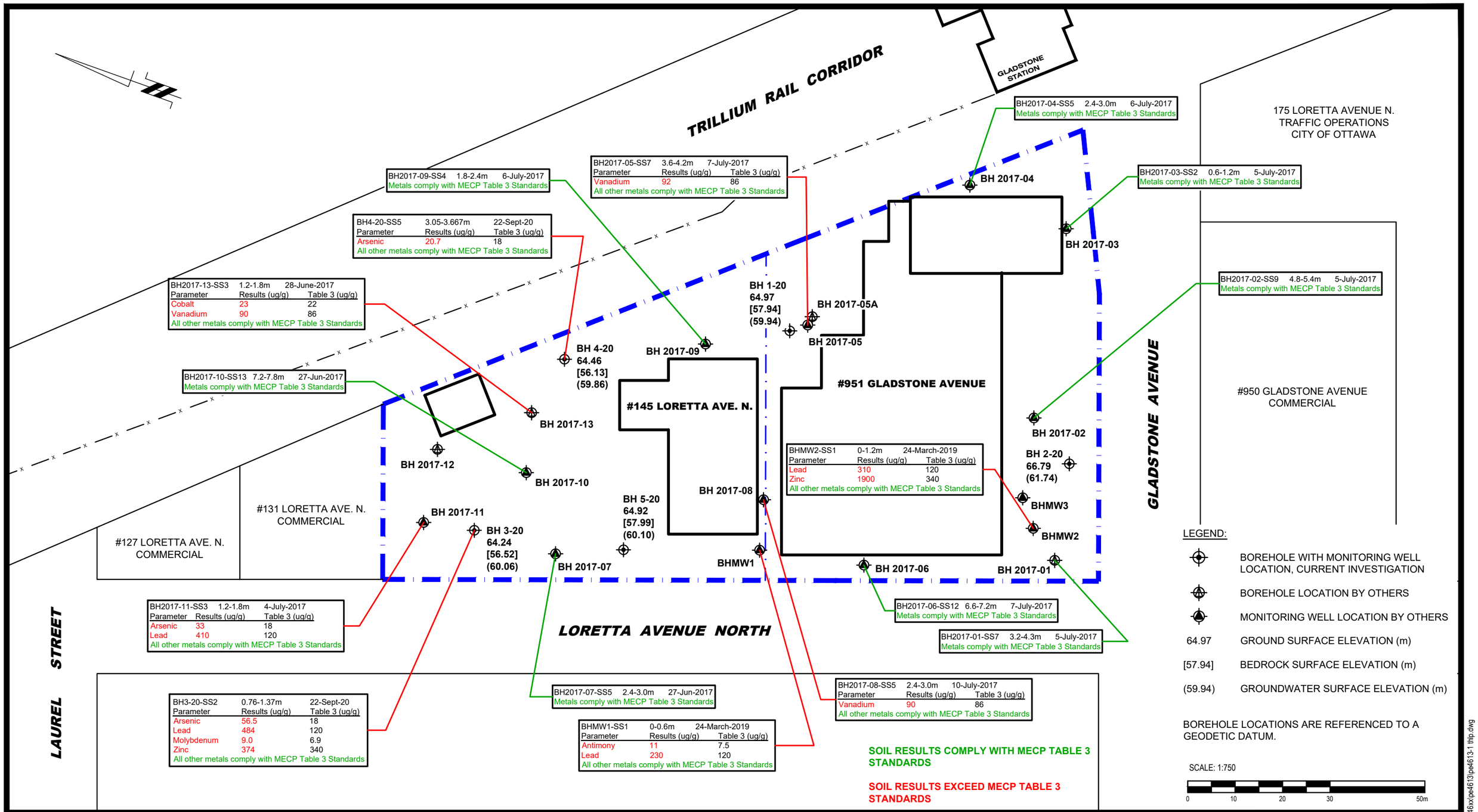

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Title:
ANALYTICAL TESTING PLAN - SOIL (METALS)

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Approved by: MSD	Revision No.:

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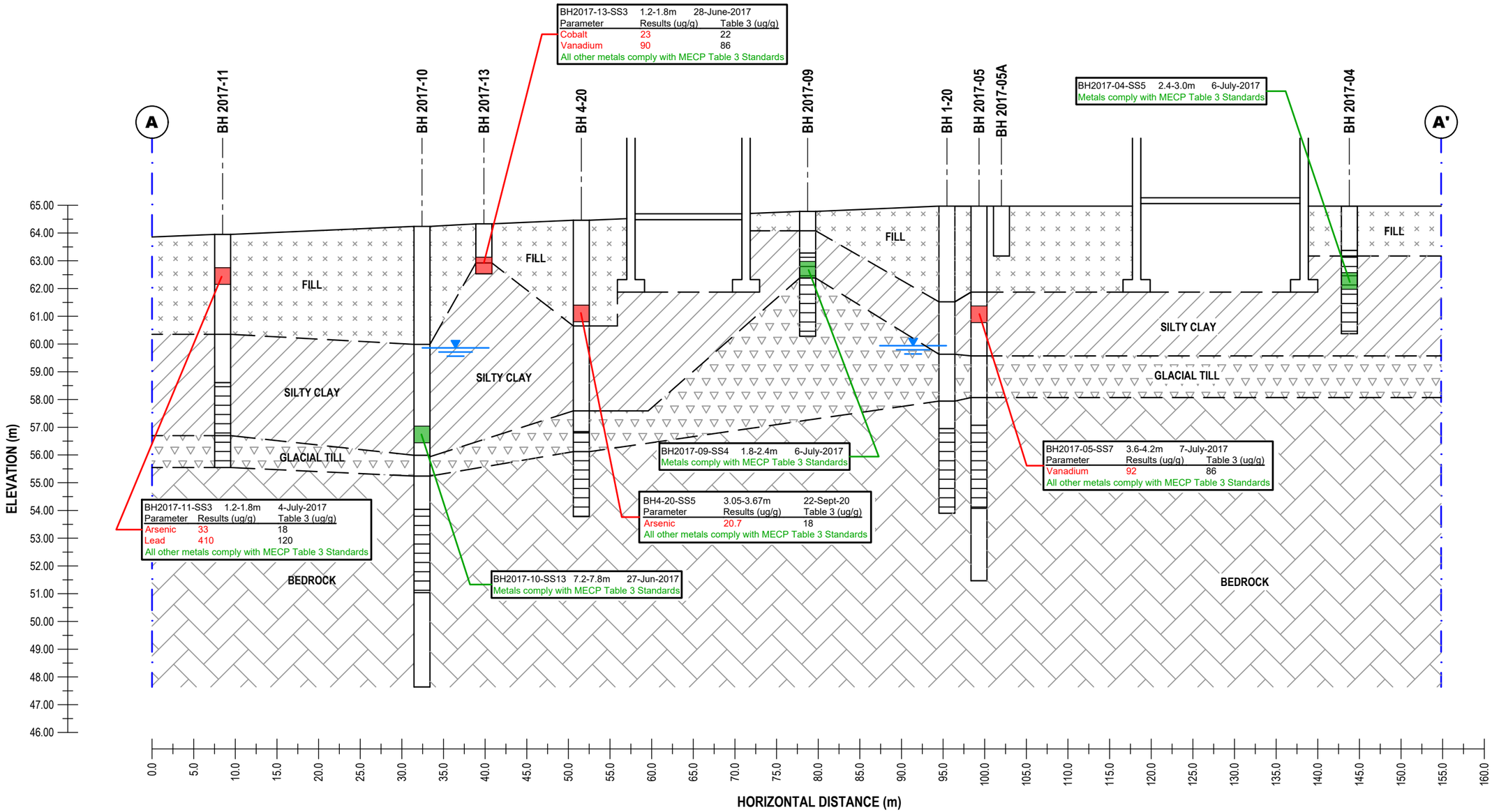

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CROSS-SECTION A-A' - SOIL (METALS)

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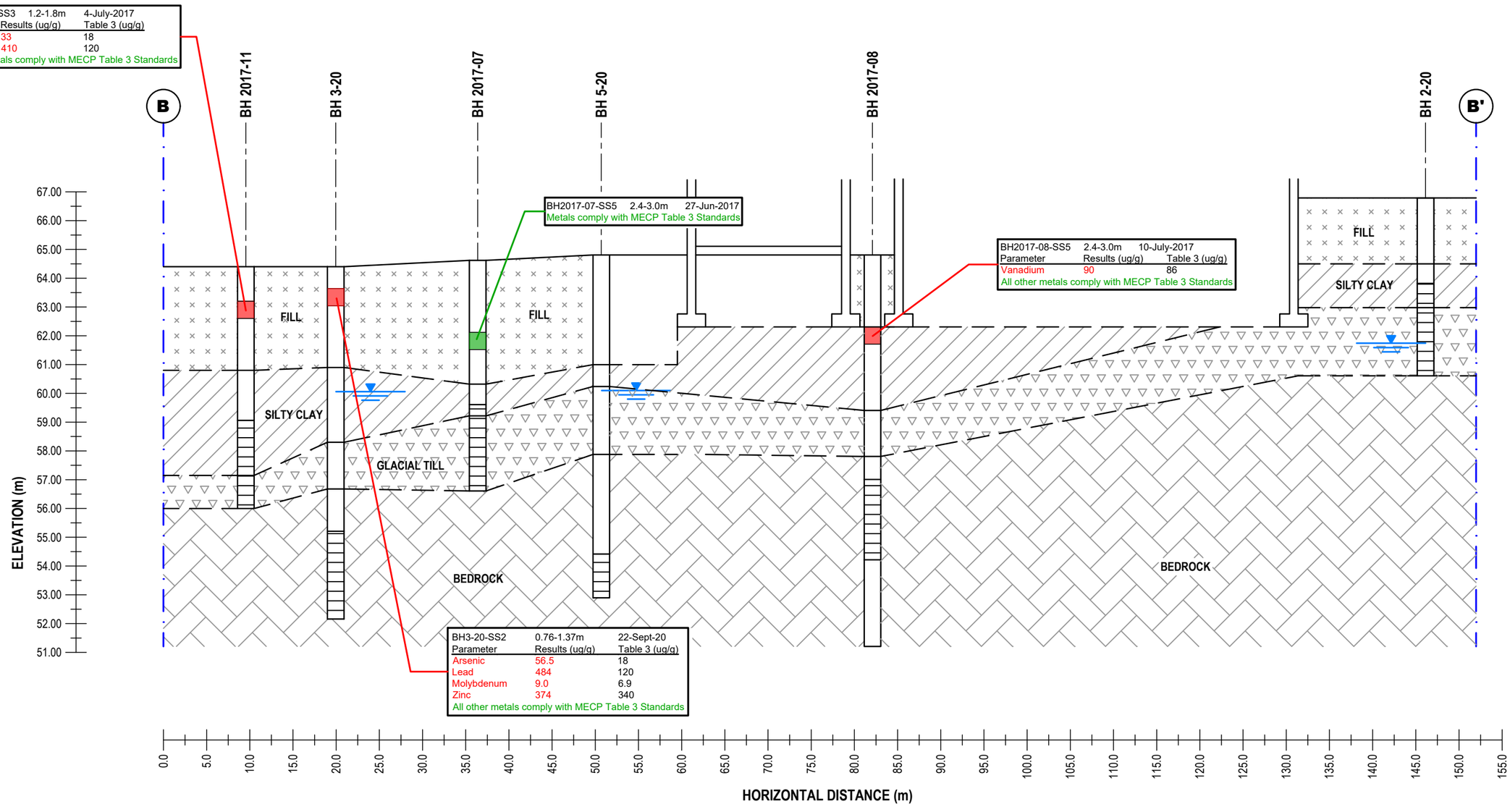

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OTTAWA, ONTARIO

Title:
CROSS-SECTION B-B' - SOIL (METALS)

Scale: AS SHOWN	Date: 10/2020
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Approved by: MSD	Revision No.:

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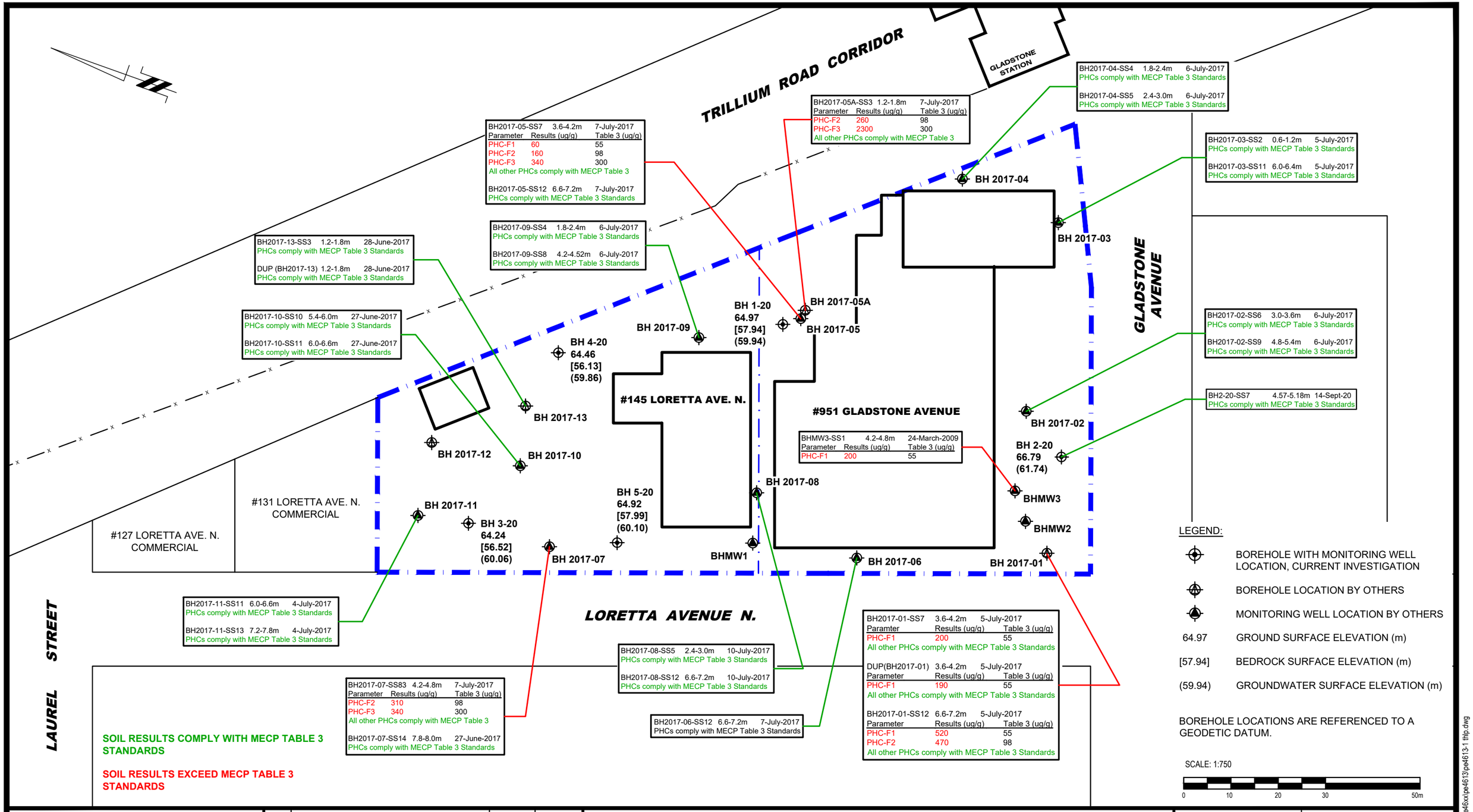

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ANALYTICAL TESTING PLAN - SOIL (PHCs)

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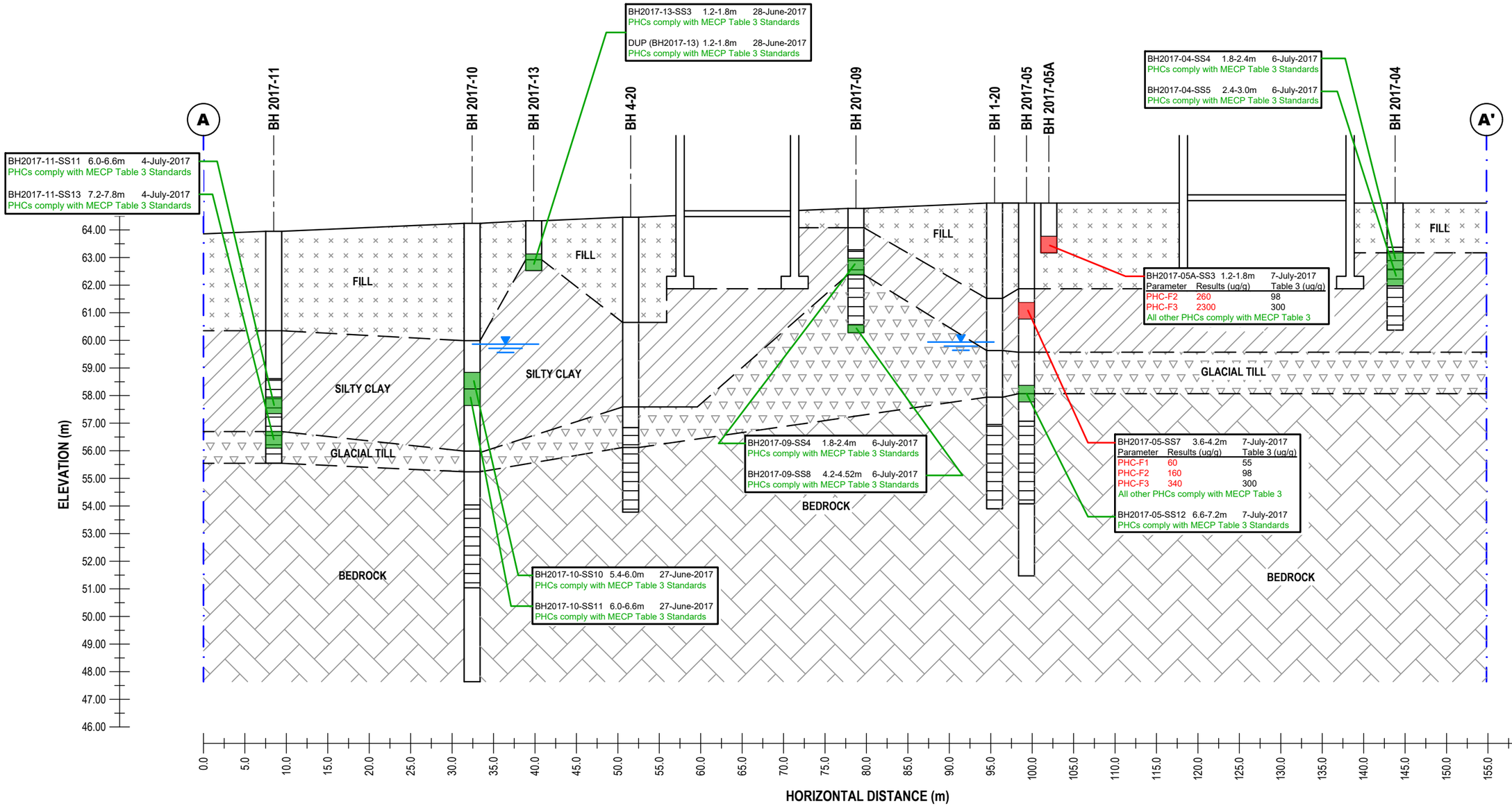

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CROSS-SECTION A-A' - SOIL (PHCs)

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Checked by: MW	Dwg. No.: PE4613-4A
Approved by: MSD	Revision No.:

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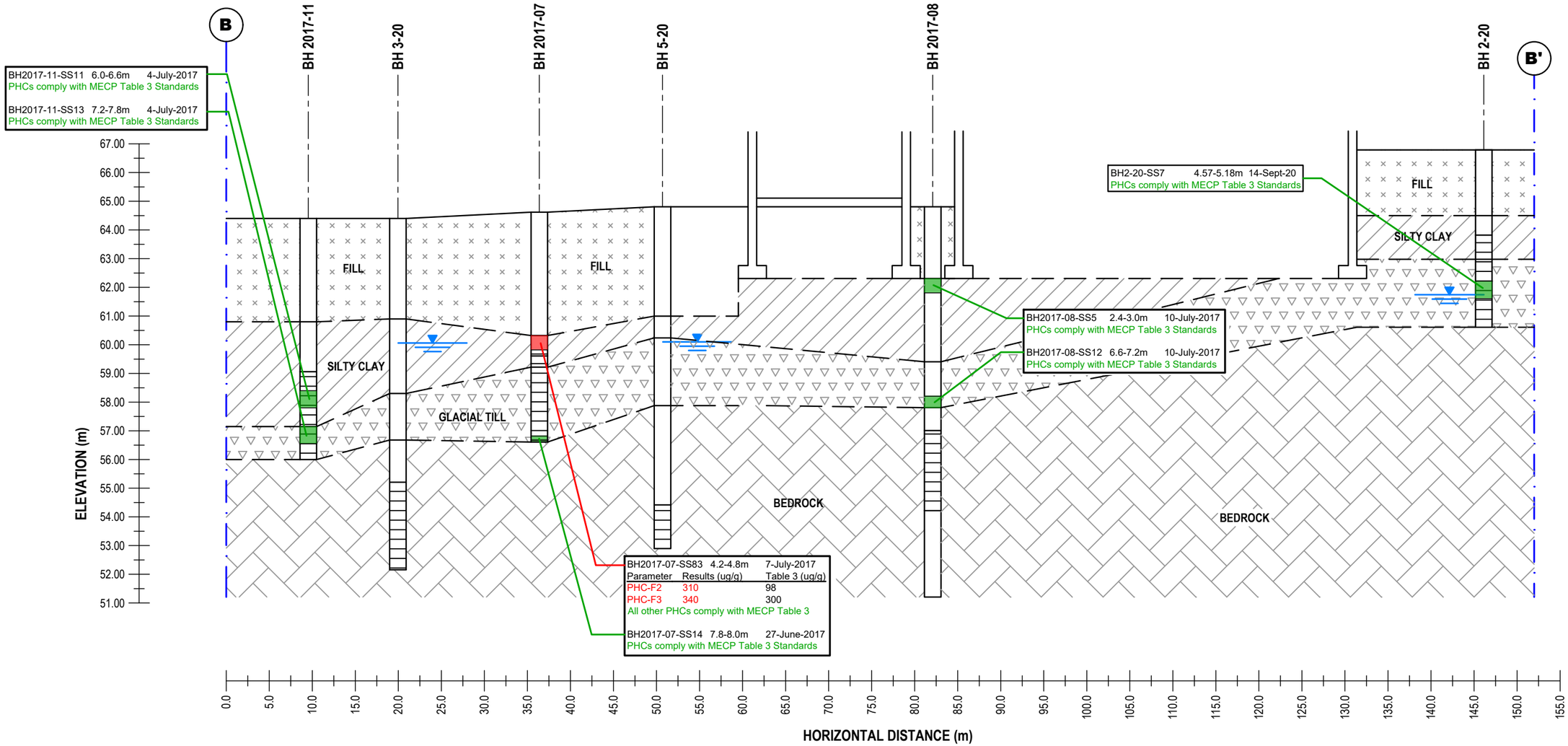

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-4B
Approved by: MSD	Revision No.:

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TRILLIUM RAIL CORRIDOR

GLADSTONE STATION

BH2017-04-SS5 2.4-3.0m 6-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-05A-SS3 1.2-4.2m 7-July-2017

Parameter	Results (ug/g)	Table 3 (ug/g)
1,2-Dichloroethane	0.32	0.05

All other VOCs comply with MECP Table 3 Standards

BH2017-09-SS4 1.8-2.4m 6-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-10-SS10 5.5-6.1m 6-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-05-SS7 3.6-4.2m 6-July-2017
VOCs comply with MECP Table 3 Standards

BHMW3-SS1 4.2-4.8m 24-March-2009

Parameter	Results (ug/g)	Table 3 (ug/g)
1,1-2 Trichloroethane	1.0	0.05

BH3-20-SS11 7.62-7.87m 22-Sept-2020
VOCs comply with MECP Table 3 Standards

BH5-20-SS10 6.86-6.93m 23-Sept-2020
VOCs comply with MECP Table 3 Standards

BH2017-08-SS12 6.6-7.2m 10-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-06-SS12 6.6-7.2m 6-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-02-SS9 4.8-5.4m 6-July-2017
VOCs comply with MECP Table 3 Standards

BH 2017-04
BH 2017-03
BH 1-20
64.97
[57.94]
(59.94)
BH 2017-05A
BH 2017-05
BH 2017-09
BH 4-20
64.46
[56.13]
(59.86)
BH 2017-13
BH 2017-12
BH 2017-10
BH 2017-11
BH 3-20
64.24
[56.52]
(60.06)
BH 5-20
64.92
[57.99]
(60.10)
BH 2017-07
BH 2017-08
BHMW1
BH 2017-06
BH 2017-01
BHMW2
BHMW3
BH 2017-02
BH 2-20
66.79
(61.74)

#145 LORETTA AVE. N.

#951 GLADSTONE AVENUE

#131 LORETTA AVE. N.
COMMERCIAL

#127 LORETTA AVE. N.
COMMERCIAL

#975 GLADSTONE AVENUE
BRITISH AMERICAN BANK NOTE INC.

175 LORETTA AVENUE N.
TRAFFIC OPERATIONS
CITY OF OTTAWA

#950 GLADSTONE AVENUE
COMMERCIAL

GLADSTONE AVENUE

LORETTA AVENUE N.

LAUREL STREET

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS
- MONITORING WELL LOCATION BY OTHERS
- 64.97 GROUND SURFACE ELEVATION (m)
- [57.94] BEDROCK SURFACE ELEVATION (m)
- (59.94) GROUNDWATER SURFACE ELEVATION (m)

BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:750

0 10 20 30 50m

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (VOCs)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-5
Approved by: MSD	Revision No.:

11x17

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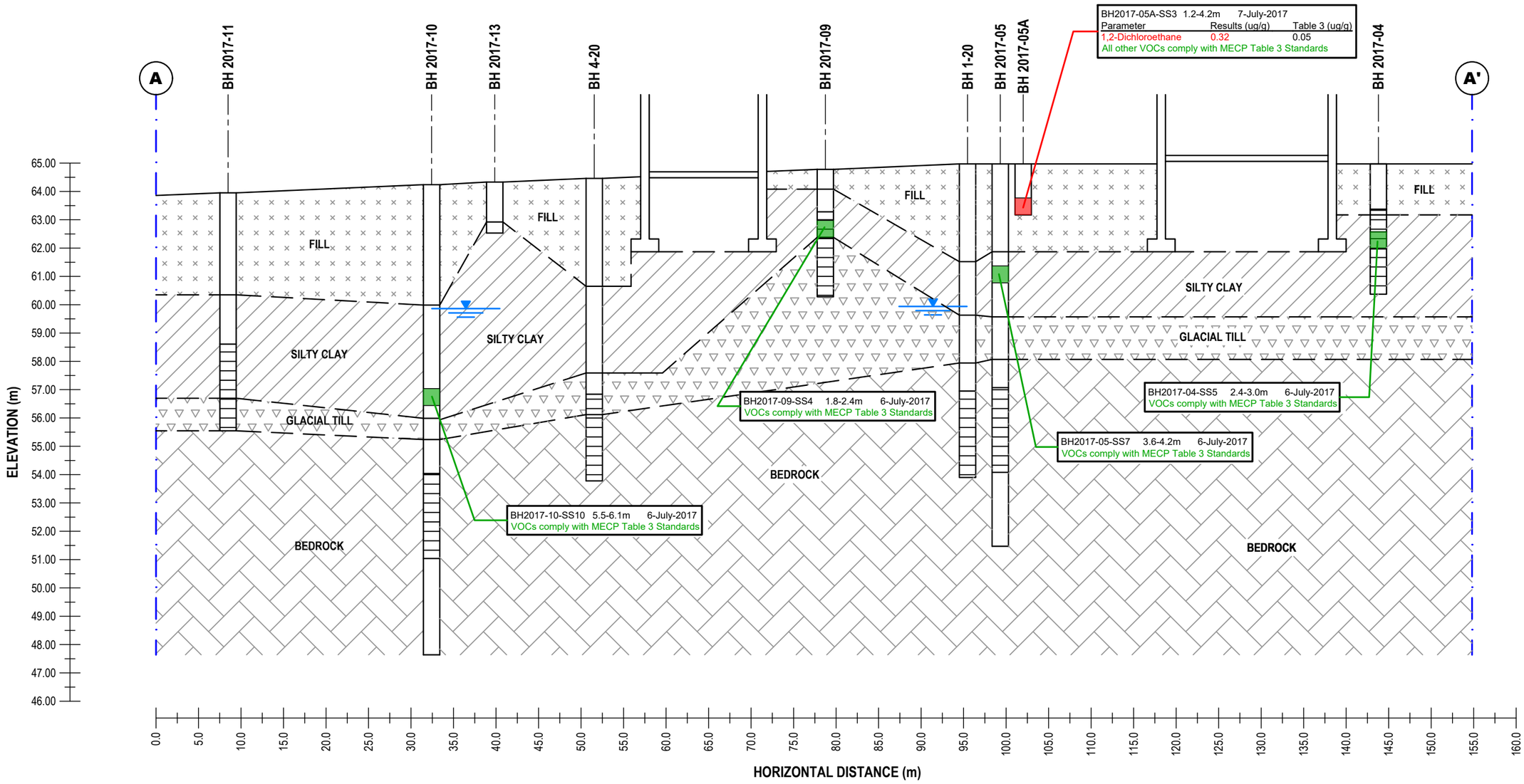

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-5A
Approved by: MSD	Revision No.:

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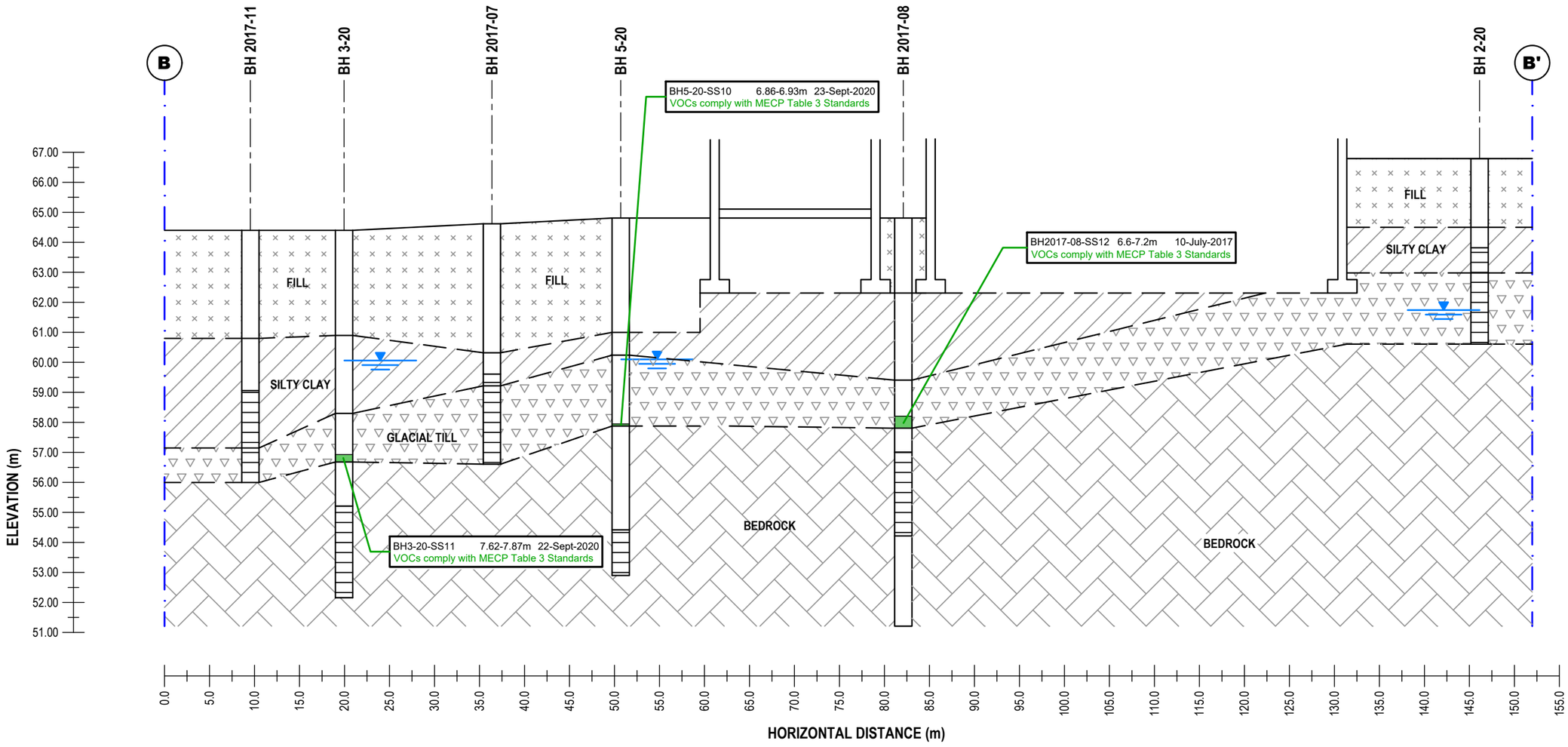

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-5B
Approved by: MSD	Revision No.:

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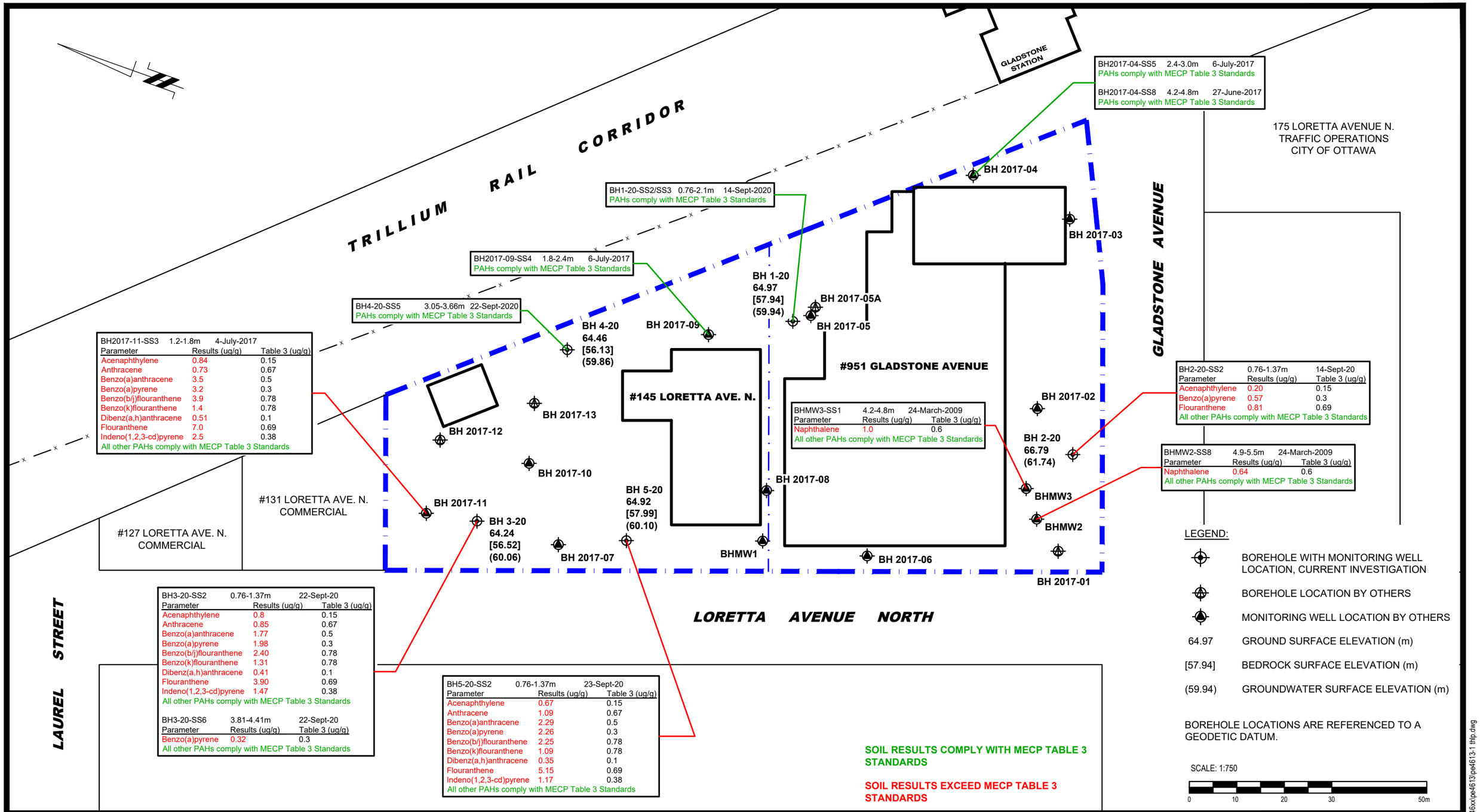

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (PAHs)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-6
Approved by: MSD	Revision No.:

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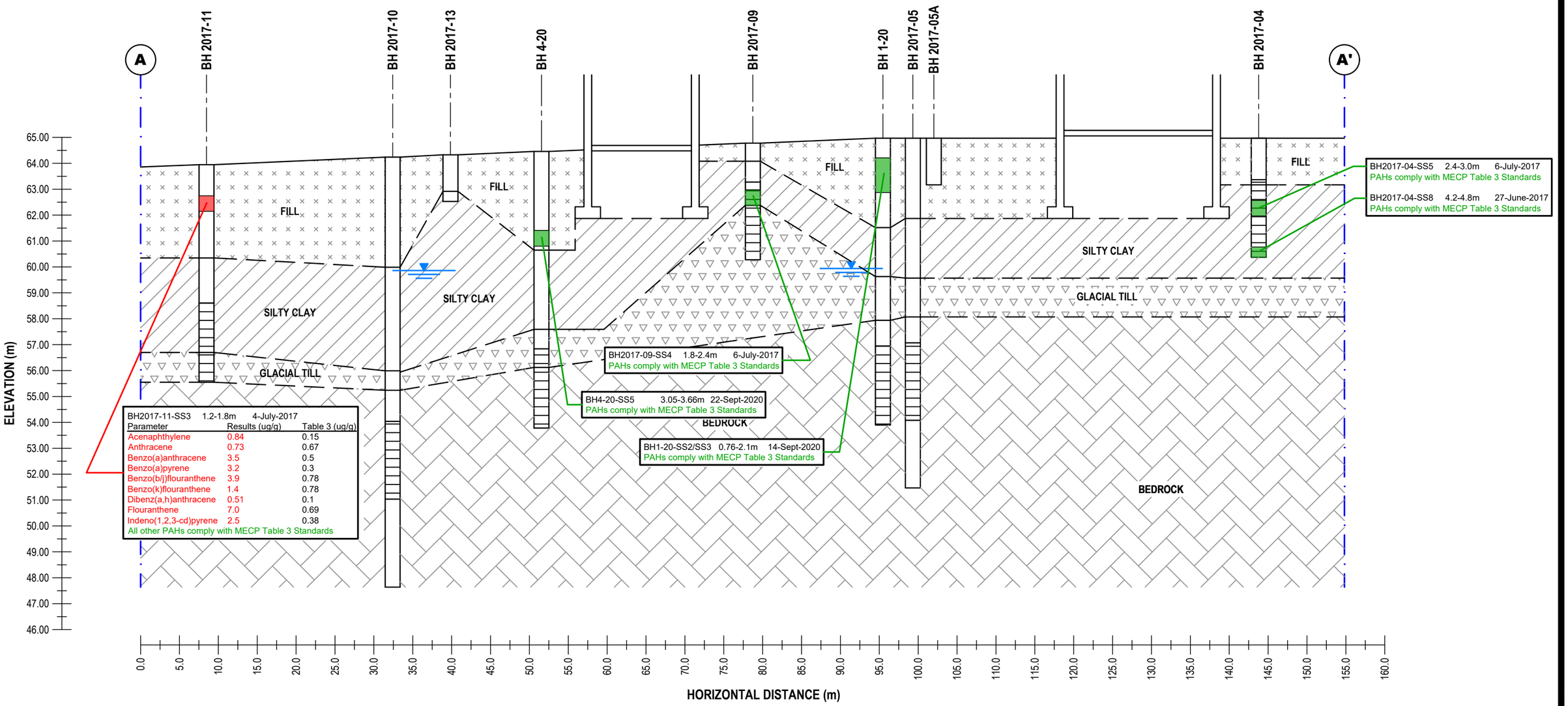

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-6A
Approved by: MSD	Revision No.:

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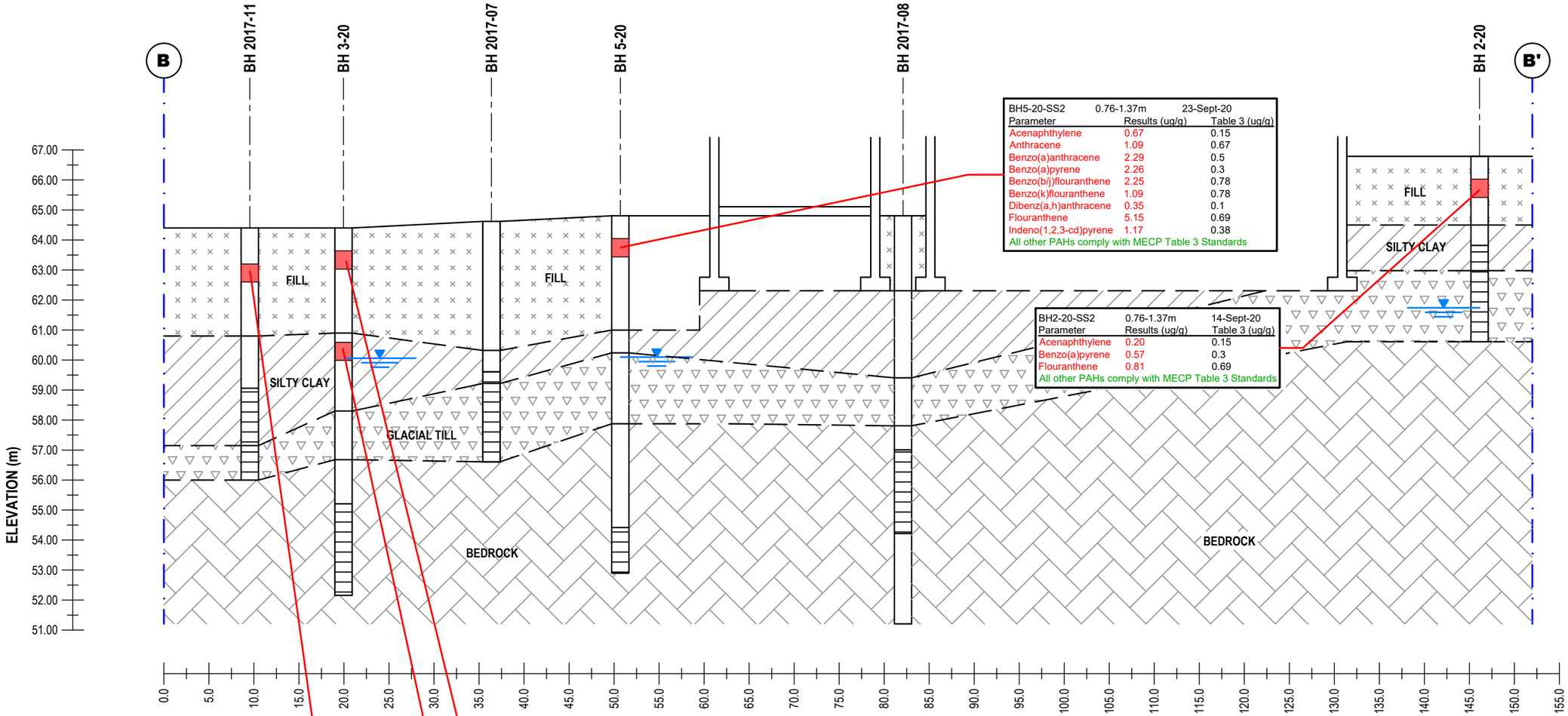

BH5-20-SS2 0.76-1.37m 23-Sept-20

Parameter	Results (ug/g)	Table 3 (ug/g)
Acenaphthylene	0.67	0.15
Anthracene	1.09	0.67
Benzo(a)anthracene	2.29	0.5
Benzo(a)pyrene	2.26	0.3
Benzo(b/j)flouranthene	2.25	0.78
Benzo(k)flouranthene	1.09	0.78
Dibenz(a,h)anthracene	0.35	0.1
Flouranthene	5.15	0.69
Indeno(1,2,3-cd)pyrene	1.17	0.38

All other PAHs comply with MECP Table 3 Standards

BH2-20-SS2 0.76-1.37m 14-Sept-20

Parameter	Results (ug/g)	Table 3 (ug/g)
Acenaphthylene	0.20	0.15
Benzo(a)pyrene	0.57	0.3
Flouranthene	0.81	0.69

All other PAHs comply with MECP Table 3 Standards

BH2017-11-SS3 1.2-1.8m 4-July-2017

Parameter	Results (ug/g)	Table 3 (ug/g)
Acenaphthylene	0.84	0.15
Anthracene	0.73	0.67
Benzo(a)anthracene	3.5	0.5
Benzo(a)pyrene	3.2	0.3
Benzo(b/j)flouranthene	3.9	0.78
Benzo(k)flouranthene	1.4	0.78
Dibenz(a,h)anthracene	0.51	0.1
Flouranthene	7.0	0.69
Indeno(1,2,3-cd)pyrene	2.5	0.38

All other PAHs comply with MECP Table 3 Standards

BH3-20-SS2 0.76-1.37m 22-Sept-20

Parameter	Results (ug/g)	Table 3 (ug/g)
Acenaphthylene	0.8	0.15
Anthracene	0.85	0.67
Benzo(a)anthracene	1.77	0.5
Benzo(a)pyrene	1.98	0.3
Benzo(b/j)flouranthene	2.40	0.78
Benzo(k)flouranthene	1.31	0.78
Dibenz(a,h)anthracene	0.41	0.1
Flouranthene	3.90	0.69
Indeno(1,2,3-cd)pyrene	1.47	0.38

All other PAHs comply with MECP Table 3 Standards

BH3-20-SS6 3.81-4.41m 22-Sept-20

Parameter	Results (ug/g)	Table 3 (ug/g)
Benzo(a)pyrene	0.32	0.3

All other PAHs comply with MECP Table 3 Standards

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-6B
Approved by: MSD	Revision No.:

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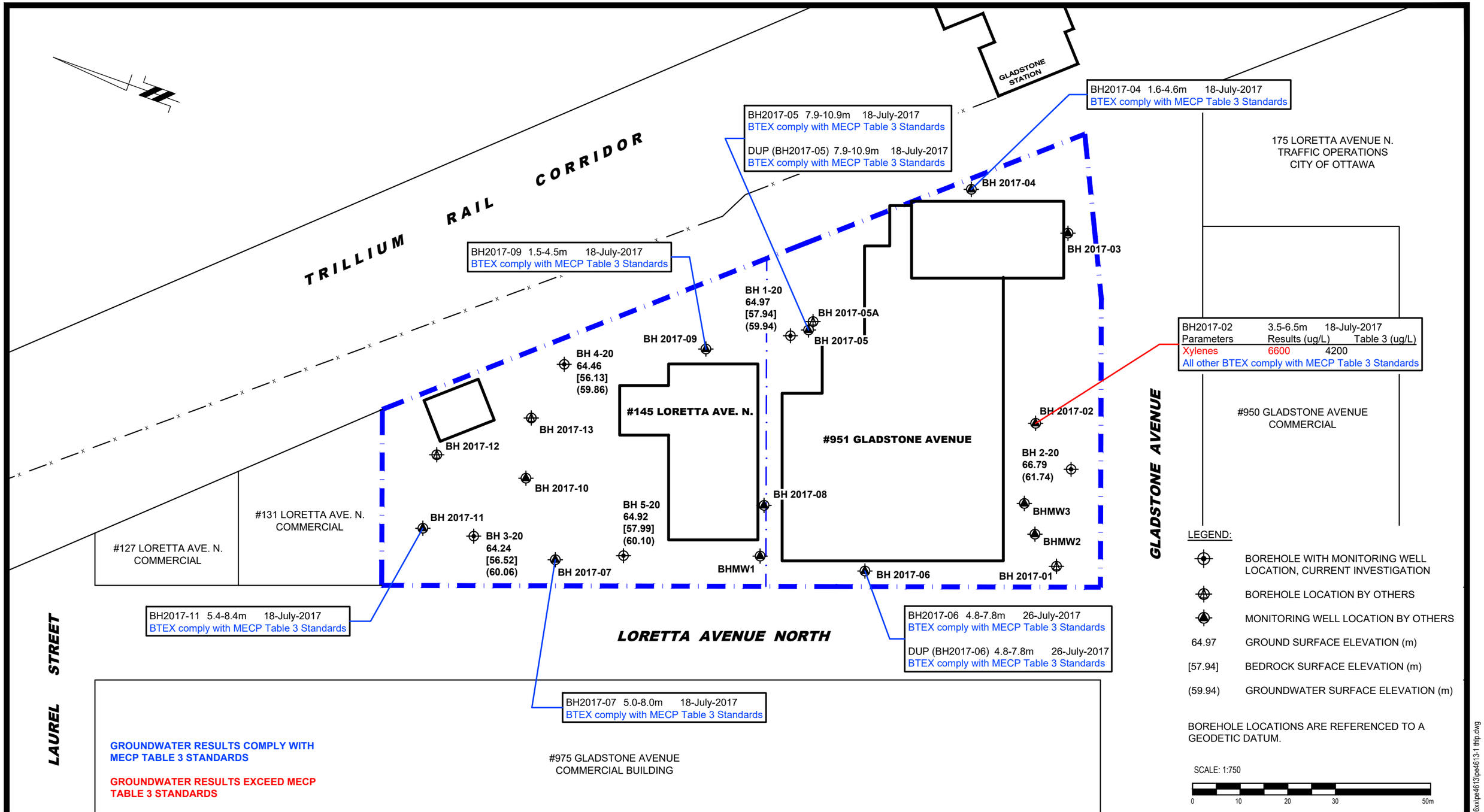

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (BTEX)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-7
Approved by: MSD	Revision No.:

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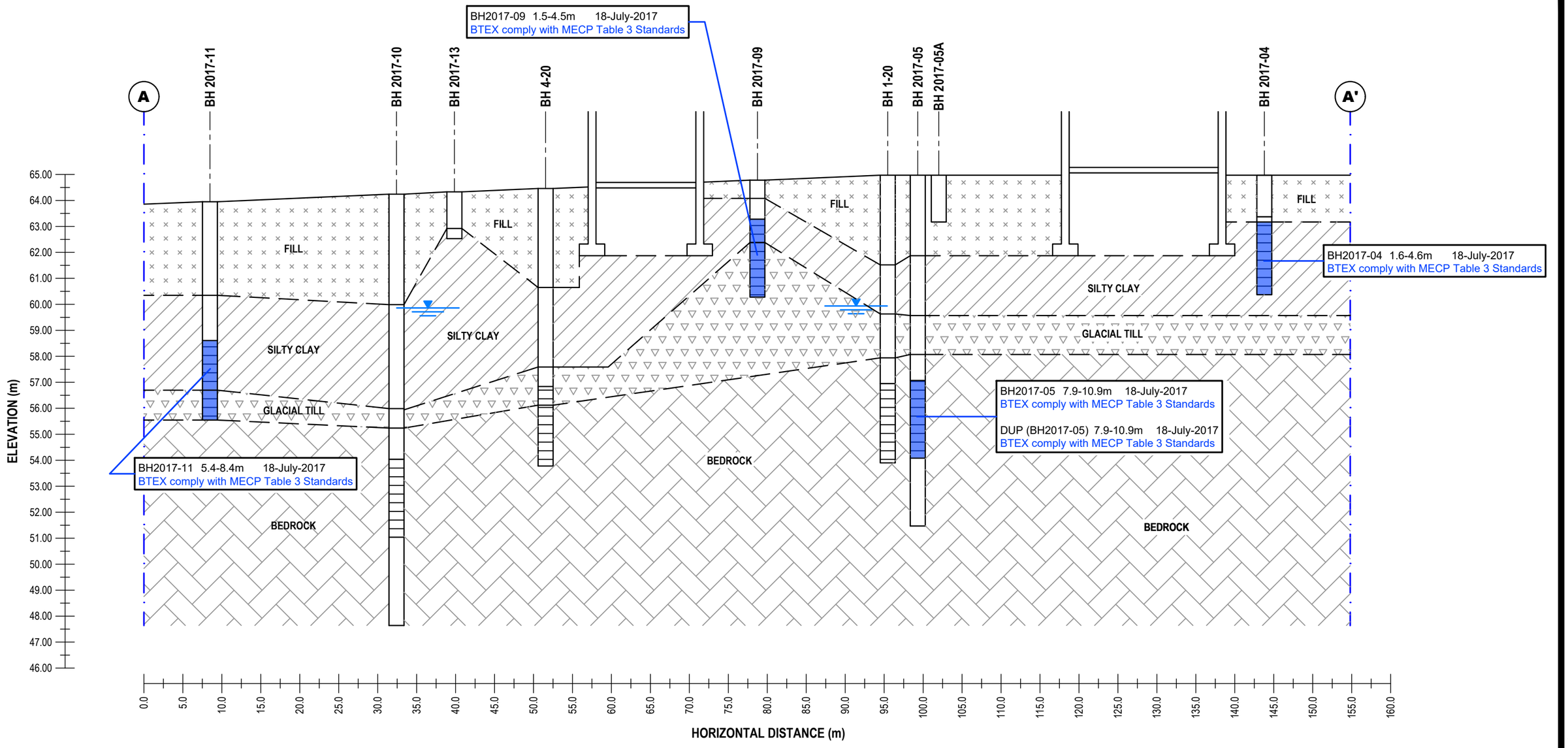

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title: **CROSS-SECTION A-A' - GROUNDWATER (BTEX)**

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-7A
Approved by: MSD	Revision No.:

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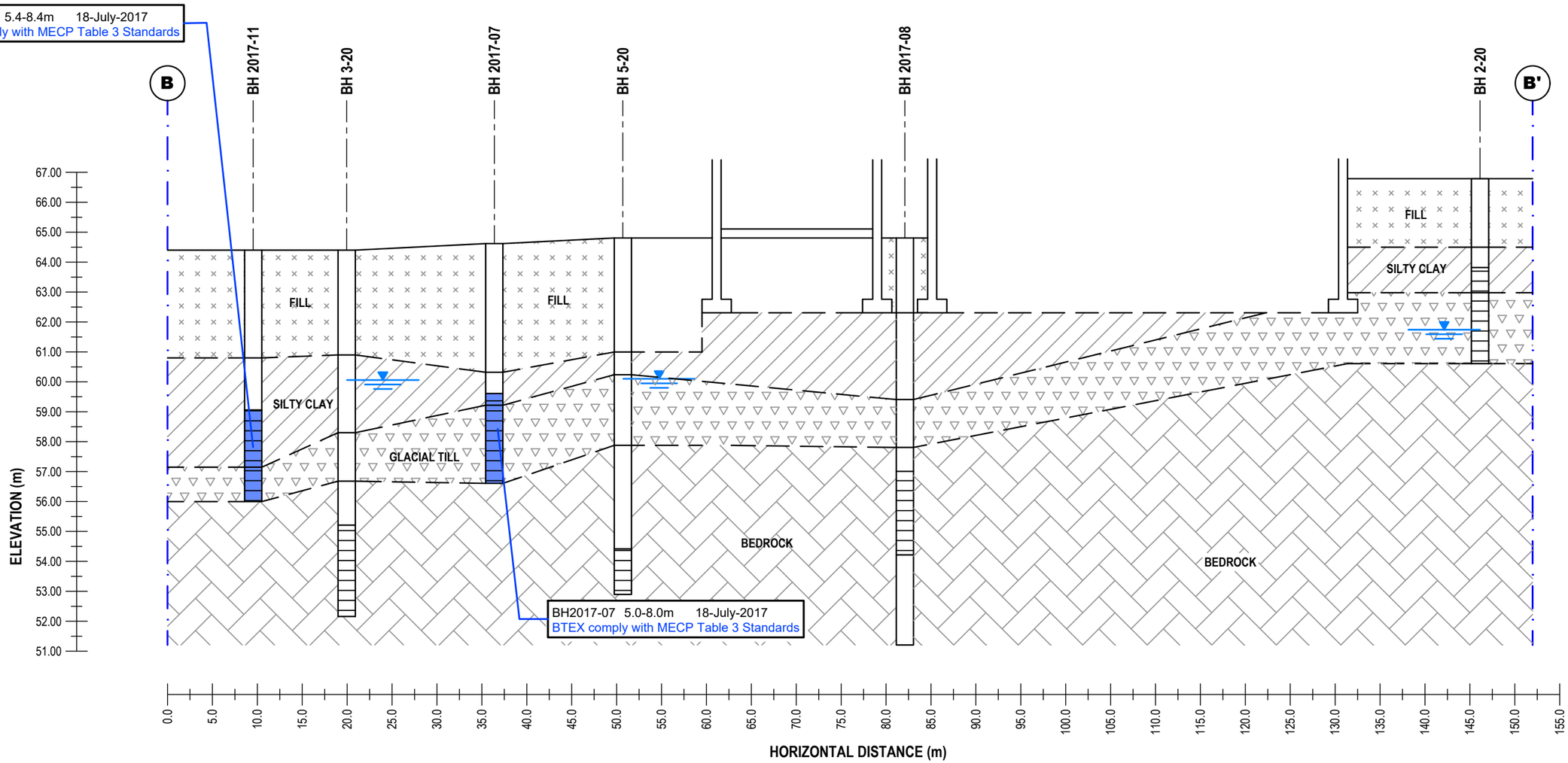

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title: **CROSS-SECTION B-B' - GROUNDWATER (BTEX)**

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-7B
Approved by: MSD	Revision No.:

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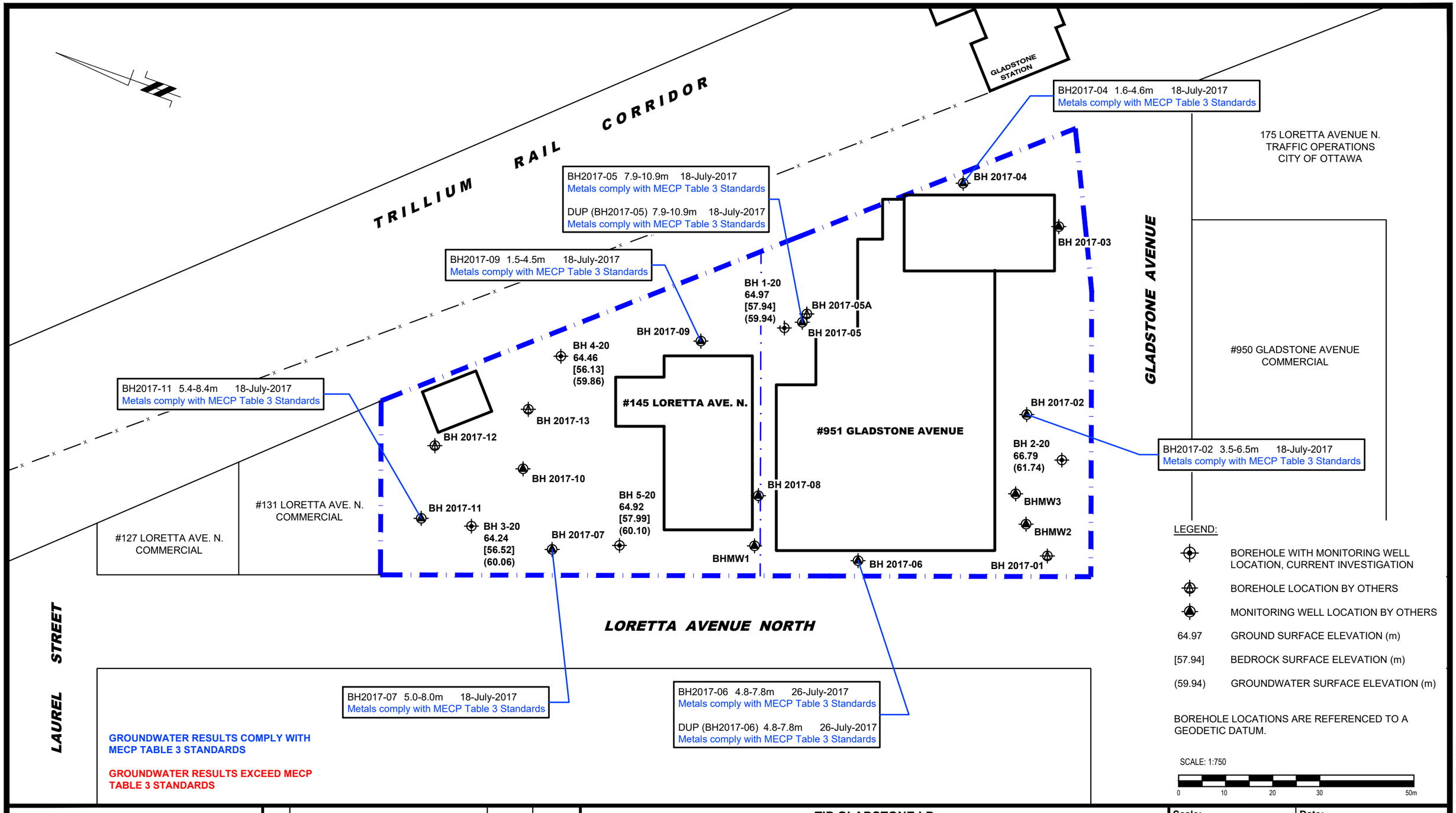

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (METALS)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-8
Approved by: MSD	Revision No.:

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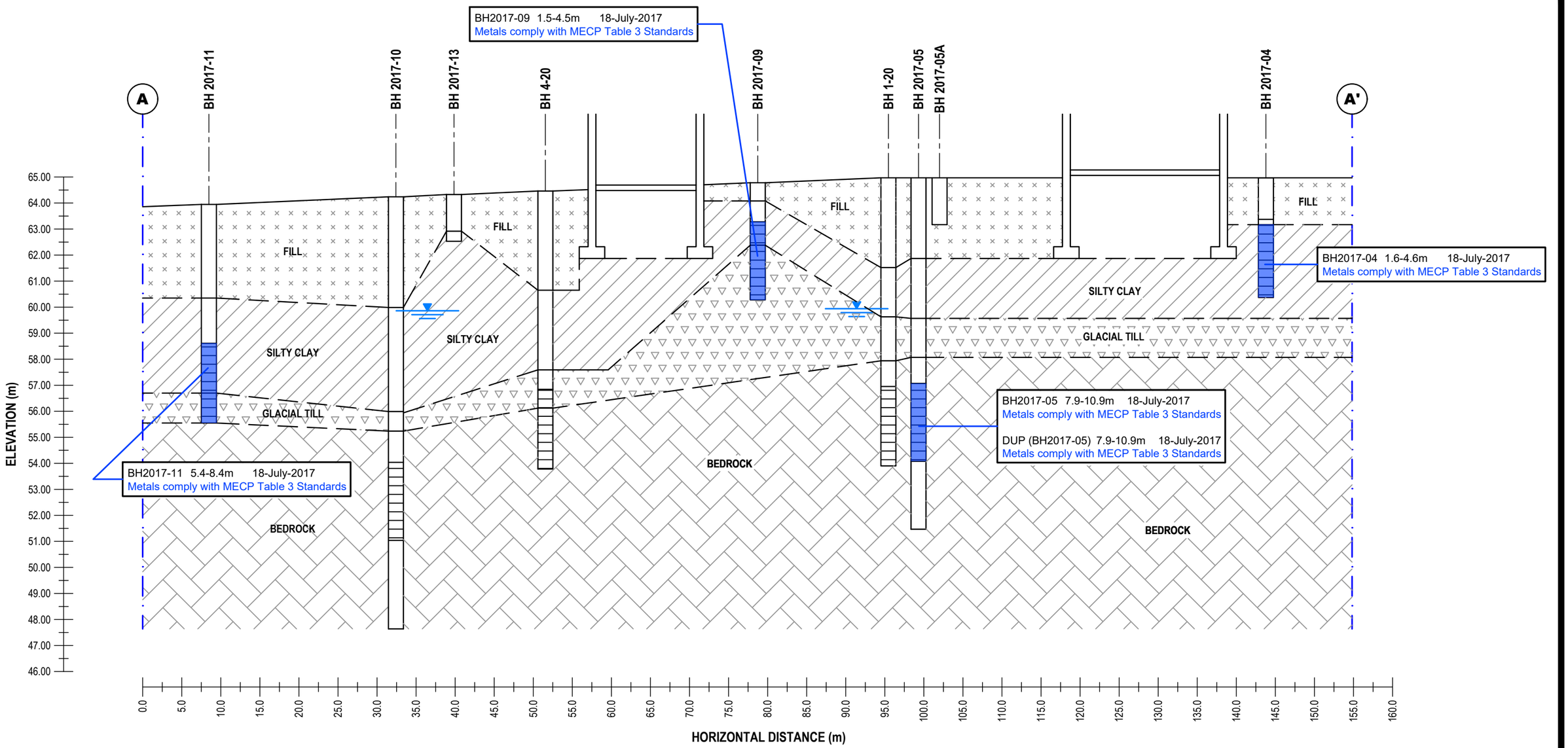

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-8A
Approved by: MSD	Revision No.:

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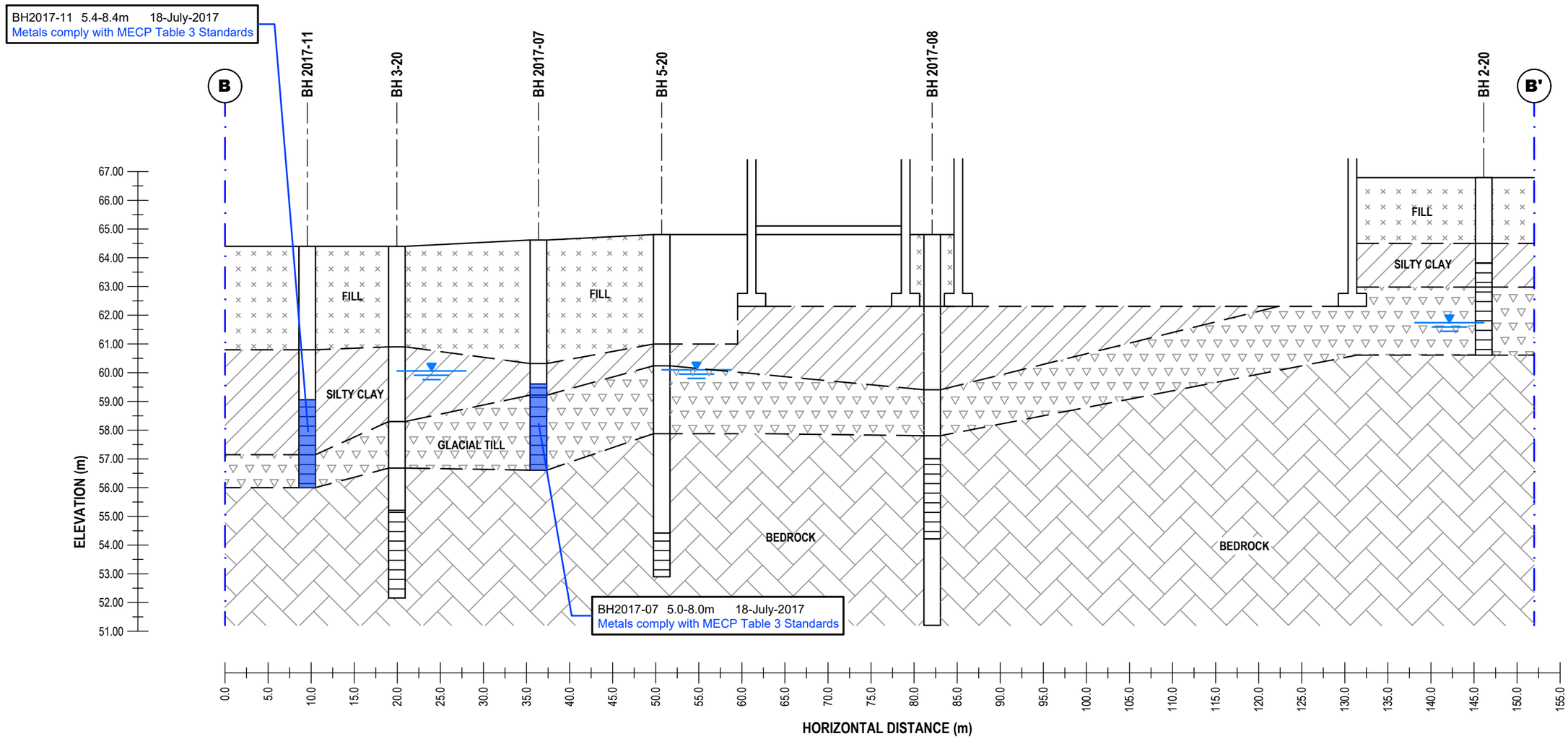

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-8B
Approved by: MSD	Revision No.:

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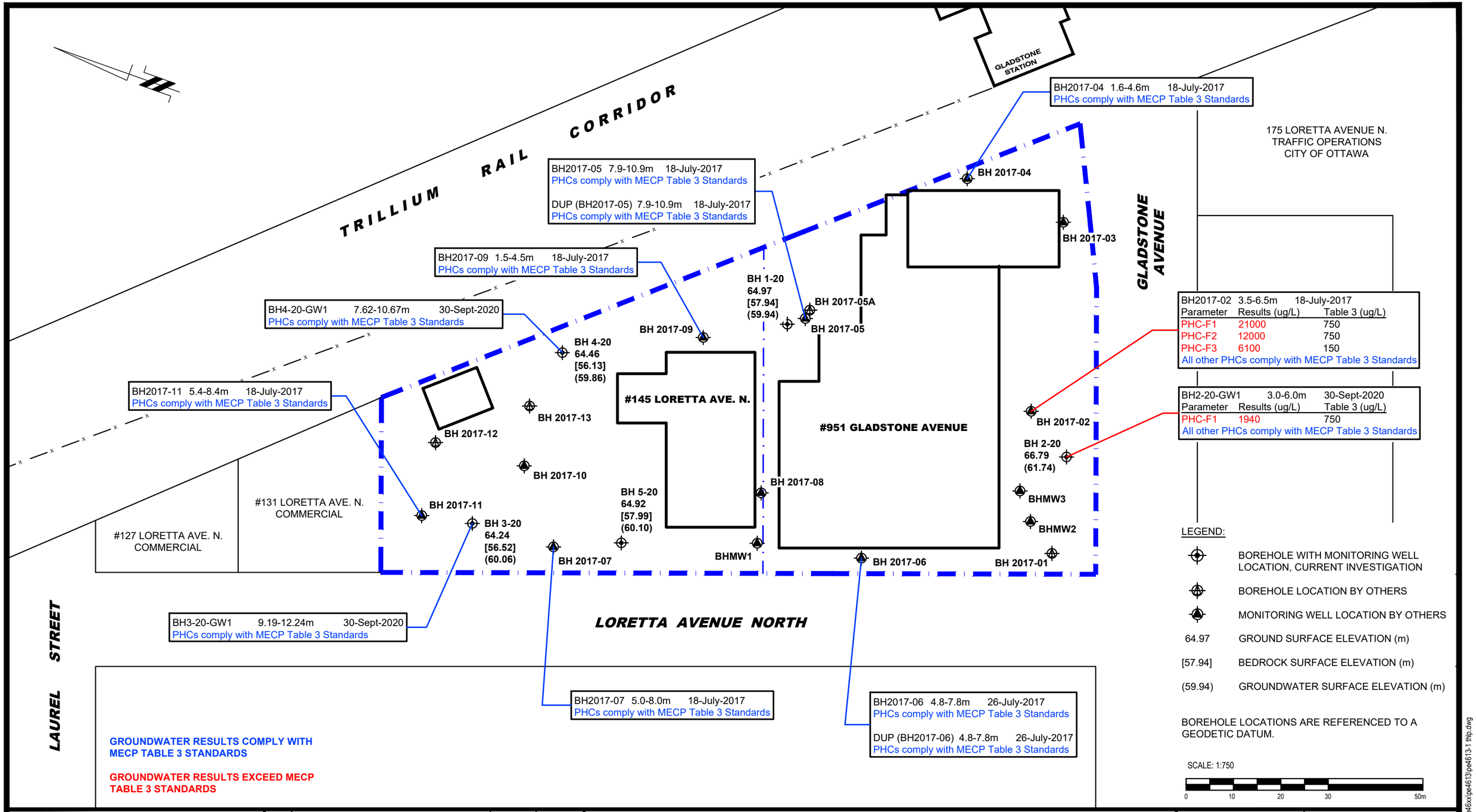

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (PHCs)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-9
Approved by: MSD	Revision No.:

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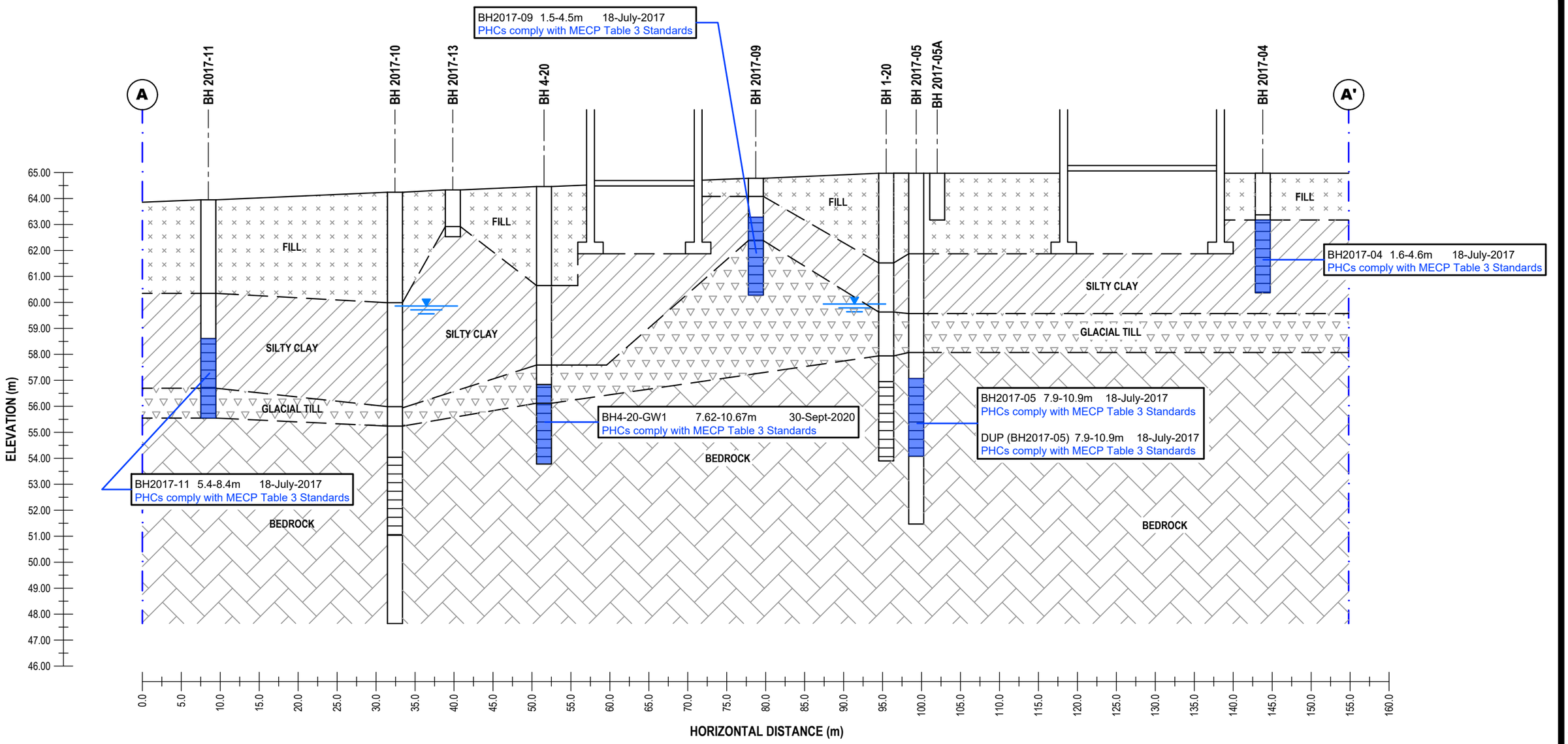

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-9A
Approved by: MSD	Revision No.:

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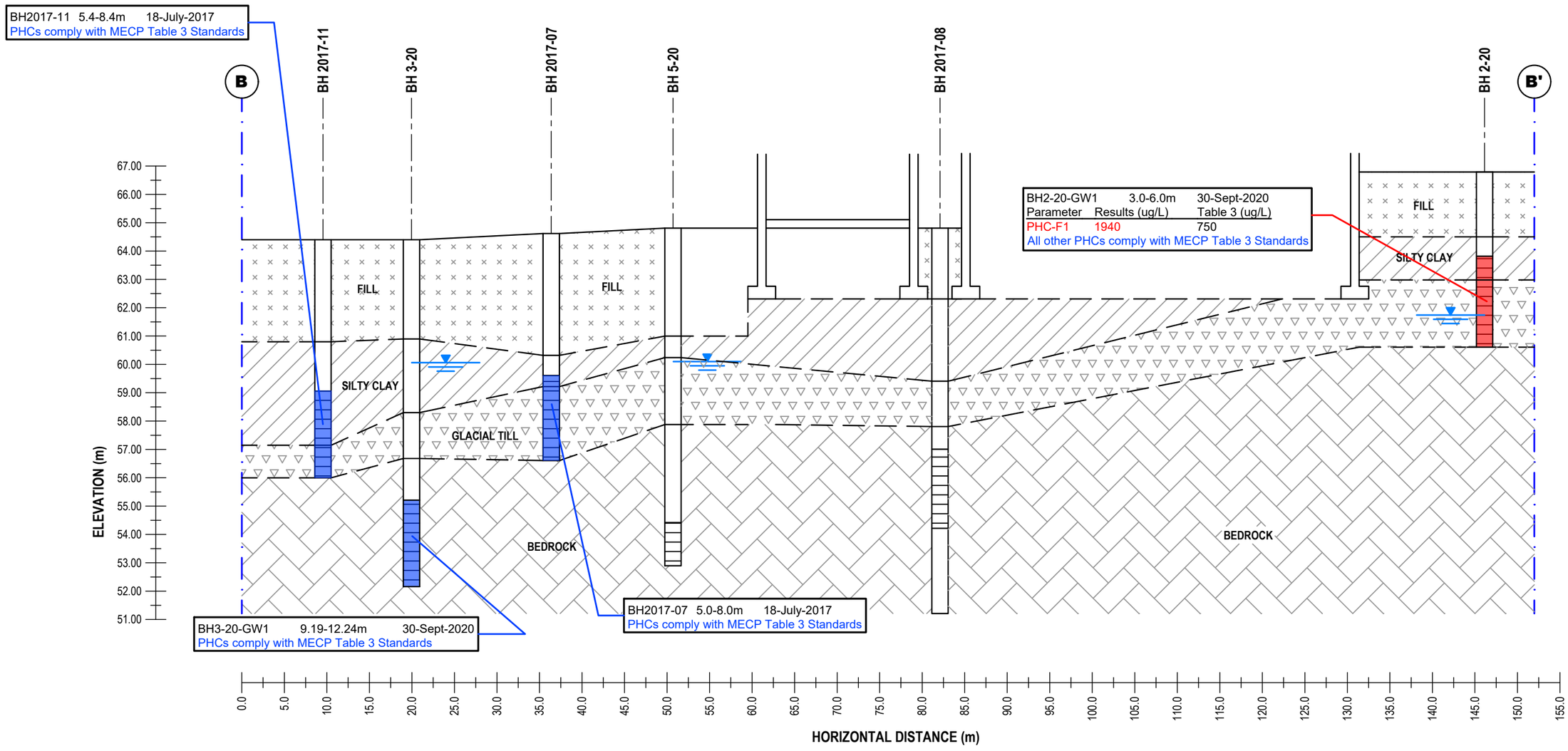

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
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BH2017-05 7.9-10.9m 18-July-2017

Parameters	Results (ug/L)	Table 3 (ug/L)
1,2-Dichloroethane	6.6	1.6
Methyl t-butyl ether	240	190

All other VOCs comply with MECP Table 3 Standards

DUP (BH2017-05) 7.9-10.9m 18-July-2017

Parameters	Results (ug/L)	Table 3 (ug/L)
1,2-Dichloroethane	7.0	1.6
Methyl t-butyl ether	240	190

All other VOCs comply with MECP Table 3 Standards

BH1-20-GW1 8.02-11.07m 30-Sept-20

Parameter	Results (ug/L)	Table 3 (ug/L)
1,2-Dichloroethane	4.5	1.6

All other VOCs comply with MECP Table 3 Standards

BH4-20-GW1 7.62-10.67m 30-Sept-20

Parameter	Results (ug/L)	Table 3 (ug/L)
1,2-Dichloroethane	2.7	1.6

All other VOCs comply with MECP Table 3 Standards

DUP (BH4-20) 7.62-10.67m 30-Sept-20

Parameter	Results (ug/L)	Table 3 (ug/L)
1,2-Dichloroethane	2.7	1.6

All other VOCs comply with MECP Table 3 Standards

3BH2017-09 1.5-4.5m 18-July-2017

Parameters	Results (ug/L)	Table 3 (ug/L)
1,2-Dichloroethane	7.0	1.6

All other VOCs comply with MECP Table 3 Standards

BH2017-04 1.6-4.6m 18-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-11 5.4-8.4m 18-July-2017
VOCs comply with MECP Table 3 Standards

BH2017-02 3.5-6.5m 18-July-2017

Parameters	Results (ug/L)	Table 3 (ug/L)
Hexane	280	51
Xylenes	6600	4200

All other VOCs comply with MECP Table 3 Standards

BH2-20-GW1 2.97-6.02m 30-Sept-20

Parameter	Results (ug/L)	Table 3 (ug/L)
Hexane	52	51

All other VOCs comply with MECP Table 3 Standards

BH3-20-GW1 9.19-12.24m 30-Sept-20
VOCs comply with MECP Table 3 Standards

BH2017-07 5.0-8.0m 18-July-2017
VOCs comply with MECP Table 3 Standards

BH5-20-GW1 10.39-11.91m 30-Sept-20

Parameter	Results (ug/L)	Table 3 (ug/L)
Chloroform	3.4	2.4

All other VOCs comply with MECP Table 3 Standards

BH2017-06 4.8-7.8m 26-July-2017
VOCs comply with MECP Table 3 Standards

DUP (BH2017-06) 4.8-7.8m 26-July-2017
VOCs comply with MECP Table 3 Standards

TRILLIUM TRAIL CORRIDOR

GLADSTONE STATION

175 LORETTA AVENUE N.
TRAFFIC OPERATIONS
CITY OF OTTAWA

GLADSTONE AVENUE

LORETTA AVENUE N.

LAUREL STREET

BH 2017-04
BH 2017-03
BH 2017-05A
BH 2017-05
BH 2017-09
BH 1-20
64.97
[57.94]
(59.94)
BH 4-20
64.46
[56.13]
(59.86)
BH 2017-13
BH 2017-12
BH 2017-10
BH 2017-11
BH 3-20
64.24
[56.52]
(60.06)
BH 5-20
64.92
[57.99]
(60.10)
BH 2017-07
BH 2017-08
BHMW1
BH 2017-06
BH 2017-02
BH 2-20
66.79
(61.74)
BHMW3
BHMW2
BH 2017-01

#145 LORETTA AVE. N.

#951 GLADSTONE AVENUE

#131 LORETTA AVE. N.
COMMERCIAL

#127 LORETTA AVE. N.
COMMERCIAL

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS
- MONITORING WELL LOCATION BY OTHERS
- 64.97 GROUND SURFACE ELEVATION (m)
- [57.94] BEDROCK SURFACE ELEVATION (m)
- (59.94) GROUNDWATER SURFACE ELEVATION (m)

BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:750

0 10 20 30 50m

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consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (VOCs)

Scale: 1:750	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-10
Approved by: MSD	Revision No.:

11x17

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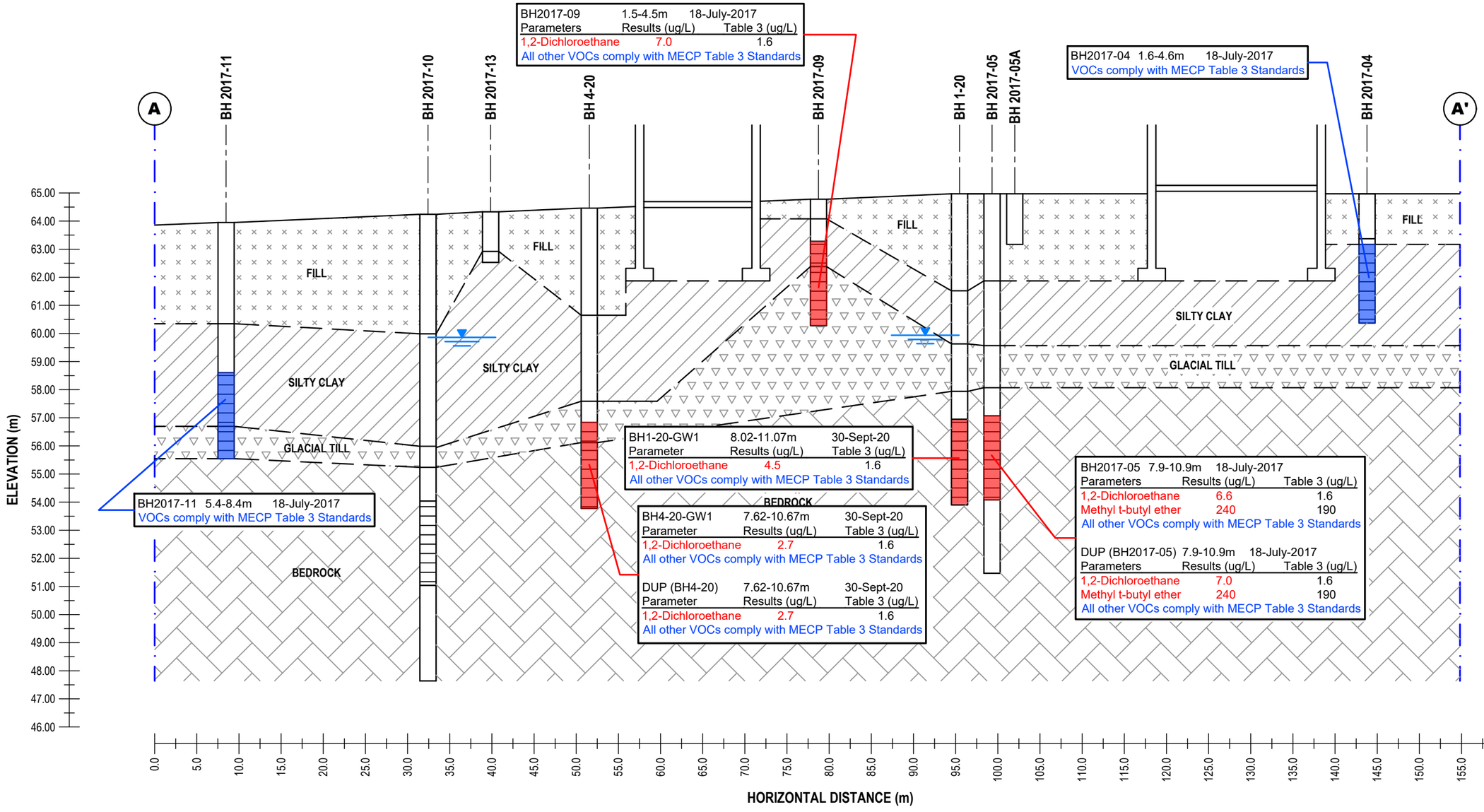

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
0			

TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-10A
Approved by: MSD	Revision No.:

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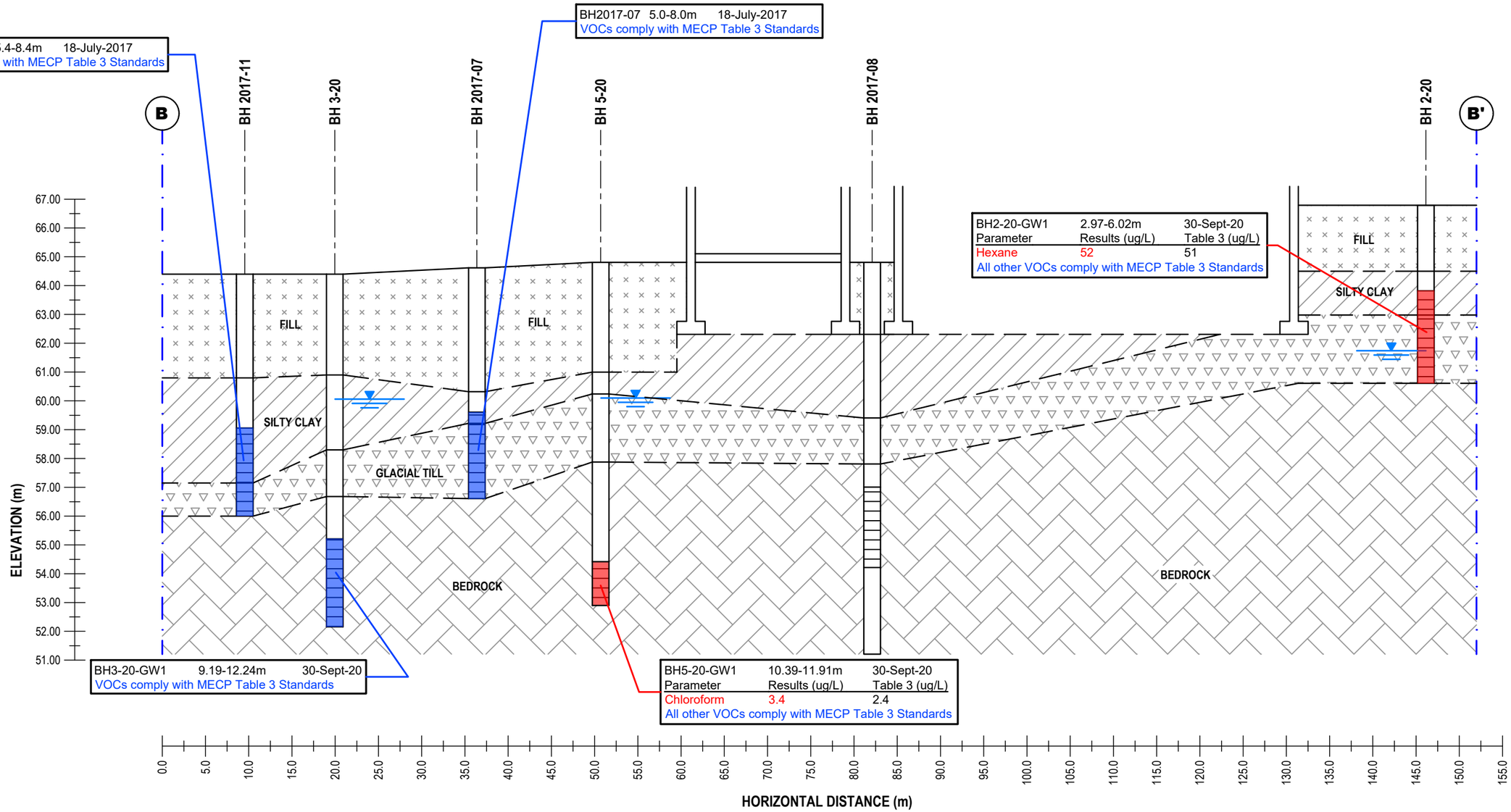

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
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TIP GLADSTONE LP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
951 GLADSTONE AVENUE & 145 LORETTA AVENUE NORTH
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE4613-1
Checked by: MW	Dwg. No.: PE4613-10B
Approved by: MSD	Revision No.:

11x17

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.

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patersongroup

Sampling & Analysis Plan

Supplemental
Phase II Environmental Site Assessment
951 Gladstone Avenue and
145 Loretta Avenue North
Ottawa, Ontario

Prepared For

TIP Gladstone LP

September 2020

Report: PE4613-SAP

Table of Contents

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

Paterson was retained by Mr. Oz Drewniak of CLV Group in partnership with TIP Gladstone LP to conduct a Supplemental Phase II Environmental Site Assessment (ESA) for the properties addressed 951 Gladstone Avenue and 145 Loretta Avenue North, in the City of Ottawa, Ontario.

The Phase II ESA was carried out to address the areas of potential environmental concern on the Phase II Property. The following subsurface investigation program was developed.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-20	Place on the central east side of the site to assess the potential impacts due to the former use of the land and quality of fill material.	Borehole to be advanced to approximately 11m to install a deep monitoring well.
BH2-20	Place on the southwestern side of the site to assess the potential impacts due to the former use of the land and quality of fill material.	Borehole to be advanced to approximately 6m to install a monitoring well.
BH3-20	Place on the northwestern side of the site to assess the potential impacts due to the former use of the land and quality of fill material.	Borehole to be advanced to approximately 12 m to install a deep monitoring well.
BH4-20	Place on the northeastern side of the site to assess the potential impacts due to the former use of the land and quality of fill material.	Borehole to be advanced to approximately 10m to install a deep monitoring well.
BH5-20	Place on the central west side of the site to assess the potential impacts due to the former use of the land and quality of fill material.	Borehole to be advanced to approximately 11m to install a deep monitoring well.

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

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

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

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

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

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

Procedure

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

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

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

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
951 Gladstone Avenue and 145 Loretta Avenue North
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4613

REMARKS

HOLE NO. BH 1-20

BORINGS BY CME-55 Low Clearance Drill **DATE** September 14, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	64.97
		AU	1				
FILL: Brown silty sand with shale, some gravel, cobbles, trace wood		SS	2	17	4	1	63.97
		SS	3	21	10	2	62.97
		SS	4	46	32		
3.45		SS	5	50	27	3	61.97
Very stiff to stiff, brown **SILTY CLAY**		SS	6	88	9	4	60.97
		SS	7	100	9	5	59.97
5.33		SS	8	38	9		
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles and boulders		SS	9	100	3	6	58.97
6.86		SS	10	50	50+		
GLACIAL TILL: Grey sandy silt with clay, gravel, cobbles and boulders 7.03		RC	1	100	57	7	57.97
		RC	2	100	73	8	56.97
BEDROCK: Fair to good quality, grey limestone with interbedded shale		RC	3	100	90	9	55.97
						10	54.97
11.07		RC	4	100	82	11	53.97
End of Borehole							
(GWL @ 5.03m - Sept. 30, 2020)							

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

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
951 Gladstone Avenue and 145 Loretta Avenue North
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4613

REMARKS

HOLE NO. BH 2-20

BORINGS BY CME-55 Low Clearance Drill **DATE** September 14, 2020

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							0	66.79
Asphaltic concrete	0.08		AU	1				
FILL: Brown silty sand with crushed stone	0.66		SS	2	42	6	1	65.79
FILL: Brown silty sand with gravel, some crushed stone			SS	3	33	8	2	64.79
	2.29		SS	4	92	15		
Very stiff, brown **SILTY CLAY**			SS	5	100	13	3	63.79
	3.81		SS	6	46	18	4	62.79
GLACIAL TILL: Compact, brown silty clay, some gravel, cobbles and boulders	4.57		SS	7	62	11	5	61.79
GLACIAL TILL: Compact to dense, grey silty sand, some clay, gravel, cobbles and boulders			SS	8	38	8		
	6.17		SS	9	0	50+	6	60.79
End of Borehole								
Practical refusal to augering at 6.17m depth								
(GWL @ 5.05m - Sept. 30, 2020)								

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

280

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
951 Gladstone Avenue and 145 Loretta Avenue North
Ottawa, Ontario

DATUM Geodetic

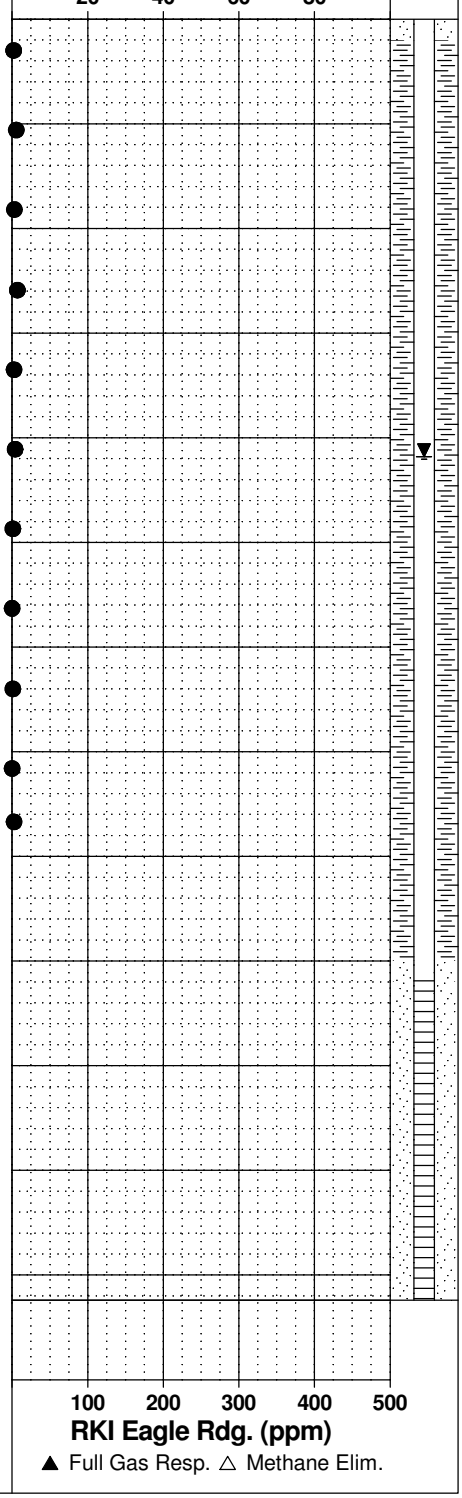
FILE NO. PE4613

REMARKS

HOLE NO. BH 3-20

BORINGS BY CME-55 Low Clearance Drill **DATE** September 22, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.08		AU	1			0	64.24		
FILL: Brown silty sand with crushed stone		SS	2	58	11	1	63.24		
		SS	3	29	14	2	62.24		
2.29 **FILL:** Brown silty clay, trace sand and gravel		SS	4	12	11				
3.05 **FILL:** Brown silty sand with clay, trace gravel 3.50		SS	5	71	10	3	61.24		
		SS	6	79	13	4	60.24		
Very stiff to stiff, brown **SILTY CLAY**		SS	7	100	6	5	59.24		
- grey by 5.3m depth		SS	8	100	3				
6.10 **GLACIAL TILL:** Grey silty clay with sand, gravel, cobbles and boulders		SS	9	25	3	6	58.24		
		SS	10	33	13	7	57.24		
7.72		SS	11	100	50+				
		RC	1	82	75	8	56.24		
BEDROCK: Good quality, grey limestone with interbedded shale						9	55.24		
		RC	2	100	55	10	54.24		
						11	53.24		
		RC	3	100	85	12	52.24		
12.24 End of Borehole									
(GWL @ 4.18m - Sept. 30, 2020)									



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
951 Gladstone Avenue and 145 Loretta Avenue North
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4613

REMARKS

HOLE NO. BH 4-20

BORINGS BY CME-55 Low Clearance Drill **DATE** September 22, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.10		AU	1			0	64.46		
FILL: Brown silty sand with crushed stone 1.37		SS	2	54	27	1	63.46		
		SS	3	29	12	2	62.46		
FILL: Brown silty clay with sand and gravel		SS	4	4	23				
3.81		SS	5	54	14	3	61.46		
		SS	6	100	8	4	60.46		
Stiff, brown **SILTY CLAY**		SS	7	88	7	5	59.46		
- grey with some sand by 6.1m depth		SS	6	100	4	6	58.46		
6.86		SS	9	100	3				
GLACIAL TILL: Grey silty sand with gravel, cobbles and boulders		SS	10	33	26	7	57.46		
8.33		SS	11	50	3	8	56.46		
		RC	1	97	75	9	55.46		
BEDROCK: Good quality, grey limestone with interbedded shale		RC	2	100	85	10	54.46		
10.67									
End of Borehole									
(GWL @ 4.60m - Sept. 30, 2020)									

Lower Explosive Limit % scale: 20 40 60 80

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

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
951 Gladstone Avenue and 145 Loretta Avenue North
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4613

REMARKS

HOLE NO. BH 5-20

BORINGS BY CME-55 Low Clearance Drill **DATE** September 23, 2020

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							0	64.92
Asphaltic concrete	0.10		AU	1				
FILL: Brown silty sand with crushed stone	0.56							
FILL: Brown silty sand with crushed stone and gravel, trace clay	1.37		SS	2	21	9	1	63.92
			SS	3	29	27	2	62.92
FILL: Brown silty sand and gravel, trace cobbles			SS	4	46	27		
			SS	5	58	47	3	61.92
	3.81							
Stiff, brown **SILTY CLAY**			SS	6	100	4	4	60.92
	4.57							
			SS	7	92	5	5	59.92
GLACIAL TILL: Grey silty clay, some sand, gravel, cobbles and boulders			SS	8	71	3		
	6.10						6	58.92
GLACIAL TILL: Dense, grey sandy silt with gravel, cobbles and boulders			SS	9	62	38		
	6.93		SS	10	100	50+	7	57.92
			RC	1	100	33		
			RC	2	93	40	8	56.92
BEDROCK: Poor to excellent quality, grey limestone with interbedded shale			RC	3	100	92	9	55.92
							10	54.92
			RC	4	100	100	11	53.92
	11.91							
End of Borehole								
(GWL @ 4.82m - Sept. 30, 2020)								

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

LOG OF BOREHOLE BH2017-01

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 104.89 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80 / ○ HEX 80 160 240 320)	CVC Conc. IBL/HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
	79 / 200	SS1		17		ASPHALT (75 mm) FILL - SAND and GRAVEL to trace Gravel, Brown, Loose to Compact				
	16 / 5	SS2		5			1	104		
	17 / 15	SS3		16						
	12 / 0	SS4		14			2	103		
	35 / 30	SS5		9		CLAY, Brown to Grey, Firm to Very Stiff				
	27 / 0	SS6		6			3	102		
>> ■ >> ○	392 / 2400	SS7		23		SANDY, trace Gravel	4	101		Sample submitted for analysis of BTEX, PHCs & Metals Odour in samples from 3.7 m to 7.6 m
	75 / 240	SS8		3						
>> ■ >> ○	197 / 1650	SS9		6			5	100		
>> ■ >> ○	280 / 1550	SS10		6			6	99		
>> ■ >> ○	375 / 1400	SS11		7						
>> ■ >> ○	448 / 3150	SS12		5			7	98		Sample submitted for analysis of BTEX, PHCs & VOCs
>> ■ >> ○	273 / 1050	SS13		100+		SAND and GRAVEL, Grey, Very Dense				
						End of Borehole at 7.6 m due to Auger Refusal.	8	97		
								96		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 1

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-02

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 104.21 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80 / ○ HEX 80 160 240 320)	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SYMBL	SUBSURFACE PROFILE MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
						ASPHALT (75 mm)				
		SS1		19		FILL - SAND and GRAVEL, Brown, Compact to Dense		104		
		SS2		29			1	103		
		SS3		30						
		SS4		25		CLAY, Brown to Grey, Firm to Very Stiff	2	102		
		SS5		12						
		SS6		10			3	101		
		SS7		14						
		SS8		2		SANDY, some Rock Fragment	4	100		Water level at 4.36 m bgs (July 17, 2017)
		SS9		8			5	99		> 200 kPa
		SS10		10						Odour in sample # SS10
		SS11		100+		Rock Fragment	6	98		
						End of Borehole at 6.5 m due to Auger Refusal.	7	97		
							8	96		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 2

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-03

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 103.36 metres (Assumed Benchmark)	DATE:

CVC *		SAMPLES			SUBSURFACE PROFILE					REMARKS
■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	No.	Type	SPT N-Value	SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	
						SURFACE				
		SS1		1		ASPHALT (85 mm) FILL - SAND and GRAVEL, Brown, Very Loose to Compact	0	103		
		SS2		4			1	102		
		SS3		21			2	101		
		SS4		28						
						CLAY, trace Sand, trace Gravel, Brown to Grey, Firm to Very Stiff	3	100		
		SS5		14						
		SS6		13			4	99		
		SS7		18						
						SANDY, trace Rock Fragment				
		SS8		5			5	98		> 200 kPa
		SS9		13						Water level at 4.9 m bgs (July 20, 2017)
		SS10		4			6	97		
		SS11		100+						Odour in sample # SS11
						BEDROCK Limestone, Grey	7	96		
		RC1								TCR = 100% SCR = 79% RQD = 58%
							8	95		
		RC2								TCR = 100% SCR = 92% RQD = 90%

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 3

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-03

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 103.36 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80; ○ HEX 80 160 240 320)	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		RC3					10	94		TCR = 93% SCR = 93% RQD = 92%
		RC4					11	93		TCR = 100% SCR = 100% RQD = 92%
							12	92		
		RC5					13	91		TCR = 100% SCR = 100% RQD = 95%
						End of Borehole at 13.5 m	14	90		
							15	89		
							16	88		
							17	87		
								86		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 4

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-04

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 100.75 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80 / ○ HEX 80 160 240 320)	CVC Conc. IBL/HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		SS1		12		ASPHALT (25 mm) FILL - SAND and GRAVEL, Brown, Compact to Loose	0	100.75		
		SS2		100+			1	100		
		SS3		5				99		
		SS4		4		CLAY, some Sand, some Gravel, Brown to Grey, Firm to Very Stiff	2			
		SS5		6		Rock Fragment		98		
		SS6		4			3			
		SS7		16		SILTY, with Sand and Gravel	4	97		
		SS8		100+						
						End of Borehole at 4.6 m due to Auger Refusal.	5	96		Water level at 4.58 m bgs (July 17, 2017)
							6	95		
								94		
							7			
								93		
							8			
								92		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 5

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-05

REF. No.: TS-SO-29563	DST CONSULTING ENGINEERS INC.
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.67 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80; ○ HEX 80 160 240 320)	CVC Conc. IBL/HEX	SAMPLES No.	Type	SPT N-Value	SYMBL	SUBSURFACE PROFILE MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
	0	SS1		24		FILL - SAND and GRAVEL, Brown, Loose to Compact		102		
	0	SS2		11			1			
	0	SS3		9				101		
	0	SS4		15			2			
	0	SS5		27				100		
	0	SS6		12		CLAY, trace Sand, trace Gravel, Brown to Grey, Firm to Very Stiff	3			Water level at 3.25 m bgs (July 17, 2017)
	280	SS7		19			4	99		
	0	SS8		4				98		> 200 kPa
	0	SS9		7			5			> 200 kPa
	0	SS10		1		SANDY		97		
	0	SS11		7			6			
	50	SS12		100+				96		
		RC1				BEDROCK Limestone, Grey	7			TCR = 100% SCR = 100% RQD = 100%
								95		
		RC2					8			TCR = 100% SCR = 98% RQD = 96%
								94		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 6

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-05

REF. No.: TS-SO-29563	DST CONSULTING ENGINEERS INC.
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.67 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80 / ○ HEX 80 160 240 320)	CVC Conc. IBL/HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		RC3					10	93		TCR = 100% SCR = 100% RQD = 100%
							11	92		
		RC4					12	91		TCR = 100% SCR = 100% RQD = 96%
		RC5					13	90		TCR = 100% SCR = 100% RQD = 100%
						End of Borehole at 13.5 m	14	89		
							15	88		
							16	87		
							17	86		
								85		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 7

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-05A

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.66 metres (Assumed Benchmark)	DATE:

CVC * ■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
	0	SS1		11		FILL - SAND and GRAVEL, Brown, Loose to Compact	1	102		Sample submitted for analysis of BTEX, PHCs & VOCs
	0	SS2		12						
	5	SS3		4						Hit possibly old engine tank; smells like engine oil
						End of Borehole at 1.8 m due to Auger Refusal.	2	101		
							3	100		
							4	99		
							5	98		
							6	97		
							7	96		
							8	95		
								94		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 8

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-06

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 104.32 metres (Assumed Benchmark)	DATE:

CVC * ■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SYMBL	SUBSURFACE PROFILE MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
	0	SS1		14		FILL - SAND and GRAVEL, Brown, Compact		104		
	0	SS2		11			1			
	0	SS3		9		CLAY, trace Sand, trace Gravel, Brown to Grey, Firm to Very Stiff		103		
	0	SS4		15			2			
	0	SS5		10				102		
	0	SS6		9			3			
	0	SS7		12				101		> 200 kPa
	0	SS8		15		SANDY	4			> 200 kPa
	0	SS9		9				100		
	0	SS10		4			5			> 200 kPa
	0	SS11		4				99		
	5	SS12		7			6			Water level at 5.96 m bgs (July 20, 2017)
	0	SS13		100+				98		
						End of Borehole at 7.8 m due to Auger Refusal.	7			
								97		
							8			
								96		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 9

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-07

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.42 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80 / ○ HEX 80 160 240 320)	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
						ASPHALT (75 mm)				
	10	SS1		11		FILL - SAND and GRAVEL, trace Silt, Brown, Compact to Very Dense		102		
	15	SS2		13			1			
	15	SS3		35				101		
	10	SS4		11			2			
	15	SS5		53				100		
	10	SS6		32			3			
	10	SS7		13				99		
	20	SS8		5		SILTY CLAY, Brown to Grey, Soft to Very Stiff	4			
	0	SS9		6				98		
	0	SS10		2		SANDY, trace Gravel	5			
	0	SS11		12				97		
	20	SS12		18			6			
	10	SS13		24		SAND and GRAVEL, Dark Grey, Compact		96		
	8	SS14		100+			7			
						End of Borehole at 8.0 m due to Auger Refusal.		95		Water level at 7.58 m bgs (July 17, 2017)
							8			
								94		

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 10

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-08

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 103.89 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80; ○ HEX 80 160 240 320)	CVC Conc. IBL/HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
						ASPHALT (25 mm)				
	0	SS1		20		FILL - SAND and GRAVEL, Brown, Loose to Compact				
	0	SS2		8			1	103		
	0	SS3		8						
	0	SS4		11			2	102		
	0	SS5		8		CLAY, some Sand, some Gravel, Brown to Grey, Soft to Very Stiff				
	0	SS6		10			3	101		
	0	SS7		9			4	100		> 200 kPa
	0	SS8		6						> 200 kPa
	0	SS9		13			5	99		> 200 kPa
	0	SS10		3		SANDY, trace Rock Fragment	6	98		Water level at 5.64 m bgs (July 20 ,2017)
	10	SS11		10						
	35	SS12		100+			7	97		
		RC1				BEDROCK Limestone, Grey				TCR = 100% SCR = 96% RQD = 93%
							8	96		
		RC2								TCR = 85% SCR = 78% RQD = 75%
								95		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 11

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-08

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 103.89 metres (Assumed Benchmark)	DATE:

CVC * ■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		RC3					10	94		TCR = 100% SCR = 100% RQD = 98%
							11	93		
		RC4					12	92		TCR = 98% SCR = 98% RQD = 90%
		RC5					13	91		TCR = 100% SCR = 100% RQD = 100%
						End of Borehole at 13.6 m.	14	90		
							15	89		
							16	88		
							17	87		
								86		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 12

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-09

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 99.62 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80 / ○ HEX 80 160 240 320)	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SYMBL	SUBSURFACE PROFILE MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
						ASPHALT (125 mm)				
		SS1		17		FILL - SAND and GRAVEL, Brown, Compact		99		
		SS2		11		CLAY, trace Sand, trace Gravel, Brown to Grey, Soft to Very Stiff	1			
		SS3		7				98		
		SS4		17			2			> 200 kPa
						SANDY, some Gravel		97		
		SS5		4			3			> 200 kPa
		SS6		26				96		
		SS7		11		some Gravel	4			
		SS8		100+				95		Water level at 4.43 m bgs (July 17, 2017)
						End of Borehole at 4.5 m due to Auger Refusal.	5			
							6	94		
								93		
							7			
								92		
							8			
								91		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 13

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-10

REF. No.: TS-SO-29563	DST CONSULTING ENGINEERS INC.
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.32 metres (Assumed Benchmark)	DATE:

CVC *		SAMPLES			SUBSURFACE PROFILE					
■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	No.	Type	SPT N-Value	SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		SS1		36		ASPHALT (75 mm)				
						FILL - SAND and GRAVEL, Brown, Very Loose to Dense				
		SS2		35			1	101		
		SS3		17						
		SS4		13			2	100		
		SS5		3						
						FILL - CLAY	3	99		
		SS6		5						
		SS7		11			4	98		Water level at 4.08 m bgs (July 20, 2017)
						CLAY, Brown to Grey, Soft to Stiff				
		SS8		8						
		SS9		7			5	97		
		SS10		3						
						SANDY, trace Gravel	6	96		
		SS11		1						
		SS12		9		Rock Fragment	7	95		
		SS13		8						
		SS14		29			8	94		
						SAND and GRAVEL, Grey				
		SS15		100+						

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 14

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-10

REF. No.: TS-SO-29563	DST CONSULTING ENGINEERS INC.
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.32 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80; ○ HEX 80 160 240 320)	CVC Conc. IBL/HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		RC1				BEDROCK Limestone, Grey	10	93		TCR = 98% SCR = 92% RQD = 85%
							11	92		
		RC2					12	91		TCR = 100% SCR = 100% RQD = 100%
							13	90		
		RC3					14	89		TCR = 98% SCR = 98% RQD = 98%
							15	88		
		RC4					16	87		TCR = 100% SCR = 100% RQD = 100%
		RC5				End of Borehole at 16.6 m.	17	86		TCR = 100% SCR = 100% RQD = 100%
								85		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 15

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-11

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.09 metres (Assumed Benchmark)	DATE:

CVC * (■ IBL 20 40 60 80; ○ HEX 80 160 240 320)	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SUBSURFACE PROFILE SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
						ASPHALT		102		
	0	SS1		10		FILL - SAND and GRAVEL, Brown, Loose to Compact				
	0									
	0	SS2		8			1	101		
	0									Sample submitted for analysis of PAH & metals
	1	SS3		11						
	5									
	0	SS4		16			2	100		
	0									
	0	SS5		14						
	0						3	99		
	0	SS6		9		CLAYEY				
	0									
	1	SS7		19		CLAY, Brown to Grey, Soft to Very Stiff	4	98		Water level at 3.95 m bgs (July 17, 2017)
	5									
	1	SS8		8						
	0									
	0	SS9		9			5	97		
	0									
	0	SS10		3						
	0						6	96		Sample submitted for analysis of BTEX & PHCs
	0	SS11		2						
	0									
	0	SS12		13			7	95		
	0									
	0	SS13		17		SAND and GRAVEL, Grey, Compact to Very Dense				Sample submitted for analysis of BTEX & PHCs
	5									
	0	SS14		100+			8	94		
	0									
						End of Borehole at 8.4 m due to Auger Refusal.				

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 16

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-12

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.05 metres (Assumed Benchmark)	DATE:

CVC * ■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	SAMPLES No.	Type	SPT N-Value	SYMBL	SUBSURFACE PROFILE MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		SS1		11		ASPHALT (75 mm)		102		Paved over
						FILL - SAND and GRAVEL, Black, Loose to Dense				
		SS2		6			1	101		
		SS3		45						
							2	100		
		SS4		11						
		SS5		4						
						CLAY, Brown to Grey, Soft to Very Stiff	3	99		
		SS6		9						
		SS7		22			4	98		
		SS8		6						
							5	97		
		SS9		5						
		SS10		1						
							6	96		
		SS11		2						
		SS12		3			7	95		
		SS13		5						
						SANDY CLAY, some Gravel, Grey, Loose	8	94		
		SS14		100+						
						End of Borehole at 8.5 m due to Auger Refusal.				

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 17

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

LOG OF BOREHOLE BH2017-13

REF. No.: TS-SO-29563	**DST CONSULTING ENGINEERS INC.**
CLIENT: Trinity Development Group Inc.	
PROJECT: Geotechnical Drilling for the Proposed Development	
LOCATION: 951 Gladstone Avenue, Ottawa, ON	METHOD: Hollow Stem Auger
SURFACE ELEVATION: 102.20 metres (Assumed Benchmark)	DATE:

CVC *		SAMPLES			SUBSURFACE PROFILE				
■ IBL 20 40 60 80 ○ HEX 80 160 240 320	CVC Conc. IBL/ HEX	No.	Type	SPT N-Value	SYMBL	MATERIAL DESCRIPTION	DPTH m	ELEV m	WATER DATA	REMARKS
						SURFACE				
		SS1		15		ASPHALT (75 mm) FILL - SAND and GRAVEL, Brown		102		
		SS2		14			1	101		
		SS3		9		CLAY, trace Gravel, Brown, Stiff				
						End of Borehole at 1.8 m due to Auger Refusal.	2	100		
							3	99		
							4	98		
							5	97		
							6	96		
							7	95		
							8	94		

DST consulting engineers

Auger Sample
Split Spoon

* - Combustible Vapour Concentration
NR - No Sample Recovery
ND - Not Detectable

Bentonite & Riser
Sand Pack & Screen

ENCLOSURE 18

GASTECBH TS-SO-29563.GPJ DATA TEMPLATE.GDT 2-8-17

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

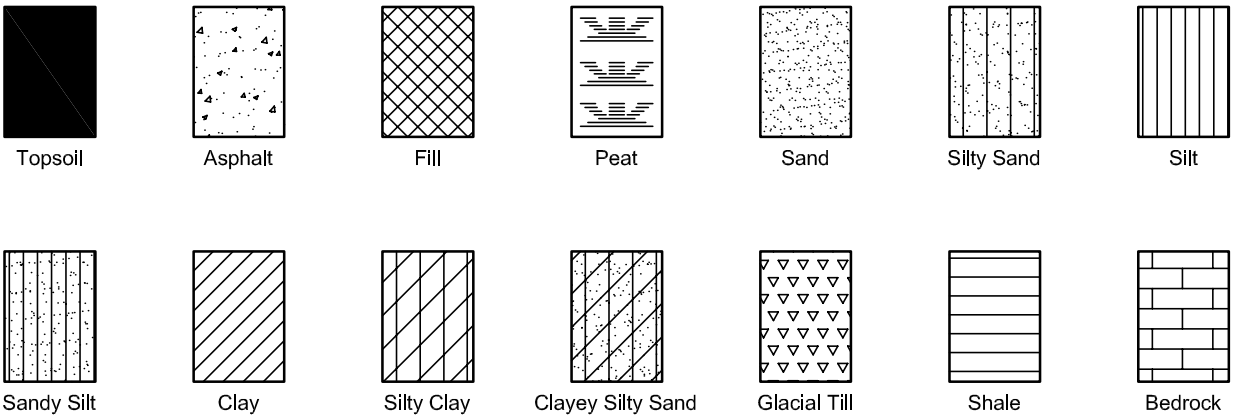
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

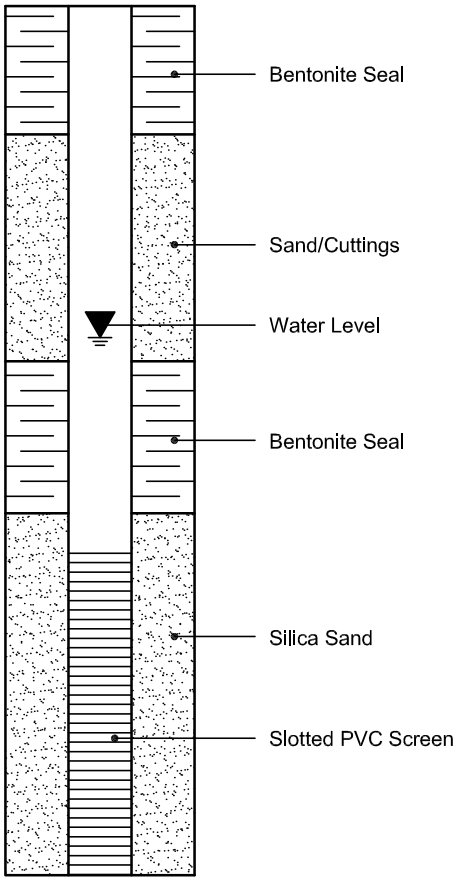
SYMBOLS AND TERMS (continued)

STRATA PLOT

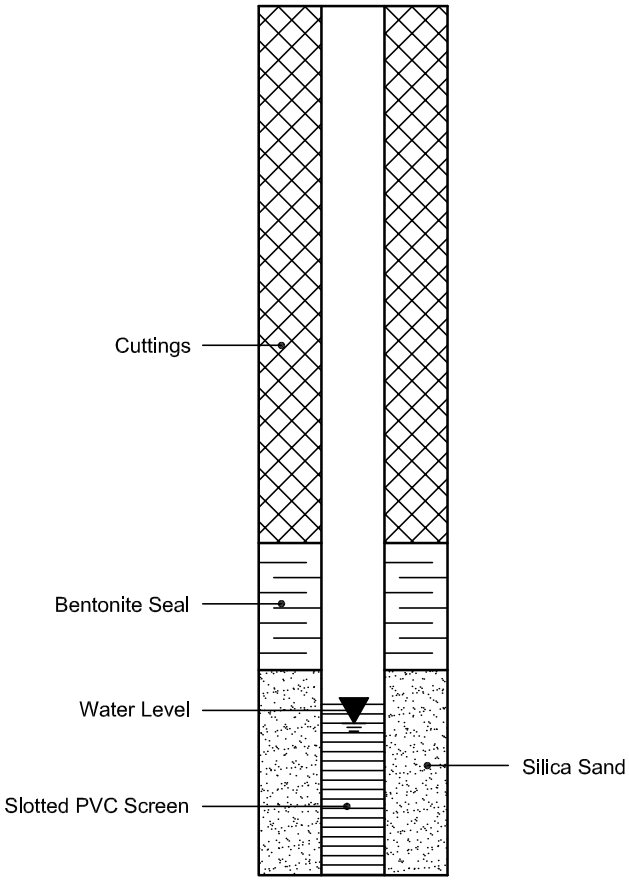


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30871
Project: PE4613
Custody: 128207

Report Date: 30-Sep-2020
Order Date: 25-Sep-2020

Order #: 2039597

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

Paracel ID	Client ID
2039597-01	BH5-20-SS2
2039597-02	BH5-20-SS10

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30871

Report Date: 30-Sep-2020

Order Date: 25-Sep-2020

Project Description: PE4613

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	28-Sep-20	28-Sep-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	28-Sep-20	28-Sep-20
Solids, %	Gravimetric, calculation	28-Sep-20	28-Sep-20

Certificate of Analysis

Report Date: 30-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30871

Project Description: PE4613

	Client ID:	BH5-20-SS2	BH5-20-SS10	-	-
	Sample Date:	23-Sep-20 10:00	23-Sep-20 10:30	-	-
	Sample ID:	2039597-01	2039597-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	94.1	85.5	-	-
Volatiles					
Acetone	0.50 ug/g dry	-	<0.50	-	-
Benzene	0.02 ug/g dry	-	<0.02	-	-
Bromodichloromethane	0.05 ug/g dry	-	<0.05	-	-
Bromoform	0.05 ug/g dry	-	<0.05	-	-
Bromomethane	0.05 ug/g dry	-	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	-	-
Chlorobenzene	0.05 ug/g dry	-	<0.05	-	-
Chloroform	0.05 ug/g dry	-	<0.05	-	-
Dibromochloromethane	0.05 ug/g dry	-	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	-	<0.05	-	-
Hexane	0.05 ug/g dry	-	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	-	-
Methylene Chloride	0.05 ug/g dry	-	<0.05	-	-
Styrene	0.05 ug/g dry	-	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	-
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	-	-

Certificate of Analysis

Report Date: 30-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30871

Project Description: PE4613

		Client ID:	BH5-20-SS2	BH5-20-SS10	-	-
		Sample Date:	23-Sep-20 10:00	23-Sep-20 10:30	-	-
		Sample ID:	2039597-01	2039597-02	-	-
	MDL/Units		Soil	Soil	-	-
Toluene	0.05 ug/g dry		-	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry		-	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry		-	<0.05	-	-
Trichloroethylene	0.05 ug/g dry		-	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry		-	<0.05	-	-
Vinyl chloride	0.02 ug/g dry		-	<0.02	-	-
m,p-Xylenes	0.05 ug/g dry		-	<0.05	-	-
o-Xylene	0.05 ug/g dry		-	<0.05	-	-
Xylenes, total	0.05 ug/g dry		-	<0.05	-	-
4-Bromofluorobenzene	Surrogate		-	137%	-	-
Dibromofluoromethane	Surrogate		-	73.9%	-	-
Toluene-d8	Surrogate		-	102%	-	-
Semi-Volatiles						
Acenaphthene	0.02 ug/g dry		0.18	-	-	-
Acenaphthylene	0.02 ug/g dry		0.67	-	-	-
Anthracene	0.02 ug/g dry		1.09	-	-	-
Benzo [a] anthracene	0.02 ug/g dry		2.29	-	-	-
Benzo [a] pyrene	0.02 ug/g dry		2.26	-	-	-
Benzo [b] fluoranthene	0.02 ug/g dry		2.25	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry		1.13	-	-	-
Benzo [k] fluoranthene	0.02 ug/g dry		1.09	-	-	-
Chrysene	0.02 ug/g dry		2.30	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry		0.35	-	-	-
Fluoranthene	0.02 ug/g dry		5.15	-	-	-
Fluorene	0.02 ug/g dry		0.30	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry		1.17	-	-	-
1-Methylnaphthalene	0.02 ug/g dry		0.13	-	-	-
2-Methylnaphthalene	0.02 ug/g dry		0.16	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry		0.29	-	-	-
Naphthalene	0.01 ug/g dry		0.32	-	-	-
Phenanthrene	0.02 ug/g dry		3.30	-	-	-
Pyrene	0.02 ug/g dry		4.40	-	-	-
2-Fluorobiphenyl	Surrogate		90.9%	-	-	-
Terphenyl-d14	Surrogate		107%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*1.64*		*ug/g*		*123*	*50-140*			
Surrogate: Terphenyl-d14	*1.43*		*ug/g*		*107*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30871

Report Date: 30-Sep-2020

Order Date: 25-Sep-2020

Project Description: PE4613

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*4.44*		*ug/g*		*139*	*50-140*			
Surrogate: Dibromofluoromethane	*2.59*		*ug/g*		*81.0*	*50-140*			
Surrogate: Toluene-d8	*3.52*		*ug/g*		*110*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Physical Characteristics									
% Solids	94.6	0.1	% by Wt.	94.3			0.3	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	0.024			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	0.022			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.70*		*ug/g dry*		*120*	*50-140*			
Surrogate: Terphenyl-d14	*1.56*		*ug/g dry*		*110*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g wet	ND			NC	50	
Benzene	ND	0.02	ug/g wet	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g wet	ND			NC	50	
Bromoform	ND	0.05	ug/g wet	ND			NC	50	
Bromomethane	ND	0.05	ug/g wet	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g wet	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
Chloroform	ND	0.05	ug/g wet	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g wet	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g wet	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g wet	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g wet	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g wet	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g wet	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g wet	ND			NC	50	
Hexane	ND	0.05	ug/g wet	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g wet	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g wet	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g wet	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g wet	ND			NC	50	
Styrene	ND	0.05	ug/g wet	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g wet	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g wet	ND			NC	50	
Toluene	ND	0.05	ug/g wet	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g wet	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2-Trichloroethane	ND	0.05	ug/g wet	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g wet	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g wet	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g wet	ND			NC	50	
o-Xylene	ND	0.05	ug/g wet	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*4.35*		*ug/g wet*		*136*	*50-140*			
Surrogate: Dibromofluoromethane	*2.44*		*ug/g wet*		*76.2*	*50-140*			
Surrogate: Toluene-d8	*3.85*		*ug/g wet*		*120*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Semi-Volatiles									
Acenaphthene	0.167	0.02	ug/g	ND	94.5	50-140			
Acenaphthylene	0.156	0.02	ug/g	ND	88.1	50-140			
Anthracene	0.153	0.02	ug/g	ND	86.5	50-140			
Benzo [a] anthracene	0.153	0.02	ug/g	ND	86.4	50-140			
Benzo [a] pyrene	0.156	0.02	ug/g	ND	88.0	50-140			
Benzo [b] fluoranthene	0.207	0.02	ug/g	ND	117	50-140			
Benzo [g,h,i] perylene	0.156	0.02	ug/g	ND	88.5	50-140			
Benzo [k] fluoranthene	0.183	0.02	ug/g	ND	103	50-140			
Chrysene	0.179	0.02	ug/g	ND	102	50-140			
Dibenzo [a,h] anthracene	0.149	0.02	ug/g	ND	84.5	50-140			
Fluoranthene	0.182	0.02	ug/g	0.024	89.5	50-140			
Fluorene	0.155	0.02	ug/g	ND	87.6	50-140			
Indeno [1,2,3-cd] pyrene	0.160	0.02	ug/g	ND	90.6	50-140			
1-Methylnaphthalene	0.180	0.02	ug/g	ND	102	50-140			
2-Methylnaphthalene	0.181	0.02	ug/g	ND	102	50-140			
Naphthalene	0.177	0.01	ug/g	ND	100	50-140			
Phenanthrene	0.159	0.02	ug/g	ND	90.0	50-140			
Pyrene	0.180	0.02	ug/g	0.022	89.7	50-140			
Surrogate: 2-Fluorobiphenyl	*1.03*		*ug/g*		*73.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.23*		*ug/g*		*86.9*	*50-140*			
Volatiles									
Acetone	11.6	0.50	ug/g	ND	116	50-140			
Benzene	4.13	0.02	ug/g	ND	103	60-130			
Bromodichloromethane	4.83	0.05	ug/g	ND	121	60-130			
Bromoform	4.19	0.05	ug/g	ND	105	60-130			
Bromomethane	4.90	0.05	ug/g	ND	123	50-140			
Carbon Tetrachloride	4.95	0.05	ug/g	ND	124	60-130			
Chlorobenzene	4.50	0.05	ug/g	ND	113	60-130			
Chloroform	4.06	0.05	ug/g	ND	101	60-130			
Dibromochloromethane	3.85	0.05	ug/g	ND	96.3	60-130			
Dichlorodifluoromethane	5.57	0.05	ug/g	ND	139	50-140			
1,2-Dichlorobenzene	4.07	0.05	ug/g	ND	102	60-130			
1,3-Dichlorobenzene	3.83	0.05	ug/g	ND	95.8	60-130			
1,4-Dichlorobenzene	4.18	0.05	ug/g	ND	105	60-130			
1,1-Dichloroethane	2.92	0.05	ug/g	ND	72.9	60-130			
1,2-Dichloroethane	4.92	0.05	ug/g	ND	123	60-130			
1,1-Dichloroethylene	4.78	0.05	ug/g	ND	119	60-130			
cis-1,2-Dichloroethylene	4.08	0.05	ug/g	ND	102	60-130			
trans-1,2-Dichloroethylene	4.14	0.05	ug/g	ND	103	60-130			
1,2-Dichloropropane	4.32	0.05	ug/g	ND	108	60-130			
cis-1,3-Dichloropropylene	4.50	0.05	ug/g	ND	112	60-130			
trans-1,3-Dichloropropylene	4.14	0.05	ug/g	ND	104	60-130			
Ethylbenzene	4.55	0.05	ug/g	ND	114	60-130			
Ethylene dibromide (dibromoethane, 1,2	4.27	0.05	ug/g	ND	107	60-130			
Hexane	4.10	0.05	ug/g	ND	102	60-130			
Methyl Ethyl Ketone (2-Butanone)	9.47	0.50	ug/g	ND	94.7	50-140			
Methyl Isobutyl Ketone	11.9	0.50	ug/g	ND	119	50-140			
Methyl tert-butyl ether	9.62	0.05	ug/g	ND	96.2	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methylene Chloride	3.98	0.05	ug/g	ND	99.4	60-130			
Styrene	4.68	0.05	ug/g	ND	117	60-130			
1,1,1,2-Tetrachloroethane	3.94	0.05	ug/g	ND	98.5	60-130			
1,1,2,2-Tetrachloroethane	4.17	0.05	ug/g	ND	104	60-130			
Tetrachloroethylene	4.37	0.05	ug/g	ND	109	60-130			
Toluene	4.07	0.05	ug/g	ND	102	60-130			
1,1,1-Trichloroethane	4.04	0.05	ug/g	ND	101	60-130			
1,1,2-Trichloroethane	4.54	0.05	ug/g	ND	113	60-130			
Trichloroethylene	5.05	0.05	ug/g	ND	126	60-130			
Trichlorofluoromethane	4.99	0.05	ug/g	ND	125	50-140			
Vinyl chloride	4.44	0.02	ug/g	ND	111	50-140			
m,p-Xylenes	9.19	0.05	ug/g	ND	115	60-130			
o-Xylene	5.15	0.05	ug/g	ND	129	60-130			
Surrogate: 4-Bromofluorobenzene	*3.06*		*ug/g*		*95.7*	*50-140*			
Surrogate: Dibromofluoromethane	*3.45*		*ug/g*		*108*	*50-140*			
Surrogate: Toluene-d8	*2.90*		*ug/g*		*90.7*	*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.

PARACEL LABORATORIES LTD.

Paracel ID: 2039597

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2039597	Nº 128207

Client Name: Paterson	Project Ref: PE4613	Page 1 of 1
Contact Name: Mark D'Arcy	Quote #:	**Turnaround Time**
Address: 154 Colonnade	PO #: 30871	☐ 1 day ☐ 3 day
	E-mail: MDarcy@patersongroup.ca	☐ 2 day ☑ Regular
Telephone: 613 226 7381		Date Required:

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

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

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)						
1	BH5-20-SS2	S		1	Sep 23	10 am			✓										
2	BH5-20-SS10	S		2	Sep 23	10:30 am		✓											
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): GPat	Received By Driver/Depot: [signature]	Received at Lab: Surneepam Dolmai	Verified By: [signature]
Relinquished By (Print): Grant paterson	Date/Time: 25/09/20 3:34	Date/Time: Sep 25, 2020 04.45	Date/Time: 9-25-20 1710
Date/Time: Sep 25 2020	Temperature: °C	Temperature: 15.1 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30904
Project: PE4613
Custody:

Report Date: 7-Oct-2020
Order Date: 1-Oct-2020

Order #: 2040558

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

Paracel ID	Client ID
2040558-01	BH1-20-GW1
2040558-02	BH2-20-GW1
2040558-03	BH3-20-GW1
2040558-04	BH4-20-GW1
2040558-05	BH5-20-GW1
2040558-06	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 07-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 1-Oct-2020

Client PO: 30904

Project Description: PE4613

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	2-Oct-20	2-Oct-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	5-Oct-20	6-Oct-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	2-Oct-20	2-Oct-20

Certificate of Analysis

Report Date: 07-Oct-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 1-Oct-2020

Client PO: **30904**

Project Description: PE4613

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	BH4-20-GW1
	Sample Date:	30-Sep-20 12:00	30-Sep-20 12:00	30-Sep-20 12:00	30-Sep-20 12:00
	Sample ID:	2040558-01	2040558-02	2040558-03	2040558-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	16.1	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	1.8	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	4.5	<0.5	<0.5	2.7
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	325	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	2.0	52.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	44.3	<2.0	5.5	15.7
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	8.8	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 07-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 1-Oct-2020

Client PO: 30904

Project Description: PE4613

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	BH4-20-GW1
	Sample Date:	30-Sep-20 12:00	30-Sep-20 12:00	30-Sep-20 12:00	30-Sep-20 12:00
	Sample ID:	2040558-01	2040558-02	2040558-03	2040558-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	65.6	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	25.1	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	90.7	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	95.5%	105%	95.0%	96.0%
Dibromofluoromethane	Surrogate	96.2%	108%	86.3%	94.8%
Toluene-d8	Surrogate	104%	106%	107%	105%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	-	1940	<25	<25
F2 PHCs (C10-C16)	100 ug/L	-	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	-	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	-	<100	<100	<100

Certificate of Analysis

Report Date: 07-Oct-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 1-Oct-2020

Client PO: **30904**

Project Description: PE4613

	Client ID:	BH5-20-GW1	DUP	-	-
	Sample Date:	30-Sep-20 12:00	30-Sep-20 12:00	-	-
	Sample ID:	2040558-05	2040558-06	-	-
	MDL/Units	Water	Water	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	3.4	<0.5	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	2.7	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethane, 1	0.2 ug/L	<0.2	<0.2	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	15.6	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-

Certificate of Analysis

Report Date: 07-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 1-Oct-2020

Client PO: 30904

Project Description: PE4613

	Client ID:	BH5-20-GW1	DUP	-	-
	Sample Date:	30-Sep-20 12:00	30-Sep-20 12:00	-	-
	Sample ID:	2040558-05	2040558-06	-	-
	MDL/Units	Water	Water	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	97.2%	97.1%	-	-
Dibromofluoromethane	Surrogate	99.4%	97.7%	-	-
Toluene-d8	Surrogate	105%	105%	-	-

Certificate of Analysis

Report Date: 07-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 1-Oct-2020

Client PO: 30904

Project Description: PE4613

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*74.8*		*ug/L*		*93.5*	*50-140*			
Surrogate: Dibromofluoromethane	*69.6*		*ug/L*		*87.0*	*50-140*			
Surrogate: Toluene-d8	*85.8*		*ug/L*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	108	5.0	ug/L	94.8			13.2	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	2.48	0.5	ug/L	2.45			1.2	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	0.87	0.5	ug/L	0.76			13.5	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*76.2*		*ug/L*		*95.3*	*50-140*			
Surrogate: Dibromofluoromethane	*85.1*		*ug/L*		*106*	*50-140*			
Surrogate: Toluene-d8	*84.4*		*ug/L*		*106*	*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)	1740	25	ug/L	ND	87.2	68-117			
F2 PHCs (C10-C16)	1820	100	ug/L	ND	114	60-140			
F3 PHCs (C16-C34)	4370	100	ug/L	ND	112	60-140			
F4 PHCs (C34-C50)	2670	100	ug/L	ND	108	60-140			
Volatiles									
Acetone	94.3	5.0	ug/L	ND	94.3	50-140			
Benzene	35.5	0.5	ug/L	ND	88.7	60-130			
Bromodichloromethane	34.2	0.5	ug/L	ND	85.5	60-130			
Bromoform	37.2	0.5	ug/L	ND	93.1	60-130			
Bromomethane	43.2	0.5	ug/L	ND	108	50-140			
Carbon Tetrachloride	34.9	0.2	ug/L	ND	87.3	60-130			
Chlorobenzene	36.2	0.5	ug/L	ND	90.5	60-130			
Chloroform	35.2	0.5	ug/L	ND	88.0	60-130			
Dibromochloromethane	36.4	0.5	ug/L	ND	90.9	60-130			
Dichlorodifluoromethane	42.1	1.0	ug/L	ND	105	50-140			
1,2-Dichlorobenzene	36.4	0.5	ug/L	ND	91.1	60-130			
1,3-Dichlorobenzene	37.0	0.5	ug/L	ND	92.6	60-130			
1,4-Dichlorobenzene	36.7	0.5	ug/L	ND	91.7	60-130			
1,1-Dichloroethane	36.9	0.5	ug/L	ND	92.3	60-130			
1,2-Dichloroethane	35.0	0.5	ug/L	ND	87.5	60-130			
1,1-Dichloroethylene	36.4	0.5	ug/L	ND	90.9	60-130			
cis-1,2-Dichloroethylene	35.3	0.5	ug/L	ND	88.2	60-130			
trans-1,2-Dichloroethylene	36.6	0.5	ug/L	ND	91.6	60-130			
1,2-Dichloropropane	35.4	0.5	ug/L	ND	88.4	60-130			
cis-1,3-Dichloropropylene	32.0	0.5	ug/L	ND	80.0	60-130			
trans-1,3-Dichloropropylene	32.9	0.5	ug/L	ND	82.3	60-130			
Ethylbenzene	36.0	0.5	ug/L	ND	90.1	60-130			
Ethylene dibromide (dibromoethane, 1,2-	33.0	0.2	ug/L	ND	82.5	60-130			
Hexane	47.8	1.0	ug/L	ND	120	60-130			
Methyl Ethyl Ketone (2-Butanone)	75.8	5.0	ug/L	ND	75.8	50-140			
Methyl Isobutyl Ketone	76.9	5.0	ug/L	ND	76.9	50-140			
Methyl tert-butyl ether	76.9	2.0	ug/L	ND	76.9	50-140			
Methylene Chloride	39.3	5.0	ug/L	ND	98.3	60-130			
Styrene	32.6	0.5	ug/L	ND	81.6	60-130			
1,1,1,2-Tetrachloroethane	33.7	0.5	ug/L	ND	84.3	60-130			
1,1,2,2-Tetrachloroethane	34.3	0.5	ug/L	ND	85.7	60-130			
Tetrachloroethylene	35.7	0.5	ug/L	ND	89.2	60-130			
Toluene	36.9	0.5	ug/L	ND	92.2	60-130			
1,1,1-Trichloroethane	34.6	0.5	ug/L	ND	86.5	60-130			
1,1,2-Trichloroethane	34.5	0.5	ug/L	ND	86.4	60-130			
Trichloroethylene	35.6	0.5	ug/L	ND	89.1	60-130			
Trichlorofluoromethane	38.2	1.0	ug/L	ND	95.4	60-130			
Vinyl chloride	40.7	0.5	ug/L	ND	102	50-140			
m,p-Xylenes	71.8	0.5	ug/L	ND	89.8	60-130			
o-Xylene	35.5	0.5	ug/L	ND	88.7	60-130			
Surrogate: 4-Bromofluorobenzene	*83.5*		*ug/L*		*104*	*50-140*			
Surrogate: Dibromofluoromethane	*80.3*		*ug/L*		*100*	*50-140*			
Surrogate: Toluene-d8	*82.5*		*ug/L*		*103*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES

Paracel ID: 2040558

Head Office
300-2319 St. Laurent Blvd
Ottawa, Ontario K1G 4J8
1-800-749-1947
paracel@paracellabs.com
www.paracellabs.com

Paracel Order Number (Lab Use Only): 2040558

Chain Of Custody (Lab Use Only)

Client Name: Paterson Group	Project Ref: PE4613
Contact Name: Mandy Witteman	Quote #:
Address: 154 Colonnade Rd S. Ottawa	PO #: 30904
Telephone: (613) 226-7381	E-mail: mwitteman@patersongroup.ca

Page 1 of 1

Turnaround Time: ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular

Date Required:

Regulation 153/04: ☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☒ Table 3 ☐ Agri/Other ☐ Table ___

For RSC: ☒ Yes ☐ No

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

Mun:

☐ Other:

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
1	BH1-20-GW1	GW		~~2~~	Sept. 30/20	PM		X											✓
2	BH2-20-GW1	↓		3	↓	↓	X	X											✓
3	BH3-20-GW1	↓		3	↓	↓	X	X											✓
4	BH4-20-GW1	↓		3	↓	↓	X	X											✓
5	BH5-20-GW1	↓		~~2~~	↓	↓		X											✓
6	DUP	↓		2	↓	↓		X											✓
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): [signature]	Received By Driver/Depot: T. DEOUSE	Received at Lab: Sumeepoam Dohmai	Verified By: [signature]
Relinquished By (Print): Mandy Witteman	Date/Time: 01/10/20 12:30	Date/Time: Oct 01, 2020 02.41	Date/Time: 10-1-20 15:22
Date/Time: Oct 1/20	Temperature: °C PH.	Temperature: 13.4 °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: Mark D'Arcy

Client PO: 30826
Project: PE4613
Custody: 128158

Report Date: 29-Sep-2020
Order Date: 24-Sep-2020

Order #: 2039462

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

Paracel ID	Client ID
2039462-01	BH3-20-SS2
2039462-02	BH3-20-SS6
2039462-03	BH3-20-SS11
2039462-04	BH4-20-SS5

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 29-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Sep-2020

Client PO: 30826

Project Description: PE4613

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	28-Sep-20	28-Sep-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	24-Sep-20	26-Sep-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	25-Sep-20	25-Sep-20
Solids, %	Gravimetric, calculation	25-Sep-20	25-Sep-20

Certificate of Analysis

Report Date: 29-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Sep-2020

Client PO: 30826

Project Description: PE4613

	Client ID:	BH3-20-SS2	BH3-20-SS6	BH3-20-SS11	BH4-20-SS5
	Sample Date:	22-Sep-20 09:00	22-Sep-20 09:00	22-Sep-20 09:00	22-Sep-20 09:00
	Sample ID:	2039462-01	2039462-02	2039462-03	2039462-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	75.1	71.5	92.6	83.4
Metals					
Antimony	1.0 ug/g dry	5.9	-	-	<1.0
Arsenic	1.0 ug/g dry	56.6	-	-	20.7
Barium	1.0 ug/g dry	249	-	-	109
Beryllium	0.5 ug/g dry	0.6	-	-	0.7
Boron	5.0 ug/g dry	12.0	-	-	11.9
Cadmium	0.5 ug/g dry	1.1	-	-	<0.5
Chromium	5.0 ug/g dry	84.0	-	-	30.3
Cobalt	1.0 ug/g dry	6.4	-	-	9.7
Copper	5.0 ug/g dry	118	-	-	26.1
Lead	1.0 ug/g dry	484	-	-	46.1
Molybdenum	1.0 ug/g dry	9.0	-	-	<1.0
Nickel	5.0 ug/g dry	28.2	-	-	20.8
Selenium	1.0 ug/g dry	1.7	-	-	<1.0
Silver	0.3 ug/g dry	0.8	-	-	<0.3
Thallium	1.0 ug/g dry	<1.0	-	-	<1.0
Uranium	1.0 ug/g dry	1.4	-	-	<1.0
Vanadium	10.0 ug/g dry	25.6	-	-	41.2
Zinc	20.0 ug/g dry	374	-	-	77.3
Volatiles					
Acetone	0.50 ug/g dry	-	-	<0.50	-
Benzene	0.02 ug/g dry	-	-	<0.02	-
Bromodichloromethane	0.05 ug/g dry	-	-	<0.05	-
Bromoform	0.05 ug/g dry	-	-	<0.05	-
Bromomethane	0.05 ug/g dry	-	-	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	-	-	<0.05	-
Chlorobenzene	0.05 ug/g dry	-	-	<0.05	-
Chloroform	0.05 ug/g dry	-	-	<0.05	-
Dibromochloromethane	0.05 ug/g dry	-	-	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	-	-	<0.05	-

Certificate of Analysis

Report Date: 29-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Sep-2020

Client PO: 30826

Project Description: PE4613

	Client ID:	BH3-20-SS2	BH3-20-SS6	BH3-20-SS11	BH4-20-SS5
	Sample Date:	22-Sep-20 09:00	22-Sep-20 09:00	22-Sep-20 09:00	22-Sep-20 09:00
	Sample ID:	2039462-01	2039462-02	2039462-03	2039462-04
	MDL/Units	Soil	Soil	Soil	Soil
1,2-Dichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	-	-	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	-	<0.05	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	-	-	<0.05	-
Hexane	0.05 ug/g dry	-	-	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	-	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	-	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	-	-	<0.05	-
Methylene Chloride	0.05 ug/g dry	-	-	<0.05	-
Styrene	0.05 ug/g dry	-	-	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	-	-	<0.05	-
Toluene	0.05 ug/g dry	-	-	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	-	<0.05	-
Trichloroethylene	0.05 ug/g dry	-	-	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	-	-	<0.05	-
Vinyl chloride	0.02 ug/g dry	-	-	<0.02	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
4-Bromofluorobenzene	Surrogate	-	-	136%	-
Dibromofluoromethane	Surrogate	-	-	94.8%	-
Toluene-d8	Surrogate	-	-	121%	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	0.09	0.02	-	0.02
Acenaphthylene	0.02 ug/g dry	0.80	0.07	-	<0.02
Anthracene	0.02 ug/g dry	0.85	0.09	-	0.05
Benzo [a] anthracene	0.02 ug/g dry	1.77	0.25	-	0.11

Certificate of Analysis

Report Date: 29-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Sep-2020

Client PO: 30826

Project Description: PE4613

	Client ID:	BH3-20-SS2	BH3-20-SS6	BH3-20-SS11	BH4-20-SS5
	Sample Date:	22-Sep-20 09:00	22-Sep-20 09:00	22-Sep-20 09:00	22-Sep-20 09:00
	Sample ID:	2039462-01	2039462-02	2039462-03	2039462-04
	MDL/Units	Soil	Soil	Soil	Soil
Benzo [a] pyrene	0.02 ug/g dry	1.98	0.32	-	0.12
Benzo [b] fluoranthene	0.02 ug/g dry	2.40	0.37	-	0.15
Benzo [g,h,i] perylene	0.02 ug/g dry	1.55	0.21	-	0.06
Benzo [k] fluoranthene	0.02 ug/g dry	1.31	0.19	-	0.08
Chrysene	0.02 ug/g dry	1.97	0.26	-	0.11
Dibenzo [a,h] anthracene	0.02 ug/g dry	0.41	0.05	-	<0.02
Fluoranthene	0.02 ug/g dry	3.90	0.54	-	0.23
Fluorene	0.02 ug/g dry	0.14	0.03	-	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	1.47	0.20	-	0.07
1-Methylnaphthalene	0.02 ug/g dry	0.04	0.03	-	<0.02
2-Methylnaphthalene	0.02 ug/g dry	0.06	0.03	-	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	0.10	0.06	-	<0.04
Naphthalene	0.01 ug/g dry	0.05	0.03	-	<0.01
Phenanthrene	0.02 ug/g dry	1.44	0.28	-	0.19
Pyrene	0.02 ug/g dry	3.08	0.45	-	0.19
2-Fluorobiphenyl	Surrogate	94.8%	105%	-	95.6%
Terphenyl-d14	Surrogate	103%	87.5%	-	87.0%

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	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	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	*1.38*		*ug/g*		*103*	*50-140*			
Surrogate: Terphenyl-d14	*1.37*		*ug/g*		*103*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*4.05*		*ug/g*		*126*	*50-140*			
Surrogate: Dibromofluoromethane	*3.23*		*ug/g*		*101*	*50-140*			
Surrogate: Toluene-d8	*4.17*		*ug/g*		*130*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	4.5	1.0	ug/g dry	4.4			2.8	30	
Barium	51.2	1.0	ug/g dry	58.4			13.1	30	
Beryllium	0.6	0.5	ug/g dry	0.6			5.4	30	
Boron	7.6	5.0	ug/g dry	7.0			8.5	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	20.7	5.0	ug/g dry	21.6			4.4	30	
Cobalt	7.9	1.0	ug/g dry	8.3			4.9	30	
Copper	16.6	5.0	ug/g dry	17.2			3.5	30	
Lead	14.0	1.0	ug/g dry	12.0			15.6	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	17.6	5.0	ug/g dry	18.1			3.0	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	27.5	10.0	ug/g dry	28.9			4.9	30	
Zinc	46.4	20.0	ug/g dry	48.2			3.8	30	
Physical Characteristics									
% Solids	72.4	0.1	% by Wt.	75.1			3.6	25	
Semi-Volatiles									
Acenaphthene	0.044	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	0.050	0.02	ug/g dry	0.044			12.7	40	
Anthracene	0.263	0.02	ug/g dry	0.079			107.0	40	QR-04
Benzo [a] anthracene	0.452	0.02	ug/g dry	0.214			71.3	40	QR-04
Benzo [a] pyrene	0.418	0.02	ug/g dry	0.250			50.4	40	QR-04
Benzo [b] fluoranthene	0.499	0.02	ug/g dry	0.272			58.9	40	QR-04
Benzo [g,h,i] perylene	0.262	0.02	ug/g dry	0.162			47.4	40	QR-04
Benzo [k] fluoranthene	0.269	0.02	ug/g dry	0.141			62.3	40	QR-04
Chrysene	0.443	0.02	ug/g dry	0.283			43.9	40	QR-04
Dibenzo [a,h] anthracene	0.070	0.02	ug/g dry	0.043			47.2	40	QR-04
Fluoranthene	1.16	0.02	ug/g dry	0.418			94.3	40	QR-04
Fluorene	0.064	0.02	ug/g dry	0.021			102.0	40	QR-04
Indeno [1,2,3-cd] pyrene	0.245	0.02	ug/g dry	0.163			40.0	40	
1-Methylnaphthalene	0.028	0.02	ug/g dry	0.021			29.5	40	
2-Methylnaphthalene	0.029	0.02	ug/g dry	0.023			21.4	40	
Naphthalene	0.027	0.01	ug/g dry	0.020			28.5	40	
Phenanthrene	0.655	0.02	ug/g dry	0.274			82.0	40	QR-04
Pyrene	0.918	0.02	ug/g dry	0.360			87.2	40	QR-04
Surrogate: 2-Fluorobiphenyl	*1.68*		*ug/g dry*		*123*	*50-140*			
Surrogate: Terphenyl-d14	*1.64*		*ug/g dry*		*120*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*4.44*		*ug/g dry*		*138*	*50-140*			
Surrogate: Dibromofluoromethane	*3.02*		*ug/g dry*		*93.6*	*50-140*			
Surrogate: Toluene-d8	*3.94*		*ug/g dry*		*122*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	41.4	1.0	ug/g	ND	82.7	70-130			
Arsenic	50.1	1.0	ug/g	1.8	96.7	70-130			
Barium	67.6	1.0	ug/g	23.3	88.4	70-130			
Beryllium	46.4	0.5	ug/g	ND	92.3	70-130			
Boron	45.3	5.0	ug/g	ND	85.0	70-130			
Cadmium	43.4	0.5	ug/g	ND	86.7	70-130			
Chromium	56.1	5.0	ug/g	8.6	94.9	70-130			
Cobalt	49.6	1.0	ug/g	3.3	92.6	70-130			
Copper	52.0	5.0	ug/g	6.9	90.4	70-130			
Lead	53.5	1.0	ug/g	4.8	97.3	70-130			
Molybdenum	47.6	1.0	ug/g	ND	95.0	70-130			
Nickel	51.8	5.0	ug/g	7.3	89.0	70-130			
Selenium	44.5	1.0	ug/g	ND	88.7	70-130			
Silver	38.8	0.3	ug/g	ND	77.5	70-130			
Thallium	44.0	1.0	ug/g	ND	87.8	70-130			
Uranium	51.7	1.0	ug/g	ND	103	70-130			
Vanadium	59.8	10.0	ug/g	11.5	96.6	70-130			
Zinc	63.5	20.0	ug/g	ND	88.4	70-130			
Semi-Volatiles									
Acenaphthene	0.187	0.02	ug/g	ND	109	50-140			
Acenaphthylene	0.190	0.02	ug/g	0.044	85.4	50-140			
Anthracene	0.234	0.02	ug/g	0.079	90.4	50-140			
Benzo [a] anthracene	0.378	0.02	ug/g	0.214	96.1	50-140			
Benzo [a] pyrene	0.416	0.02	ug/g	0.250	97.7	50-140			
Benzo [b] fluoranthene	0.543	0.02	ug/g	0.272	159	50-140			QM-06
Benzo [g,h,i] perylene	0.322	0.02	ug/g	0.162	94.2	50-140			
Benzo [k] fluoranthene	0.389	0.02	ug/g	0.141	145	50-140			
Chrysene	0.485	0.02	ug/g	0.283	118	50-140			
Dibenzo [a,h] anthracene	0.191	0.02	ug/g	0.043	86.5	50-140			
Fluoranthene	0.730	0.02	ug/g	0.418	183	50-140			QM-06
Fluorene	0.177	0.02	ug/g	0.021	91.5	50-140			
Indeno [1,2,3-cd] pyrene	0.322	0.02	ug/g	0.163	93.2	50-140			
1-Methylnaphthalene	0.193	0.02	ug/g	0.021	101	50-140			
2-Methylnaphthalene	0.211	0.02	ug/g	0.023	110	50-140			
Naphthalene	0.188	0.01	ug/g	0.020	98.3	50-140			
Phenanthrene	0.467	0.02	ug/g	0.274	114	50-140			
Pyrene	0.636	0.02	ug/g	0.360	161	50-140			QM-06
Surrogate: 2-Fluorobiphenyl	*1.28*		*ug/g*		*93.6*	*50-140*			
Surrogate: Terphenyl-d14	*1.21*		*ug/g*		*89.0*	*50-140*			
Volatiles									
Acetone	12.1	0.50	ug/g	ND	121	50-140			
Benzene	4.06	0.02	ug/g	ND	102	60-130			
Bromodichloromethane	3.87	0.05	ug/g	ND	96.7	60-130			
Bromoform	3.87	0.05	ug/g	ND	96.8	60-130			
Bromomethane	4.20	0.05	ug/g	ND	105	50-140			
Carbon Tetrachloride	3.97	0.05	ug/g	ND	99.2	60-130			
Chlorobenzene	4.24	0.05	ug/g	ND	106	60-130			
Chloroform	3.87	0.05	ug/g	ND	96.8	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Dibromochloromethane	3.66	0.05	ug/g	ND	91.5	60-130			
Dichlorodifluoromethane	2.88	0.05	ug/g	ND	71.9	50-140			
1,2-Dichlorobenzene	3.95	0.05	ug/g	ND	98.8	60-130			
1,3-Dichlorobenzene	3.73	0.05	ug/g	ND	93.2	60-130			
1,4-Dichlorobenzene	4.09	0.05	ug/g	ND	102	60-130			
1,1-Dichloroethane	3.53	0.05	ug/g	ND	88.3	60-130			
1,2-Dichloroethane	3.90	0.05	ug/g	ND	97.5	60-130			
1,1-Dichloroethylene	3.23	0.05	ug/g	ND	80.8	60-130			
cis-1,2-Dichloroethylene	3.91	0.05	ug/g	ND	97.7	60-130			
trans-1,2-Dichloroethylene	3.16	0.05	ug/g	ND	78.9	60-130			
1,2-Dichloropropane	4.01	0.05	ug/g	ND	100	60-130			
cis-1,3-Dichloropropylene	4.08	0.05	ug/g	ND	102	60-130			
trans-1,3-Dichloropropylene	3.54	0.05	ug/g	ND	88.5	60-130			
Ethylbenzene	4.19	0.05	ug/g	ND	105	60-130			
Ethylene dibromide (dibromoethane, 1,2	3.71	0.05	ug/g	ND	92.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	9.66	0.50	ug/g	ND	96.6	50-140			
Methyl Isobutyl Ketone	8.86	0.50	ug/g	ND	88.6	50-140			
Methyl tert-butyl ether	9.16	0.05	ug/g	ND	91.6	50-140			
Methylene Chloride	3.45	0.05	ug/g	ND	86.3	60-130			
Styrene	4.25	0.05	ug/g	ND	106	60-130			
1,1,1,2-Tetrachloroethane	3.58	0.05	ug/g	ND	89.5	60-130			
1,1,2,2-Tetrachloroethane	3.87	0.05	ug/g	ND	96.8	60-130			
Tetrachloroethylene	3.78	0.05	ug/g	ND	94.4	60-130			
Toluene	3.92	0.05	ug/g	ND	98.1	60-130			
1,1,1-Trichloroethane	3.88	0.05	ug/g	ND	97.1	60-130			
1,1,2-Trichloroethane	3.92	0.05	ug/g	ND	98.1	60-130			
Trichloroethylene	4.22	0.05	ug/g	ND	105	60-130			
Trichlorofluoromethane	5.38	0.05	ug/g	ND	134	50-140			
Vinyl chloride	2.46	0.02	ug/g	ND	61.5	50-140			
m,p-Xylenes	8.28	0.05	ug/g	ND	104	60-130			
o-Xylene	4.63	0.05	ug/g	ND	116	60-130			
Surrogate: 4-Bromofluorobenzene	*3.28*		*ug/g*		*103*	*50-140*			
Surrogate: Dibromofluoromethane	*3.31*		*ug/g*		*103*	*50-140*			
Surrogate: Toluene-d8	*3.24*		*ug/g*		*101*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QM-06 : Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other QC.

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

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.

Paracel ID: 2039462

E D .
N S I V E .
B L E .

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Paracel Order Number (Lab Use Only): 2039462

Chain Of Custody (Lab Use Only) No. 128158

Client Name: PATERSON
Project Ref: PE4613
Page 1 of 1

Contact Name: Mark D'Arcy
Quote #:

Address: 154 Colonnade Road
PO #: 30826

E-mail: mdarcy@patersongroup.ca

Telephone: 613-226-7381

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

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Required Analysis
1	BH3-20-SS2	S		1	Sep 22/20				✓	✓				
2	BH3-20-SS6	S		1					✓					
3	BH3-20-SS11	S		2				✓						
4	BH4-20-SS5	S		1					✓	✓				
5														
6														
7														
8														
9														
10														

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):
Relinquished By (Print): Joshua Dempsey
Date/Time: Sep 24/2020

Received By Driver/Depot: M. FEDUIE
Date/Time: 24/09/20 2:49
Temperature: °C FF

Received at Lab:
Date/Time: 9-24-2020
Temperature: 11.2 °C

Verified By:
Date/Time: 9-24-2016:13
pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30843
Project: PE4613
Custody: 128180

Report Date: 22-Sep-2020
Order Date: 16-Sep-2020

Order #: 2038458

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

Paracel ID	Client ID
2038458-01	BH1-20-SS2/SS3
2038458-02	BH2-20-SS2
2038458-03	BH2-20-SS7

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30843

Report Date: 22-Sep-2020

Order Date: 16-Sep-2020

Project Description: PE4613

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	18-Sep-20	19-Sep-20
PHC F1	CWS Tier 1 - P&T GC-FID	18-Sep-20	19-Sep-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Sep-20	19-Sep-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	18-Sep-20	22-Sep-20
Solids, %	Gravimetric, calculation	18-Sep-20	21-Sep-20

Certificate of Analysis

Report Date: 22-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 16-Sep-2020

Client PO: 30843

Project Description: PE4613

	Client ID:	BH1-20-SS2/SS3	BH2-20-SS2	BH2-20-SS7	-
	Sample Date:	14-Sep-20 09:00	14-Sep-20 09:00	14-Sep-20 09:00	-
	Sample ID:	2038458-01	2038458-02	2038458-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	87.9	92.3	86.9	-
Volatiles					
Benzene	0.02 ug/g dry	-	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-
Toluene	0.05 ug/g dry	-	-	<0.05	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
Toluene-d8	Surrogate	-	-	115%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	0.02	0.04	-	-
Acenaphthylene	0.02 ug/g dry	0.07	0.20	-	-
Anthracene	0.02 ug/g dry	0.12	0.21	-	-
Benzo [a] anthracene	0.02 ug/g dry	0.28	0.40	-	-
Benzo [a] pyrene	0.02 ug/g dry	0.28	0.57	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.34	0.64	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.18	0.32	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	0.18	0.37	-	-
Chrysene	0.02 ug/g dry	0.26	0.51	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	0.05	0.08	-	-
Fluoranthene	0.02 ug/g dry	0.54	0.81	-	-
Fluorene	0.02 ug/g dry	0.02	0.03	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.17	0.29	-	-
1-Methylnaphthalene	0.02 ug/g dry	0.11	0.03	-	-
2-Methylnaphthalene	0.02 ug/g dry	0.15	0.05	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	0.26	0.08	-	-
Naphthalene	0.01 ug/g dry	0.10	0.03	-	-
Phenanthrene	0.02 ug/g dry	0.29	0.39	-	-
Pyrene	0.02 ug/g dry	0.48	0.69	-	-
2-Fluorobiphenyl	Surrogate	102%	95.9%	-	-
Terphenyl-d14	Surrogate	101%	92.3%	-	-

Certificate of Analysis

Report Date: 22-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 16-Sep-2020

Client PO: 30843

Project Description: PE4613

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
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	*1.38*		*ug/g*		*103*	*50-140*			
Surrogate: Terphenyl-d14	*1.31*		*ug/g*		*98.1*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.21*		*ug/g*		*103*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Physical Characteristics									
% Solids	92.2	0.1	% by Wt.	93.0			0.9	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	0.027	0.02	ug/g dry	0.027			0.8	40	
Anthracene	0.027	0.02	ug/g dry	0.027			0.1	40	
Benzo [a] anthracene	0.032	0.02	ug/g dry	0.031			3.2	40	
Benzo [a] pyrene	0.039	0.02	ug/g dry	0.038			2.7	40	
Benzo [b] fluoranthene	0.046	0.02	ug/g dry	0.045			1.9	40	
Benzo [g,h,i] perylene	0.029	0.02	ug/g dry	0.036			19.2	40	
Benzo [k] fluoranthene	0.022	0.02	ug/g dry	0.022			1.9	40	
Chrysene	0.034	0.02	ug/g dry	0.039			15.4	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	0.062	0.02	ug/g dry	0.056			10.9	40	
Fluorene	ND	0.02	ug/g dry	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.026	0.02	ug/g dry	0.027			2.6	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	0.023	0.02	ug/g dry	ND			NC	40	
Pyrene	0.055	0.02	ug/g dry	0.058			4.9	40	
Surrogate: 2-Fluorobiphenyl	*1.41*		*ug/g dry*		*97.3*	*50-140*			
Surrogate: Terphenyl-d14	*1.52*		*ug/g dry*		*105*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*10.9*		*ug/g dry*		*115*	*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)	204	7	ug/g	ND	102	80-120			
F2 PHCs (C10-C16)	103	4	ug/g	ND	112	60-140			
F3 PHCs (C16-C34)	297	8	ug/g	ND	132	60-140			
F4 PHCs (C34-C50)	189	6	ug/g	ND	132	60-140			
Semi-Volatiles									
Acenaphthene	0.172	0.02	ug/g	ND	94.7	50-140			
Acenaphthylene	0.216	0.02	ug/g	0.027	104	50-140			
Anthracene	0.212	0.02	ug/g	0.027	102	50-140			
Benzo [a] anthracene	0.197	0.02	ug/g	0.031	91.1	50-140			
Benzo [a] pyrene	0.214	0.02	ug/g	0.038	97.1	50-140			
Benzo [b] fluoranthene	0.279	0.02	ug/g	0.045	129	50-140			
Benzo [g,h,i] perylene	0.207	0.02	ug/g	0.036	94.3	50-140			
Benzo [k] fluoranthene	0.213	0.02	ug/g	0.022	106	50-140			
Chrysene	0.226	0.02	ug/g	0.039	103	50-140			
Dibenzo [a,h] anthracene	0.193	0.02	ug/g	ND	107	50-140			
Fluoranthene	0.232	0.02	ug/g	0.056	97.2	50-140			
Fluorene	0.158	0.02	ug/g	ND	86.9	50-140			
Indeno [1,2,3-cd] pyrene	0.214	0.02	ug/g	0.027	103	50-140			
1-Methylnaphthalene	0.240	0.02	ug/g	ND	133	50-140			
2-Methylnaphthalene	0.252	0.02	ug/g	ND	139	50-140			
Naphthalene	0.228	0.01	ug/g	ND	126	50-140			
Phenanthrene	0.199	0.02	ug/g	ND	110	50-140			
Pyrene	0.231	0.02	ug/g	0.058	95.4	50-140			
Surrogate: 2-Fluorobiphenyl	*1.59*		*ug/g*		*110*	*50-140*			
Surrogate: Terphenyl-d14	*1.57*		*ug/g*		*108*	*50-140*			
Volatiles									
Benzene	4.23	0.02	ug/g	ND	106	60-130			
Ethylbenzene	3.98	0.05	ug/g	ND	99.5	60-130			
Toluene	3.82	0.05	ug/g	ND	95.5	60-130			
m,p-Xylenes	8.15	0.05	ug/g	ND	102	60-130			
o-Xylene	4.02	0.05	ug/g	ND	101	60-130			
Surrogate: Toluene-d8	*7.71*		*ug/g*		*96.4*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARA LABORATOR

Paracel ID: 2038458

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2038458	No. 128180

Client Name: PATERSON — TC 1013

Page 1 of 1

Contact Name: MARK DARCY

Quote #:

Address: 154 COLONNADE Rd. S. OTTAWA ONT.

PO #: 30843

E-mail: mdarcy@PATERSONGROUP.ca

Telephone: (613) 226-7381

Turnaround Time

☐ 1 day ☐ 3 day

☐ 2 day ☑ Regular

Date Required:

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Required Analysis
1	BH1-20-SS2/SS3	S	\	1	SEPT 14/20	—			↘					
2	BH2-20-SS2	↓	↓	1	↓	↓			↘					
3	BH2-20-SS7	↓	↓	2	↓	↓	↘							
4	BH2-20-SS8 ← (HOLD!)	↓	↓	2	↓	↓								
5														
6														
7														
8														
9														
10														

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): DOMINIC LANDRY	Date/Time: 16/09/20 3:46	Date/Time: Sep 16, 2020 04:27	Date/Time: 16 Sep 2020
Date/Time: SEPT. 16/2020	Temperature: °C	Temperature: 14.1 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 31226
Project: PE4613
Custody: 55535

Report Date: 11-Dec-2020
Order Date: 7-Dec-2020

Order #: 2050084

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

Paracel ID	Client ID
2050084-01	BH3-20-GW2
2050084-02	BH5-20-GW2
2050084-03	BH2017-07
2050084-04	BHMW1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 11-Dec-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Dec-2020

Client PO: 31226

Project Description: PE4613

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	8-Dec-20	8-Dec-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	9-Dec-20	9-Dec-20
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	10-Dec-20	11-Dec-20

Certificate of Analysis

Report Date: 11-Dec-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Dec-2020

Client PO: 31226

Project Description: PE4613

	Client ID:	BH3-20-GW2	BH5-20-GW2	BH2017-07	BHMW1
	Sample Date:	04-Dec-20 09:00	04-Dec-20 09:00	04-Dec-20 09:00	04-Dec-20 09:00
	Sample ID:	2050084-01	2050084-02	2050084-03	2050084-04
	MDL/Units	Water	Water	Water	Water
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	-	<25	-	<25
F2 PHCs (C10-C16)	100 ug/L	-	<100	-	<100
F3 PHCs (C16-C34)	100 ug/L	-	<100	-	<100
F4 PHCs (C34-C50)	100 ug/L	-	<100	-	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01	<0.01	0.08
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	<0.01	0.23
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<0.01	0.25
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	0.30
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<0.05	0.16
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	0.14
Chrysene	0.05 ug/L	<0.05	<0.05	<0.05	0.28
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	<0.01	<0.01	<0.01	0.56
Fluorene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<0.05	0.15
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	<0.10	<0.10
Naphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.05 ug/L	<0.05	<0.05	<0.05	0.32
Pyrene	0.01 ug/L	<0.01	<0.01	<0.01	0.47
2-Fluorobiphenyl	Surrogate	86.2%	94.8%	113%	106%
Terphenyl-d14	Surrogate	108%	108%	111%	123%

Certificate of Analysis

Report Date: 11-Dec-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Dec-2020

Client PO: 31226

Project Description: PE4613

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*20.2*		*ug/L*		*101*	*50-140*			
Surrogate: Terphenyl-d14	*22.6*		*ug/L*		*113*	*50-140*			

Certificate of Analysis

Report Date: 11-Dec-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Dec-2020

Client PO: 31226

Project Description: PE4613

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	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1890	25	ug/L	ND	94.5	68-117			
F2 PHCs (C10-C16)	1340	100	ug/L	ND	83.5	60-140			
F3 PHCs (C16-C34)	3290	100	ug/L	ND	83.9	60-140			
F4 PHCs (C34-C50)	1930	100	ug/L	ND	78.0	60-140			
Semi-Volatiles									
Acenaphthene	4.47	0.05	ug/L	ND	89.5	50-140			
Acenaphthylene	4.07	0.05	ug/L	ND	81.3	50-140			
Anthracene	3.52	0.01	ug/L	ND	70.5	50-140			
Benzo [a] anthracene	3.81	0.01	ug/L	ND	76.2	50-140			
Benzo [a] pyrene	4.07	0.01	ug/L	ND	81.5	50-140			
Benzo [b] fluoranthene	5.58	0.05	ug/L	ND	112	50-140			
Benzo [g,h,i] perylene	4.08	0.05	ug/L	ND	81.6	50-140			
Benzo [k] fluoranthene	5.21	0.05	ug/L	ND	104	50-140			
Chrysene	4.29	0.05	ug/L	ND	85.8	50-140			
Dibenzo [a,h] anthracene	4.42	0.05	ug/L	ND	88.5	50-140			
Fluoranthene	3.77	0.01	ug/L	ND	75.5	50-140			
Fluorene	4.29	0.05	ug/L	ND	85.9	50-140			
Indeno [1,2,3-cd] pyrene	4.34	0.05	ug/L	ND	86.8	50-140			
1-Methylnaphthalene	4.93	0.05	ug/L	ND	98.5	50-140			
2-Methylnaphthalene	5.37	0.05	ug/L	ND	107	50-140			
Naphthalene	4.25	0.05	ug/L	ND	85.1	50-140			
Phenanthrene	3.60	0.05	ug/L	ND	72.1	50-140			
Pyrene	3.92	0.01	ug/L	ND	78.5	50-140			
Surrogate: 2-Fluorobiphenyl	*19.3*		*ug/L*		*96.7*	*50-140*			
Surrogate: Terphenyl-d14	*22.6*		*ug/L*		*113*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2050084

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2050084	№ 55535

Client Name: PATERSON GROUP	Project Ref: PE 4613	Page 1 of 1
Contact Name: MARK D'ARCY	Quote #:	Turnaround Time
Address: 154 COLONNADE Rd. S. OTTAWA, ONT.	PO #: 31226	☐ 1 day ☐ 3 day
	E-mail: Mdarcy@PATERSONGroup.ca	☐ 2 day ☑ Regular
Telephone: (613) 226 - 7381		Date Required:

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PAH's	PHC's
1	BH3-20-GW2	GW		3	DEC. 4/20	—	✓	
2	BH5-20-GW2	↓		4	↓	↓	✓	✓
3	BH2017-07	↓		3	↓	↓	✓	
4	BHMW1	↓		4	↓	↓	✓	✓
5								
6								
7								
8								
9								
10								

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign): [signature]	Received By Driver/Depot:	Received at Lab: Sumeeparn Dokmai	Verified By: [signature]
Relinquished By (Print): Dominic Landry	Date/Time:	Date/Time: DEC 07, 2020 02.30	Date/Time: 12-7-20 14:4[illegible]
Date/Time: DEC. 7/2020	Temperature: °C	Temperature: 13.1 °C	pH Verified: ☐ By:

TABLE 1		CLIENT: Paterson Group Consulting Engineers				
PARACEL LABORATORIES LTD.		ATTENTION: Mark D'Arcy				
WORKORDER: 2050084		PROJECT: PE4613				
REPORT DATE: 12/11/2020		REFERENCE: Standing Offer				

Parameter	Units	MDL	Regulation	Sample			
				BH3-20-GW2 2050084-01	BH5-20-GW2 2050084-02	BH2017-07 2050084-03	BHMW1 2050084-04
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Non-Potable Groundwater, coarse	12/04/2020 09:00 AM	12/04/2020 09:00 AM	12/04/2020 09:00 AM	12/04/2020 09:00 AM
Hydrocarbons							
F1 PHCs (C6-C10)	ug/L	25	750 ug/L	N/A	ND (25)	N/A	ND (25)
F2 PHCs (C10-C16)	ug/L	100	150 ug/L	N/A	ND (100)	N/A	ND (100)
F3 PHCs (C16-C34)	ug/L	100	500 ug/L	N/A	ND (100)	N/A	ND (100)
F4 PHCs (C34-C50)	ug/L	100	500 ug/L	N/A	ND (100)	N/A	ND (100)
Semi-Volatiles							
Acenaphthene	ug/L	0.05	600 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Acenaphthylene	ug/L	0.05	1.8 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Anthracene	ug/L	0.01	2.4 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	0.08
Benzo[a]anthracene	ug/L	0.01	4.7 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	0.23
Benzo[a]pyrene	ug/L	0.01	0.81 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	0.25
Benzo[b]fluoranthene	ug/L	0.05	0.75 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	0.30
Benzo[g,h,i]perylene	ug/L	0.05	0.2 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	0.16
Benzo[k]fluoranthene	ug/L	0.05	0.4 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	0.14
Chrysene	ug/L	0.05	1 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	0.28
Dibenzo[a,h]anthracene	ug/L	0.05	0.52 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Fluoranthene	ug/L	0.01	130 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	0.56
Fluorene	ug/L	0.05	400 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Indeno[1,2,3-cd]pyrene	ug/L	0.05	0.2 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	0.15
1-Methylnaphthalene	ug/L	0.05	1800 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2-Methylnaphthalene	ug/L	0.05	1800 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Methylnaphthalene (1&2)	ug/L	0.10	1800 ug/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Naphthalene	ug/L	0.05	1400 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Phenanthrene	ug/L	0.05	580 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	0.32
Pyrene	ug/L	0.01	68 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	0.47