patersongroup

Consulting Engineers

154 Colonnade Road South
Ottawa, Ontario
Canada, K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Geological Engineering
Materials Testing
Building Science
Archaeological Studies

www.patersongroup.ca

October 14, 2020
File: PE3651-LET.03

Richcraft (Lisgar) Ltd.
201-2280 St. Laurent Boulevard
Ottawa, Ontario
K1G 4K1

Attention: **Ms. Fairouz Wahab**

Subject: **Phase II - Environmental Site Assessment Update**
Proposed Residential Development
176 Nepean Street and 293 to 307 Lisgar Street
Ottawa, Ontario

Dear Madame,

Further to your request, Paterson Group (Paterson) carried out a Phase II - Environmental Site Assessment (ESA) Update for the aforementioned properties. This report updates a previous Phase II-ESA report entitled, *"Phase II Environmental Site Assessment, 176 Nepean Street and 293 to 307 Lisgar Street, Ottawa, Ontario,"* completed by Paterson, dated February 5, 2018. This Phase II ESA Update has been completed in accordance with O.Reg. 153/04, as amended, under the Environmental Protection Act. This report is to be read in conjunction with the Phase II ESA Report (PE3651-REP.02).

Background Information

Physical Setting

The Phase II Property is located in an urban area surrounded by various sized commercial and residential structures. Site topography slopes slightly down towards the north and east. The Phase II Property is at a similar grade as the adjacent properties. Site drainage consists primarily of sheet flow to a catch basins both on site and along Lisgar and Nepean Streets. The Phase II Property is situated within a municipally serviced area.

Past Investigations

A Phase I ESA was conducted by Paterson in August of 2017. Based on the findings of the Phase I ESA, historical on- and off-site potentially contaminating activities (PCAs) were considered to result in three (3) areas of potential environmental concern (APECs) on the Phase I and Phase II Property, as presented in Table 1.

Table 1
Area 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	At locations of former building foundations.	30 – Importation of Fill Material of Unknown Quality	On-site	BTEX/PHCs (F_1-F_4) and PAHs	Soil, Groundwater
				Metals Hg, CrVI (add to table in Phase I ESA Update)	Soil (fill material)
APEC 2	Southwestern portion of Phase I Property	28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	BTEX/PHCs (F_1-F_4)	Soil, Groundwater
APEC 3	Northwestern portion of Phase I Property	37 – Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-site	VOCs	Soil, Groundwater

Paterson subsequently completed a Phase II ESA in February 2018 to address the aforementioned APECs.

The subsurface investigation consisted of drilling seven (7) boreholes, five (5) of which were constructed with groundwater monitoring well installations.

Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of 12 soil samples were submitted for laboratory analysis of a combination of volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs, F_1-F_4), polycyclic aromatic hydrocarbons (PAHs) and metals. Several PAH and metal parameters exceeding the selected MECP Table 3 Residential Standards were identified in the fill material across the majority of the subject site.

Additional PAH and metals analyses were conducted for the underlying native silty clay. No PAH parameters were detected in the native silty clay.

Metal parameters, specifically cobalt and vanadium were identified at concentrations exceeding the selected MECP Standards. Based on our experience, however, these parameters are naturally occurring at elevated concentrations in silty clays within the Ottawa region. Furthermore, they were not present at elevated concentrations in the overlying impacted fill material and as such, they are not considered contaminants of concern in the native material.

Groundwater samples obtained from three (3) monitoring wells, BH1A, BH3 and BH5, were analysed for VOCs, PHC, and/or PAHs. Based on the analytical results, no detectable parameter concentrations were identified with one exception. A concentration of chloroform marginally exceeding the selected standard was identified in BH2. The chloroform was considered to have resulted from the use of municipal groundwater during the rock coring process and was expected to dissipate over time. The groundwater was considered to be in compliance with the MECP Table 3 Standards.

Based on the findings of the Phase II ESA, an environmental site remediation was recommended to remove the PAH and metal impacted fill material across the subject site.

A Phase I ESA update was completed by Paterson in October of 2020. Based on the findings of the assessment, no new or materially changed APECs were identified on the subject property. As such, the findings of the 2018 Phase II ESA were considered to be representative of the current site conditions. It was recommended that the 2018 Phase II ESA be updated within 18 months of filing an RSC for the subject property, in accordance with O.Reg. 153/04, as amended.

Impediments

No impediments were encountered during this Phase II ESA Update.

Investigation Method

A groundwater sampling event took place on September 24, 2020. A groundwater sample was collected from BH1A and submitted for volatile organic compounds (VOC) analysis.

Review and Evaluation

Geology

Site soils generally consist of a pavement structure over fill material, underlain by native silty clay, glacial till and shale bedrock. The fill material primarily consists of brown silty sand with gravel and ranges in depth from approximately 1 to 1.5 m below grade. With the exception of the fill identified at BH5, fill material was observed to contain fragments of construction debris (brick and concrete) coal and/or ash at the remaining borehole locations. Shale bedrock was identified at depths ranging from approximately 6.3 to 7.5 m below grade. Site stratigraphy is shown on Drawings PE3651-7R - Cross-Section A-A' and PE3651-8R – Cross-Section B-B'.

Groundwater was encountered within the shale at depths ranging from 10.2 to 10.7m below existing grade.

Further details regarding the soil profile are provided on the Soil Profile and Test Data Sheets appended to the 2018 Phase II ESA Report.

Groundwater Elevations, Flow Direction and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on September 24, 2020, using an electronic water level meter. Groundwater levels are summarized in Table 2. All measurements are relative to the top spindle of a fire hydrant located on the south side of Lisgar Street, south of the Phase II Property, with geodetic elevation 72.57m above sea level (ASL).

Table 2
Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1A	71.82	9.46	62.36	September 24, 2020
BH1	71.84	9.54	62.30	
BH5	72.00	9.42	62.58	

Based on the August 2017 groundwater sampling, the groundwater contour mapping was completed. groundwater beneath the Phase II Property appears to be flowing in an easterly direction with a horizontal hydraulic gradient of approximately 0.026 m/m was calculated. The groundwater contour plan is shown on Drawing PE3651-3R.

Groundwater Quality

A groundwater sample and a duplicate sample (BH7-GW2) were recovered from monitoring well BH1A and were submitted for laboratory analysis of volatile organic compounds (VOCs). The results of the analytical testing are presented in Table 3. The laboratory certificate of analysis is appended to this report.

Table 3
Analytical Test Results – Groundwater (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 3 Standards (µg/L)
		September 24, 2020		
		BH1A-GW2 (9.1-12.2m)	BH7-GW2 (DUP)	
Acetone	5	nd	nd	130000
Benzene	0.5	nd	nd	44
Bromodichloromethane	0.5	nd	nd	85000
Bromoform	0.5	nd	nd	380
Bromomethane	0.5	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	630
Chloroform	0.5	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	2300
Ethylene dibromide	0.2	nd	nd	0.25
Hexane	1	nd	nd	51
Methyl Ethyl Ketone	5	nd	nd	470000
Methyl Isobutyl Ketone	5	nd	nd	140000
Methyl tert-butyl ether	2	nd	nd	190
Methylene Chloride	5	nd	nd	610
Styrene	0.5	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	1.6
Toluene	0.5	3.8	3.8	18000
1,1,1-Trichloroethane	0.5	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	1.6
Trichlorofluoromethane	1	nd	nd	2500

Table 3
Analytical Test Results – Groundwater (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 3 Standards (µg/L)
		September 24, 2020		
		BH1A-GW2 (9.1-12.2m)	BH7-GW2 (DUP)	
Vinyl Chloride	0.5	nd	nd	0.5
Xylenes, total	0.5	nd	nd	4200

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

No detectable VOC concentrations were identified in the groundwater samples analyzed. The results comply with the selected MECP Table 3 Standards.

Quality Assurance and Quality Control Results

All samples submitted as part of this recent sampling event were handled in accordance with the Analytical Protocol with respect to holding time, preservation method, storage requirement, and container type.

A duplicate of groundwater Sample BH1A-GW2 and a trip blank were analyzed for VOCs. No detectable VOC concentrations were identified in the original sample or the duplicate sample recovered from BH1A, or the trip blank.

As per Subsection 47(3) of O.Reg. 153/04 as amended by O.Reg. 269/11, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

Phase II Conceptual Site Model

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Table 1 in the Past Investigations Section of this report, PCAs considered to result in APECs on the Phase II Property include:

- Item 30: Importation of Fill Material of Unknown Quality, resulting in APEC 1 across the northern and southeastern portions of the Phase I Property in the vicinity of historical building foundations;
- Item 28: Gasoline and Associated Products Storage in Fixed Tanks, resulting in APEC 2 on the southwestern portion of the Phase II Property in the vicinity of an interior aboveground storage tank (AST) which is no longer in use; and

- ❒ Item 37: Operation of Dry Cleaning Equipment (where chemicals are used), an off-site PCA (former dry cleaners at 211 Bank Street) resulting in APEC 3 on the northern portion of the Phase II Property.

Contaminants of Potential Concern

Contaminants of potential concern identified in association with the aforementioned APECs include BTEX, VOCs, PHCs and PAHs in the soil and groundwater. Metals, Hg and CrVI are considered to be CPCs in the fill material only.

Subsurface Structures and Utilities

Based on underground service locates completed prior to the 2017 subsurface investigation, buried telephone and electrical services are present on the Phase II Property. Their approximate locations are shown on Drawing: PE3651-3R – Test Hole Location Plan. A buried natural gas service previously extended from Lisgar Avenue to the residential dwelling. Buried water and sewer services are also considered to be present on site, however their locations could not be confirmed.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE3651-6R - Cross-Section A-A' and PE3651-7R – Cross-Section B-B'. Stratigraphy consists of:

- ❑ Pavement structure ranging from 25 to 50mm in depth and consisting of asphaltic concrete underlain by a granular base (sand and gravel).

- ❑ Fill ranging in depth from approximately 1 to 1.5 m below ground surface and generally consisting of brown silty sand with gravel. Construction debris (brick and concrete fragments) suspected ash and/or coal fragments were noted at all borehole locations with the exception of BH5.

- ❑ Native silty clay extending to depths ranging from approximately 3.7 to 5.3 m below grade.

- ❑ Glacial till consisting of silty clay with some sand and shale fragments was encountered below the silty clay to depths ranging from 6.3 to 7.5 m below grade.

Shale bedrock was encountered at depths ranging from 6.3 to 7.5 m below grade. This is the deepest unit investigated. Groundwater was encountered in this stratigraphic unit.

Hydrogeological Characteristics

Groundwater was encountered in the shale bedrock beneath the Phase II Property. This unit is interpreted to function as a local aquifer at the subject site.

Water levels were measured at the subject site as part of this Phase II ESA Update. Water levels have been summarized in Table 2 of this report and are presented on Drawing PE3651-3R.

Based on the groundwater elevations measured during the August 31, 2017 monitoring event, groundwater contour mapping was completed and the horizontal hydraulic gradient for the subject site was calculated. Groundwater flow at the subject site was determined to be in an easterly direction with a hydraulic gradient of approximately 0.026 m/m was calculated. Think we need to use the original contour plan, as noted previously.

Approximate Depth to Bedrock

Bedrock was identified in all boreholes at depths ranging from 6.3 to 7.5m below grade.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 10.3 and 10.7m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the Phase II Property.

Section 43.1 of the Regulation does apply to the Phase II Property in that it is not within 30m of a body of water and there is more than 2m of overburden across the site.

Fill Placement

Fill material was identified across the Phase II Property and generally consisted of silty sand and gravel to depths ranging from approximately 1 to 1.5m below grade. Fill material in the immediate vicinity of former building foundations was noted to contain fragments of construction debris (including brick and concrete) as well as possible ash and coal fragments.

Proposed Buildings and Other Structures

It is our understanding that the site is to be redeveloped with two multi-storey residential towers with ground floor commercial space. The towers will be connected below grade through 4 levels of underground parking.

Existing Buildings and Structures

A two-storey residential dwelling, with a full basement, is currently situated on the southwestern portion of the subject land. A parking kiosk is present to the northeast of the dwelling. No other buildings or structures are present on the subject site.

Water Bodies

There are no water bodies on the Phase II Property or on lands within the 250 m search radius.

Areas of Natural Significance

No areas of natural significance are present on the Phase II Property or on lands within the 250 m search radius.

Environmental Condition

Areas Where Contaminants are Present

Based on screening and analytical results PAH and metal concentrations exceeding MECP Table 3 standards were identified in the fill material. Cobalt and vanadium concentrations exceeding MECP Table 3 standards were identified in the underlying native silty clay; these concentrations are considered to be naturally occurring in clay soils within the Ottawa region and are not considered to be contaminants of concern.

A chloroform concentration marginally exceeding the MECP Table 3 standards was identified in the groundwater recovered from BH2; the chloroform concentration is considered to have resulted from the use of municipal groundwater during the rock coring process and is not considered to be a contaminant of concern. Based on the findings of the Phase II ESA and Phase II ESA Update, the groundwater at the Phase II Property complies with MECP Table 3 Standards (sometimes the S is capitalized and sometimes it's not). Analytical test results are present in plan view on Drawings PE3651-4R and 5R – Analytical Testing Plans.

Types of Contaminants

The following parameters were identified in the fill material at concentrations exceeding the MECP Table 3 standards:

- PAHs - acenapthylene, anthracene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluroanthene, benzo[k]fluoranthene, dibenzo[a,h]anthracene, fluoranthene, Indeno[1,2,3-cd]pyrene, naphthalene and phenanthrene.
- Metals – antimony, barium, lead, nickel, zinc and mercury.

All other PAH and metal parameters detected in the fill material were in compliance with the MECP Table 3 Standards.

Contaminated Media

Based on the results of the Phase II ESA, some of the fill material is impacted with PAH and metal concentrations exceeding MECP Table 3 standards. Groundwater on the subject site complies with the MECP Table 3 Standards.

What Is Known About Areas Where Contaminants Are Present

Impacted fill is present on the northern portion of the property east of the community garden and on the southeastern portion of the property, in the vicinity of BH1, BH2, BH3 and BH6. Analytical test results exceeding the MECP Table 3 Standards are presented on Drawings PE3651-4R, PE3651-7R and PE3651-8R.

Distribution and Migration of Contaminants

As previously noted, the PAH and metal impacts are considered to be limited to the fill material. Based on their low solubility in combination with the depth of the water table in the bedrock, well beneath the fill material, the potential for migration is considered to be negligible. Further, groundwater beneath the Phase II Property is in compliance with MECP Table 3 Standards.

Contaminant distribution is presented in both plan view and cross-section, on Drawings PE3651-4R, PE3651-7R and PE3651-8R.

Discharge of Contaminants

Metal and PAH concentrations are considered to have been directly discharged to the soil through historical infilling of former building foundations or historical storage/management of coal (and resulting ash) for heating purposes.

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.

Due to the Phase II Property having been covered largely by asphaltic concrete and building structures and the low solubilities of PAHs and metals, precipitation and infiltration are not considered to have contributed to the migration of the identified parameters. Based on analytical testing of the underlying native soils and groundwater, which is present well below the fill material, impacts are considered to be confined to the fill material.

Potential for Vapour Intrusion

Given the low organic vapour readings, the potential for vapour intrusion within the

Recommendations

Based on the 2018 Phase II ESA in combination with this Phase II ESA Update, fill material impacted with PAH and metal concentrations exceeding MECP Table 3 Standards is present on the Phase II Property. It is our understanding that the subject site is to be redeveloped with two multi-storey apartment towers with 2 to 5 levels of underground parking.

It is our recommendation that an environmental site remediation program, involving the removal of all impacted fill material, be completed concurrently with the site redevelopment. Prior to offsite disposal at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct confirmatory sampling as required.

It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903, at the time of construction excavation.

Statement of Limitations

This Phase II - Environmental Site Assessment Update report has been prepared under the supervision of a Qualified Person in general accordance with Ontario Regulation 153/04, as amended, by O.Reg. 269/11 under the Environmental Protection Act. The conclusions presented herein are based on information gathered from a limited historical review and field inspection program. The findings of the Phase II - ESA Update are based on a review of readily available geological, historical and regulatory information and a cursory review made at the time of the field assessment.

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 Richcraft (Lisgar) Ltd. Permission and notification from the above noted party and this firm will be required to release this report to any other party.

We trust that this submission satisfies your current requirements. Should you have any questions please contact the undersigned.

Paterson Group Inc.

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

Karyn Munch, P. Eng., QP$_{ESA}$

Report Distribution

- ❑ Richcraft (Lisgar) Ltd.
- ❑ Paterson Group (1 copy)

Appendix

- ❑ Figure 1 - Key Plan
- ❑ Drawing PE3651-3R - Test Hole Location Plan
- ❑ Drawing PE3651-4AR– Analytical Testing Plan – Soil (BTEX/PHCs and VOCs)
- ❑ Drawing PE3651-4BR – Analytical Testing Plan – Soil (PAHs)
- ❑ Drawing PE3651-4CR – Analytical Testing Plan – Soil (Metals)
- ❑ Drawing PE3651-5R – Analytical Testing Plan – Groundwater (BTEX/PHCs, VOCs and PAHs)
- ❑ Drawing PE3651-6R - Groundwater Contour Plan
- ❑ Drawing PE3651-7AR - Cross-Section A-A' – Soil (BTEX/PHCs and VOCs)
- ❑ Drawing PE3651-7BR – Cross-Section A-A' – Soil (PAHs)
- ❑ Drawing PE3651-7CR – Cross-Section A-A' – Soil (Metals)
- ❑ Drawing PE3651-7DR – Cross-Section A-A' – Groundwater
- ❑ Drawing PE3651-8AR – Cross-Section B-B' – Soil (BTEX/PHCs and VOCs)
- ❑ Drawing PE351-8BR – Cross-Section B-B' – Soil (PAHs)
- ❑ Drawing PE3651-8CR – Cross-Section B-B' – Soil (Metals)
- ❑ Drawing PE3651-8DR – Cross-Section B-B' – Groundwater
- ❑ Drawing PE3651-9R – Contaminant Transport Diagram
- ❑ Laboratory Certificates of Analysis

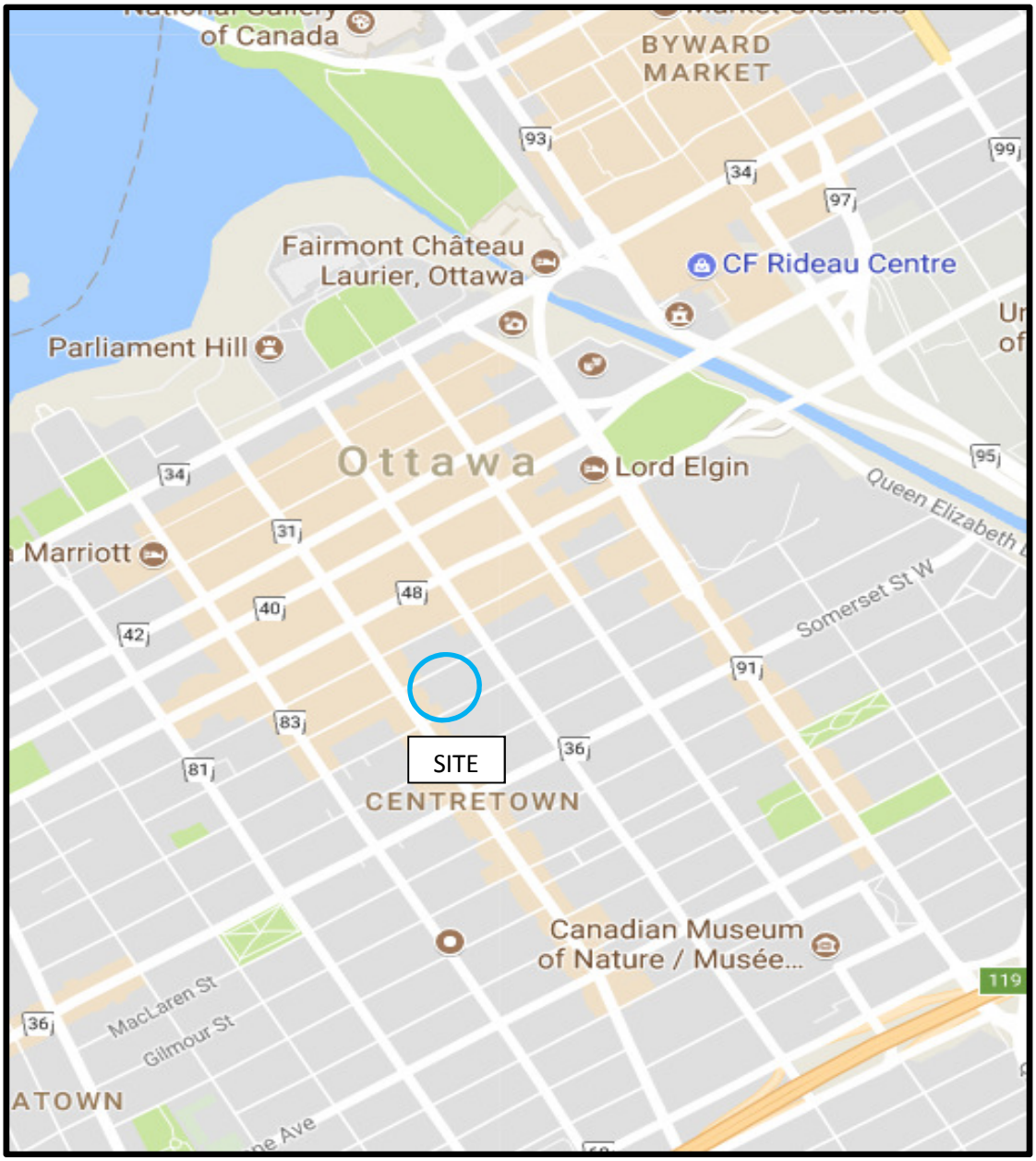


FIGURE 1

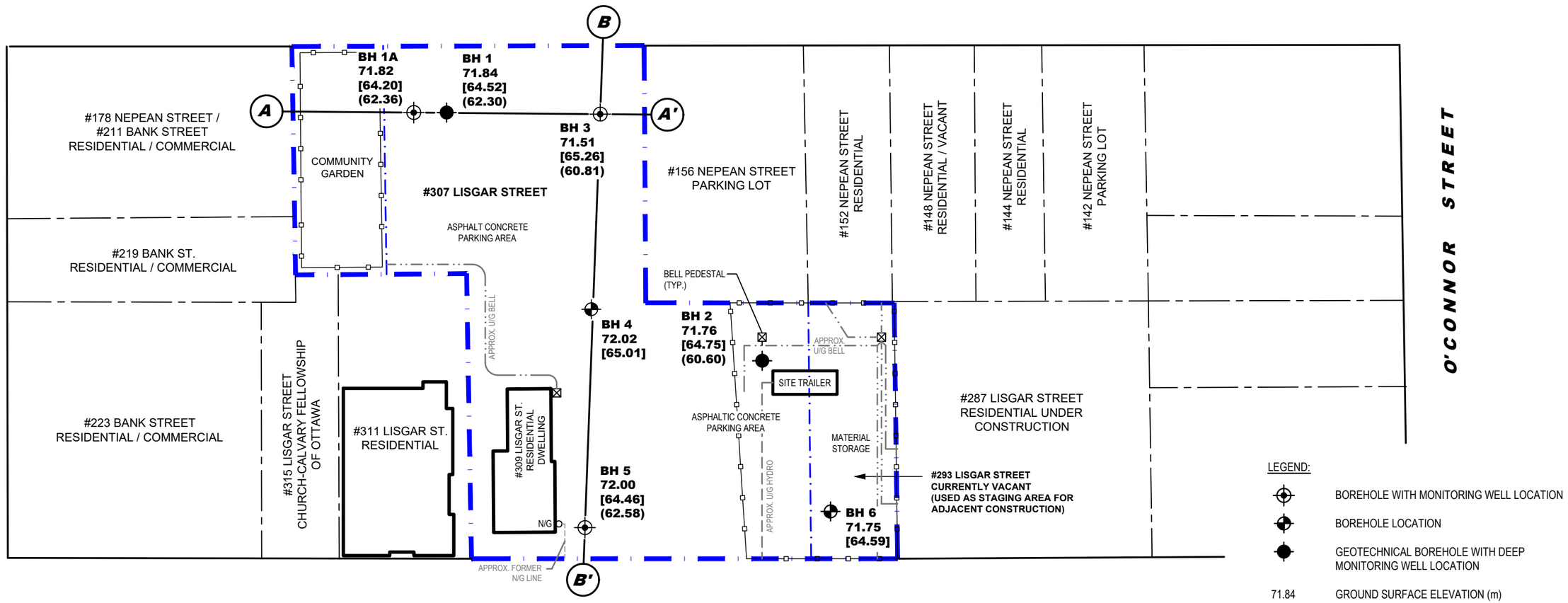
KEY PLAN

#203 BANK STREET
RESIDENTIAL/COMMERCIAL

#171 NEPEAN STREET
RESIDENTIAL /
COMMERCIAL

#153 NEPEAN STREET
RESIDENTIAL APPARTMENT

#143 NEPEAN STREET
PARKING LOT



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- GEOTECHNICAL BOREHOLE WITH DEEP MONITORING WELL LOCATION
- 71.84 GROUND SURFACE ELEVATION (m)
- [64.52] BEDROCK SURFACE ELEVATION (m)
- (61.63) GROUNDWATER SURFACE ELEVATION (m)
- A — A' CROSS-SECTION LOCATION

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 72.57m.

#318 LISGAR STREET
VACANT

#312
LISGAR ST.
VACANT

FH - BM

#300 LISGAR STREET
RESIDENTIAL APPARTMENTS

#355 COOPER STREET
DOMINION CHALMERS UNITED CHURCH PARKING LOT

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

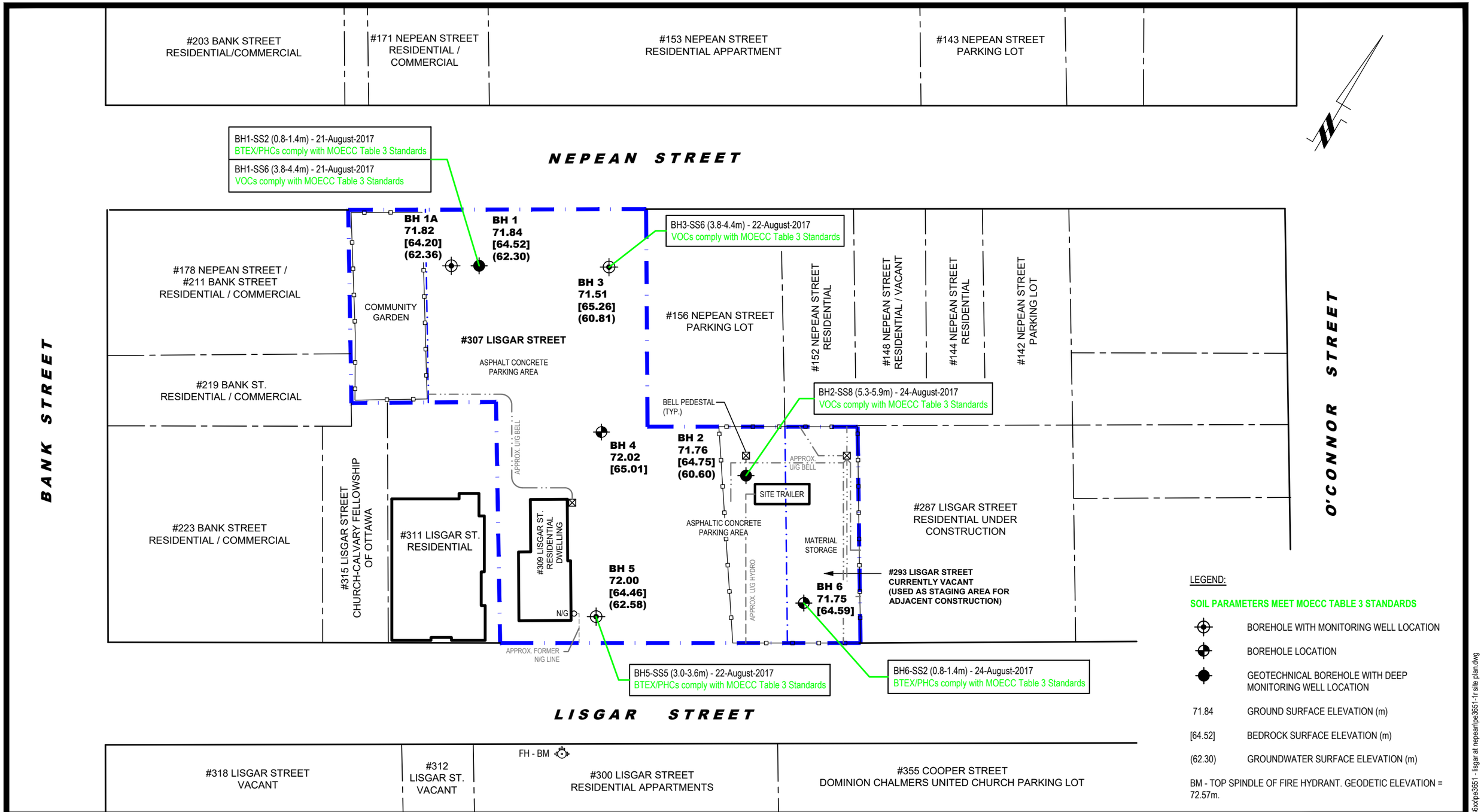
PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:500	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-3R
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-1r site plan.dwg



LEGEND:

SOIL PARAMETERS MEET MOECC TABLE 3 STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- GEOTECHNICAL BOREHOLE WITH DEEP MONITORING WELL LOCATION
- 71.84 GROUND SURFACE ELEVATION (m)
- [64.52] BEDROCK SURFACE ELEVATION (m)
- (62.30) GROUNDWATER SURFACE ELEVATION (m)

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 72.57m.

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET
OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - SOIL**
BTEX / PHC / VOC

Scale: 1:500	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-4AR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-1r site plan.dwg

BH1-SS2 (0.8-1.4m) - 21-August-2017

Parameter	Result	MOECC
Mercury	0.4	0.27
Barium	418	390
Lead	247	120
Nickel	120	100
Zinc	341	340

Other metals comply with MOECC Table 3 Standards

BH1-SS3 (1.5-2.1m) - 21-August-2017

Parameter	Result	MOECC
Cobalt	22.2*	22
Vanadium	93.7*	86

*Parameters considered to be naturally occuring at elevated levels in native silty clay

Other metals comply with MOECC Table 3 Standards

#171 NEPEAN STREET
RESIDENTIAL / COMMERCIAL

#153 NEPEAN STREET
RESIDENTIAL APPARTMENT

#143 NEPEAN STREET
PARKING LOT

NEPEAN STREET

BH3-SS2 (0.8-1.4m) - 24-August-2017
Metals comply with MOECC Table 3 Standards

BH 1A
71.82
[64.20]
(62.36)

BH 1
71.84
[64.52]
(62.30)

BH 3
71.51
[65.26]
(60.81)

#178 NEPEAN STREET /
#211 BANK STREET
RESIDENTIAL / COMMERCIAL

COMMUNITY GARDEN

#307 LISGAR STREET

ASPHALT CONCRETE PARKING AREA

#156 NEPEAN STREET
PARKING LOT

#152 NEPEAN STREET
RESIDENTIAL

#148 NEPEAN STREET
RESIDENTIAL / VACANT

#144 NEPEAN STREET
RESIDENTIAL

#142 NEPEAN STREET
PARKING LOT

BH2-SS3 (1.5-2.1m) - 21-August-2017

Parameter	Result	MOECC
Vanadium	93.7*	86

*Parameters considered to be naturally occuring at elevated levels in native silty clay

Other metals comply with MOECC Table 3 Standards

BELL PEDESTAL (TYP.)

BH 2
71.76
[64.75]
(60.60)

BH 4
72.02
[65.01]

APPROX. U/G BELL

APPROX. U/G BELL

SITE TRAILER

#219 BANK ST.
RESIDENTIAL / COMMERCIAL

#223 BANK STREET
RESIDENTIAL / COMMERCIAL

#315 LISGAR STREET
CHURCH-CALVARY FELLOWSHIP
OF OTTAWA

#311 LISGAR ST.
RESIDENTIAL

#309 LISGAR ST.
RESIDENTIAL
DWELLING

ASPHALTIC CONCRETE PARKING AREA

MATERIAL STORAGE

#287 LISGAR STREET
RESIDENTIAL UNDER
CONSTRUCTION

BH 5
72.00
[64.46]
(62.58)

BH 6
71.75
[64.59]

#293 LISGAR STREET
CURRENTLY VACANT
(USED AS STAGING AREA FOR
ADJACENT CONSTRUCTION)

N/G

APPROX. U/G HYDRO

APPROX. FORMER N/G LINE

BANK STREET

O'CONNOR STREET

LISGAR STREET

BH6-SS2 (0.8-1.4m) - 24-August-2017

Parameter	Result	MOECC
Mercury	1.1	0.27
Antimony	97.9	7.5
Lead	551	120

Other metals comply with MOECC Table 3 Standards

BH6-SS3 (1.5-2.1m) - 24-August-2017

Parameter	Result	MOECC
Cobalt	23.5*	22
Vanadium	113*	86

*Parameters considered to be naturally occuring at elevated levels in native silty clay

Other metals comply with MOECC Table 3 Standards

#318 LISGAR STREET
VACANT

#312
LISGAR ST.
VACANT

FH - BM

#300 LISGAR STREET
RESIDENTIAL APPARTMENTS

LEGEND:

SOIL PARAMETERS MEET MOECC TABLE 3 STANDARDS

SOIL PARAMETERS EXCEED MOECC TABLE 3 STANDARDS

APPROX. AREA OF SOIL IMPACTED WITH METALS EXCEEDING MOECC TABLE 3 STANDARDS

BOREHOLE WITH MONITORING WELL LOCATION

BOREHOLE LOCATION

GEOTECHNICAL BOREHOLE WITH DEEP MONITORING WELL LOCATION

71.84 GROUND SURFACE ELEVATION (m)

[64.52] BEDROCK SURFACE ELEVATION (m)

(61.63) GROUNDWATER SURFACE ELEVATION (m)

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 72.57m.

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - SOIL METALS

Scale: 1:500	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-4BR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-1r site plan.dwg

BH1-SS2 (0.8-1.4m) - 21-August-2017

Parameter	Result	MOECC
Anthracene	0.95	0.67
Benzo[a]anthracene	2.47	0.5
Benzo[a]pyrene	3.29	0.3
Benzo[b]fluoranthene	3.68	0.78
Benzo[k]flouranthene	2.16	0.78
Dibenzo[a,h]anthracene	0.69	0.1
Fluoranthene	5.38	0.69
Indeno[1,2,3-cd]pyrene	2.2	0.38

Other PAHs comply with MOECC Table 3 Standards

BH1-SS3 (1.5-2.1m) - 21-August-2017
PAHs were not detected in sample; results in compliance with MOECC Table 3 Standards

BH3-SS2 (0.8-1.4m) - 22-August-2017

Parameter	Result	MOECC
Benzo[a]anthracene	0.66	0.5
Benzo[a]pyrene	0.59	0.3
Dibenzo[a,h]anthracene	0.11	0.1
Fluoranthene	1.71	0.69

Other PAHs comply with MOECC Table 3 Standards

BH3-SS3 (1.5-2.1m) - 22-August-2017
PAHs were not detected in sample; results in compliance with MOECC Table 3 Standards

BH2-G1/SS2 (0.3-1.4m) - 24-August-2017

Parameter	Result	MOECC
Acenapthylene	0.74	0.15
Anthracene	2.01	0.67
Benzo[a]anthracene	3.16	0.5
Benzo[a]pyrene	2.82	0.3
Benzo[b]fluoranthene	2.77	0.78
Benzo[k]flouranthene	1.82	0.78
Dibenzo[a,h]anthracene	0.5	0.1
Fluoranthene	8.52	0.69
Indeno[1,2,3-cd]pyrene	1.48	0.38
Naphthalene	0.66	0.6
Phenanthrene	6.47	6.2

Other PAHs comply with MOECC Table 3 Standards

BH2-SS3 (1.5-2.1m) - 24-August-2017
PAHs were not detected in sample; results in compliance with MOECC Table 3 Standards

BH6-SS3 (1.5-2.1m) - 24-August-2017
PAHs were not detected in sample; results in compliance with MOECC Table 3 Standards

#171 NEPEAN STREET
RESIDENTIAL / COMMERCIAL

#153 NEPEAN STREET
RESIDENTIAL APPARTMENT

#143 NEPEAN STREET
PARKING LOT

NEPEAN STREET

BH 1A
71.82
[64.20]
(62.36)

BH 1
71.84
[64.52]
(62.30)

BH 3
71.51
[65.26]
(60.81)

#178 NEPEAN STREET /
#211 BANK STREET
RESIDENTIAL / COMMERCIAL

COMMUNITY
GARDEN

#307 LISGAR STREET

#156 NEPEAN STREET
PARKING LOT

ASPHALT CONCRETE
PARKING AREA

BELL PEDESTAL
(TYP.)

BANK STREET

#219 BANK ST.
RESIDENTIAL / COMMERCIAL

BH 4
72.02
[65.01]

BH 2
71.76
[64.75]
(60.60)

APPROX. U/G BELL

APPROX.
U/G BELL

SITE TRAILER

#315 LISGAR STREET
CHURCH-CAL VARY FELLOWSHIP
OF OTTAWA

#223 BANK STREET
RESIDENTIAL / COMMERCIAL

#311 LISGAR ST.
RESIDENTIAL

#309 LISGAR ST.
RESIDENTIAL
DWELLING

ASPHALTIC CONCRETE
PARKING AREA

MATERIAL
STORAGE

#287 LISGAR STREET
RESIDENTIAL UNDER
CONSTRUCTION

BH 5
72.00
[64.46]
(62.58)

N/G

APPROX. U/G HYDRO

#293 LISGAR STREET
CURRENTLY VACANT
(USED AS STAGING AREA FOR
ADJACENT CONSTRUCTION)

BH 6
71.75
[64.59]

APPROX. FORMER
N/G LINE

O'CONNOR STREET

LISGAR STREET

#318 LISGAR STREET
VACANT

#312
LISGAR ST.
VACANT

FH - BM

#300 LISGAR STREET
RESIDENTIAL APPARTMENTS

#355 COOPER STREET
DOMINION CHALMERS UNITED CHURCH PARKING LOT

LEGEND:

SOIL PARAMETERS MEET MOECC TABLE 3 STANDARDS

SOIL PARAMETERS EXCEED MOECC TABLE 3 STANDARDS

APPROX. AREA OF SOIL IMPACTED WITH PAHs EXCEEDING MOECC TABLE 3 STANDARDS

BOREHOLE WITH MONITORING WELL LOCATION

BOREHOLE LOCATION

GEOTECHNICAL BOREHOLE WITH DEEP MONITORING WELL LOCATION

71.84 GROUND SURFACE ELEVATION (m)

[64.52] BEDROCK SURFACE ELEVATION (m)

(61.63) GROUNDWATER SURFACE ELEVATION (m)

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 72.57m.

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL PAHs

Scale: 1:500	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-4CR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-1r site plan.dwg

#203 BANK STREET
RESIDENTIAL/COMMERCIAL

#171 NEPEAN STREET
RESIDENTIAL /
COMMERCIAL

#153 NEPEAN STREET
RESIDENTIAL APPARTMENT

#143 NEPEAN STREET
PARKING LOT

BH1A-GW1 (9.1-12.2m) - 31-August-2014
BTEX/PHC, VOCs, PAHs comply with MOECC Table 3 Standards

BH1A-GW2 (9.1-12.2m) - 24-September-2020
VOCs comply with MECP Table 3 Standards

BH7-GW2 (DUP) (9.1-12.2m) - 24-September-2020
VOCs comply with MECP Table 3 Standards

NEPEAN STREET

BH3-GW1 (10.1-13.2m) - 31-August-2014
BTEX/PHC, VOCs, PAHs comply with MOECC Table 3 Standards

BANK STREET

O'CONNOR STREET

BH 1A
71.82
[64.20]
(62.36)

BH 1
71.84
[64.52]
(62.30)

BH 3
71.51
[65.26]
(60.81)

#178 NEPEAN STREET /
#211 BANK STREET
RESIDENTIAL / COMMERCIAL

COMMUNITY
GARDEN

#307 LISGAR STREET

ASPHALT CONCRETE
PARKING AREA

#156 NEPEAN STREET
PARKING LOT

#152 NEPEAN STREET
RESIDENTIAL

#148 NEPEAN STREET
RESIDENTIAL / VACANT

#144 NEPEAN STREET
RESIDENTIAL

#142 NEPEAN STREET
PARKING LOT

#219 BANK ST.
RESIDENTIAL / COMMERCIAL

BELL PEDESTAL
(TYP.)

BH 4
72.02
[65.01]

BH 2
71.76
[64.75]
(60.60)

APPROX. U/G BELL

APPROX. U/G BELL

SITE TRAILER

#315 LISGAR STREET
CHURCH-CALVARY FELLOWSHIP
OF OTTAWA

#311 LISGAR ST.
RESIDENTIAL

#309 LISGAR ST.
RESIDENTIAL
DWELLING

N/G

ASPHALTIC CONCRETE
PARKING AREA

MATERIAL
STORAGE

#287 LISGAR STREET
RESIDENTIAL UNDER
CONSTRUCTION

#223 BANK STREET
RESIDENTIAL / COMMERCIAL

BH 5
72.00
[64.46]
(62.58)

APPROX. UIG HYDRO

#293 LISGAR STREET
CURRENTLY VACANT
(USED AS STAGING AREA FOR
ADJACENT CONSTRUCTION)

BH 6
71.75
[64.59]

APPROX. FORMER
N/G LINE

BH5-GW1 (9.1-12.2m) - 31-August-2014
BTEX/PHC and VOCs comply with MOECC Table 3 Standards

LISGAR STREET

#318 LISGAR STREET
VACANT

#312
LISGAR ST.
VACANT

FH - BM

#300 LISGAR STREET
RESIDENTIAL APPARTMENTS

#355 COOPER STREET
DOMINION CHALMERS UNITED CHURCH PARKING LOT

LEGEND:

GROUNDWATER PARAMETERS MEET MOECC TABLE 3 STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- GEOTECHNICAL BOREHOLE WITH DEEP MONITORING WELL LOCATION
- 71.84 GROUND SURFACE ELEVATION (m)
- [64.52] BEDROCK SURFACE ELEVATION (m)
- (61.63) GROUNDWATER SURFACE ELEVATION (m)

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 72.57m.

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

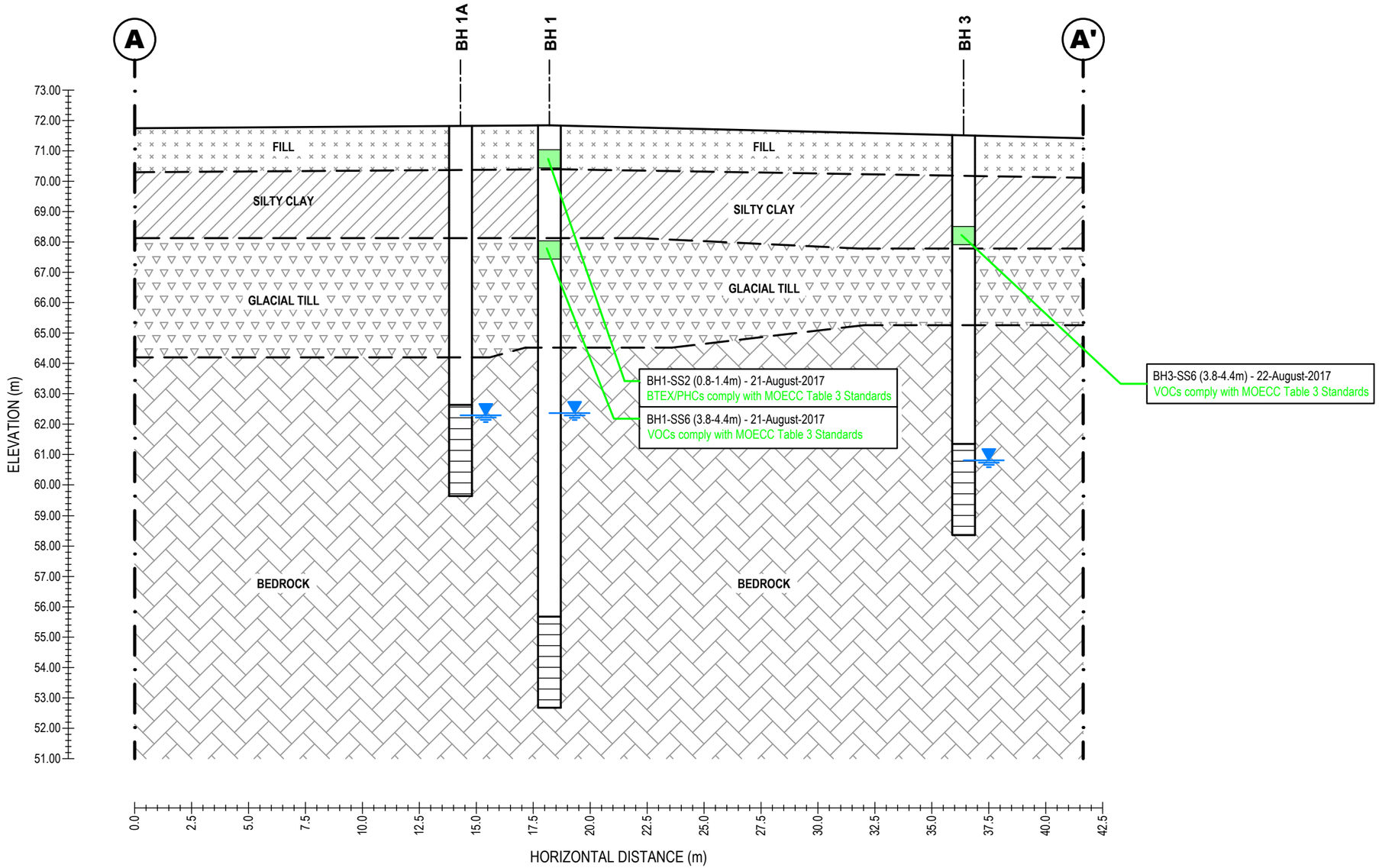
PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - GROUNDWATER**
BTEX / PHC / VOC / PAH

Scale: 1:500	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-5R
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-1r site plan.dwg



LEGEND:

SOIL PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

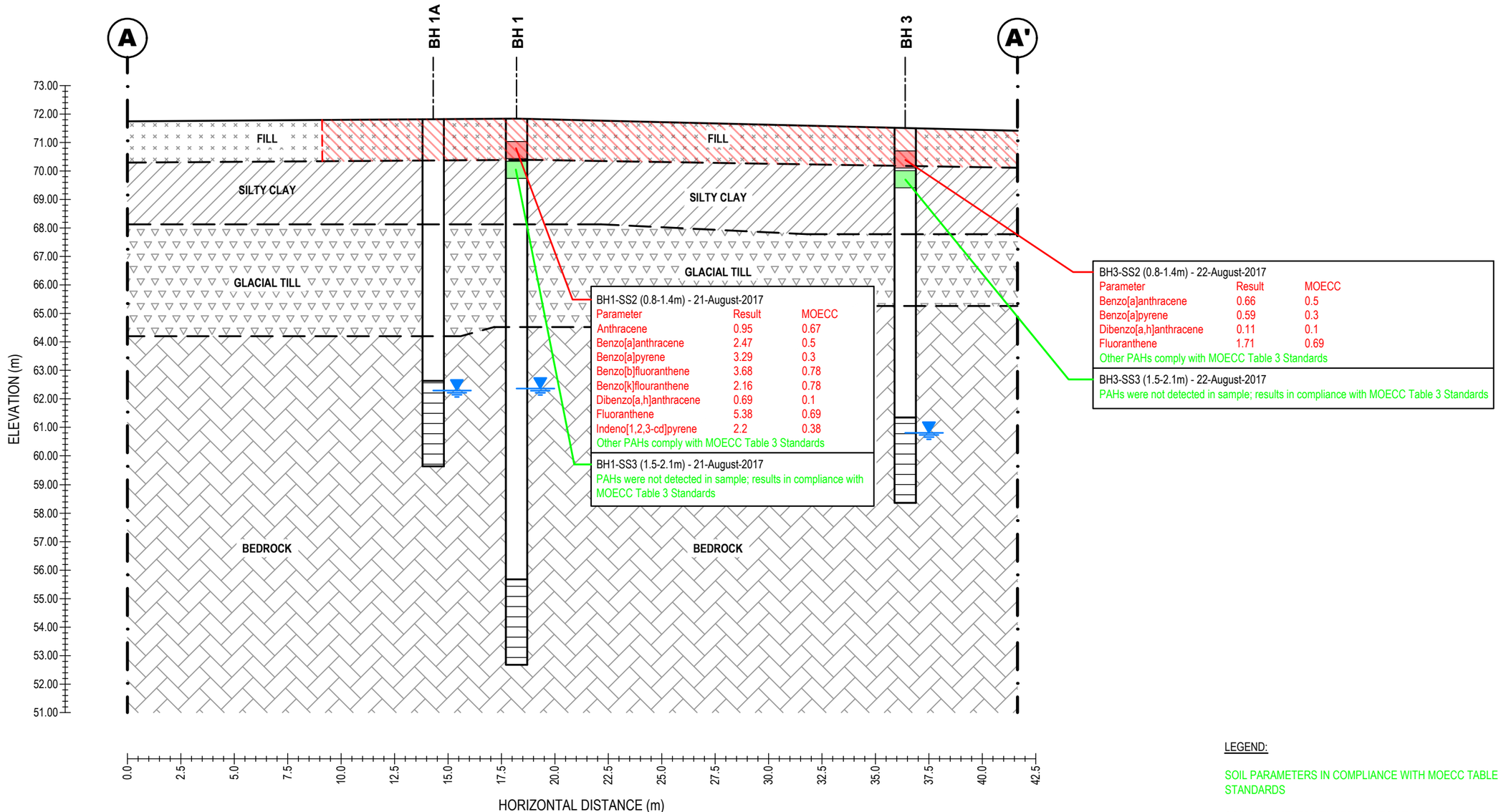
PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title: CROSS-SECTION A-A' - SOIL BTEX / PHC / VOC

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-7AR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-7 seca revision.dwg



BH1-SS2 (0.8-1.4m) - 21-August-2017

Parameter	Result	MOECC
Anthracene	0.95	0.67
Benzo[a]anthracene	2.47	0.5
Benzo[a]pyrene	3.29	0.3
Benzo[b]fluoranthene	3.68	0.78
Benzo[k]fluoranthene	2.16	0.78
Dibenzo[a,h]anthracene	0.69	0.1
Fluoranthene	5.38	0.69
Indeno[1,2,3-cd]pyrene	2.2	0.38

Other PAHs comply with MOECC Table 3 Standards

BH1-SS3 (1.5-2.1m) - 21-August-2017

PAHs were not detected in sample; results in compliance with MOECC Table 3 Standards

BH3-SS2 (0.8-1.4m) - 22-August-2017

Parameter	Result	MOECC
Benzo[a]anthracene	0.66	0.5
Benzo[a]pyrene	0.59	0.3
Dibenzo[a,h]anthracene	0.11	0.1
Fluoranthene	1.71	0.69

Other PAHs comply with MOECC Table 3 Standards

BH3-SS3 (1.5-2.1m) - 22-August-2017

PAHs were not detected in sample; results in compliance with MOECC Table 3 Standards

LEGEND:

SOIL PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

SOIL PARAMETERS EXCEED MOECC TABLE 3 STANDARDS

APPROX. AREA OF SOIL IMPACTED WITH PAHs EXCEEDING MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

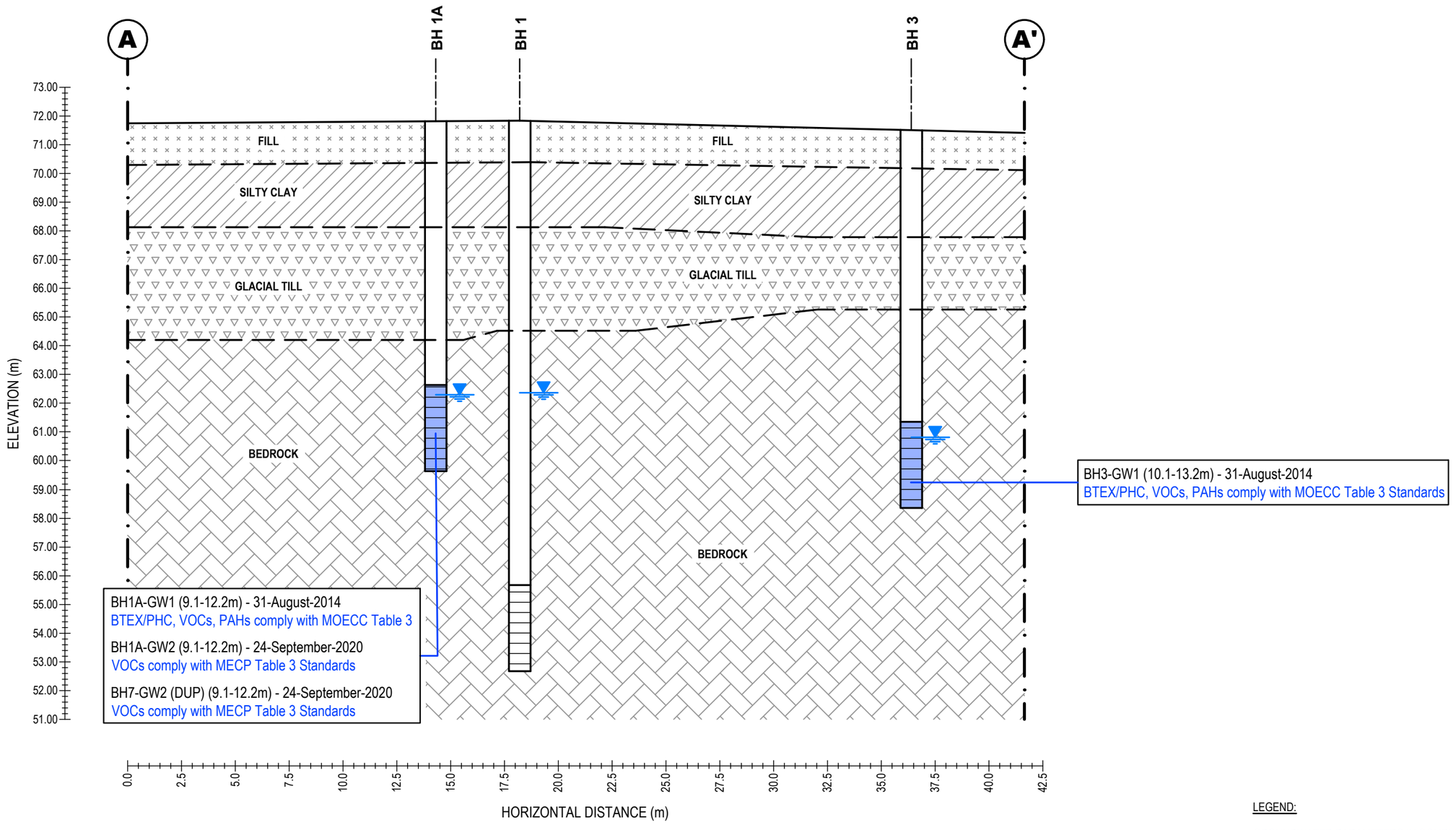
RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET
OTTAWA, ONTARIO

Title: CROSS-SECTION A-A' - SOIL PAHs

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-7CR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-7 seca revision.dwg



LEGEND:

GROUNDWATER PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

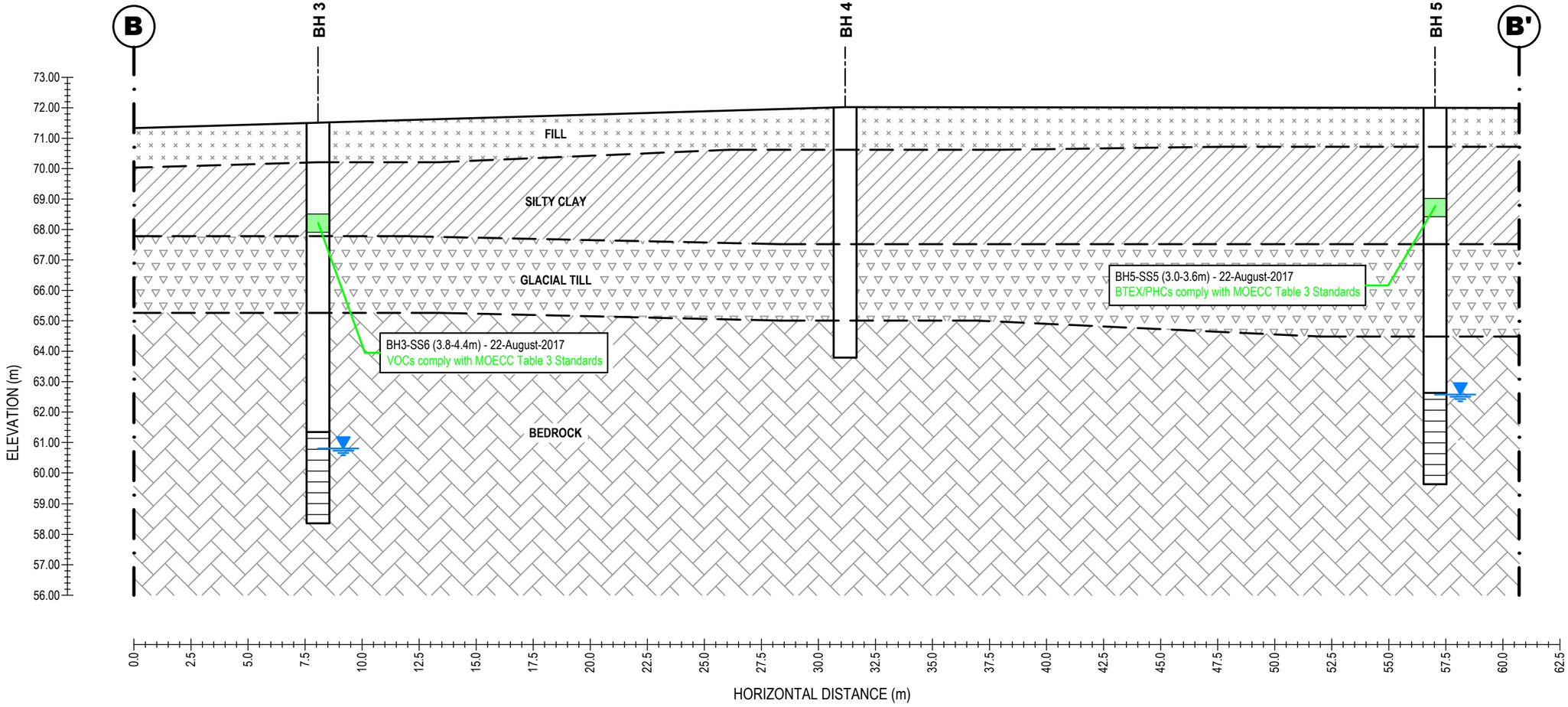
RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET
OTTAWA, ONTARIO

Title: **CROSS-SECTION A-A' - GROUNDWATER BTEX / PHC / VOC / PAH**

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-7DR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-7 seca revision.dwg



LEGEND:

SOIL PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

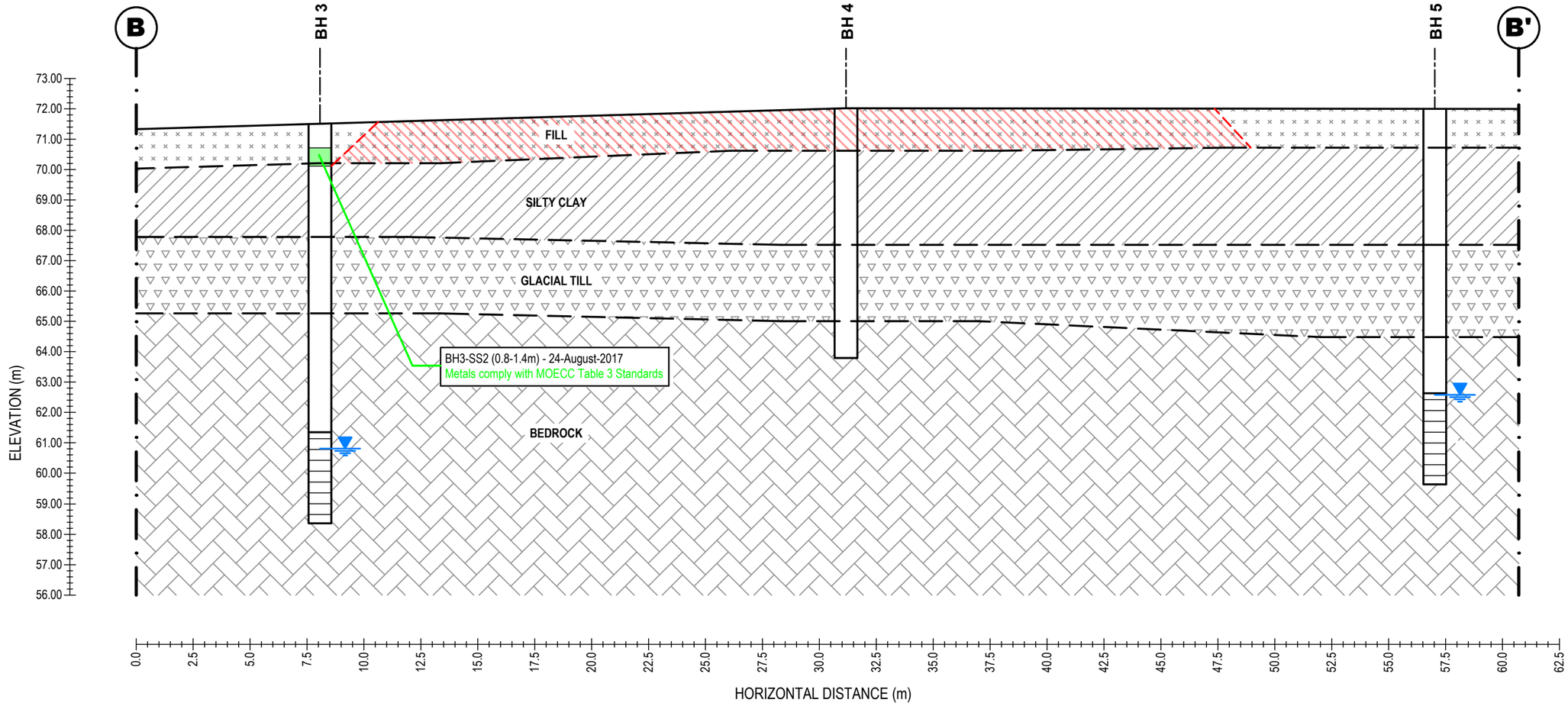
RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title: CROSS-SECTION B-B' - SOIL BTEX / PHC / VOC

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-8AR
Approved by: MSD	Revision No.: 0



LEGEND:

SOIL PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

APPROX. AREA OF SOIL IMPACTED WITH METALS EXCEEDING MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

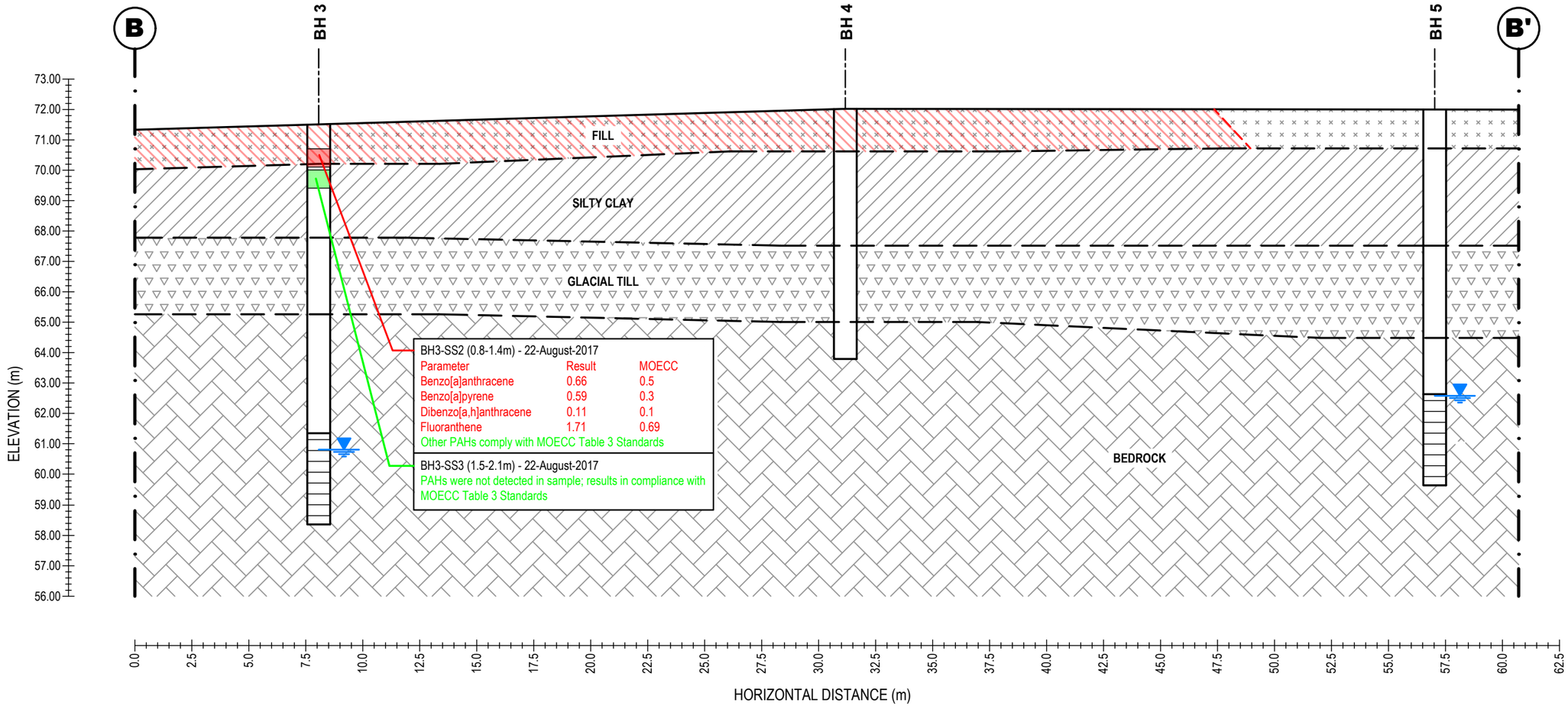
RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-8BR
Approved by: MSD	Revision No.: 0



LEGEND:

SOIL PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

SOIL PARAMETERS EXCEED MOECC TABLE 3 STANDARDS

APPROX. AREA OF SOIL IMPACTED WITH PAHs EXCEEDING MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

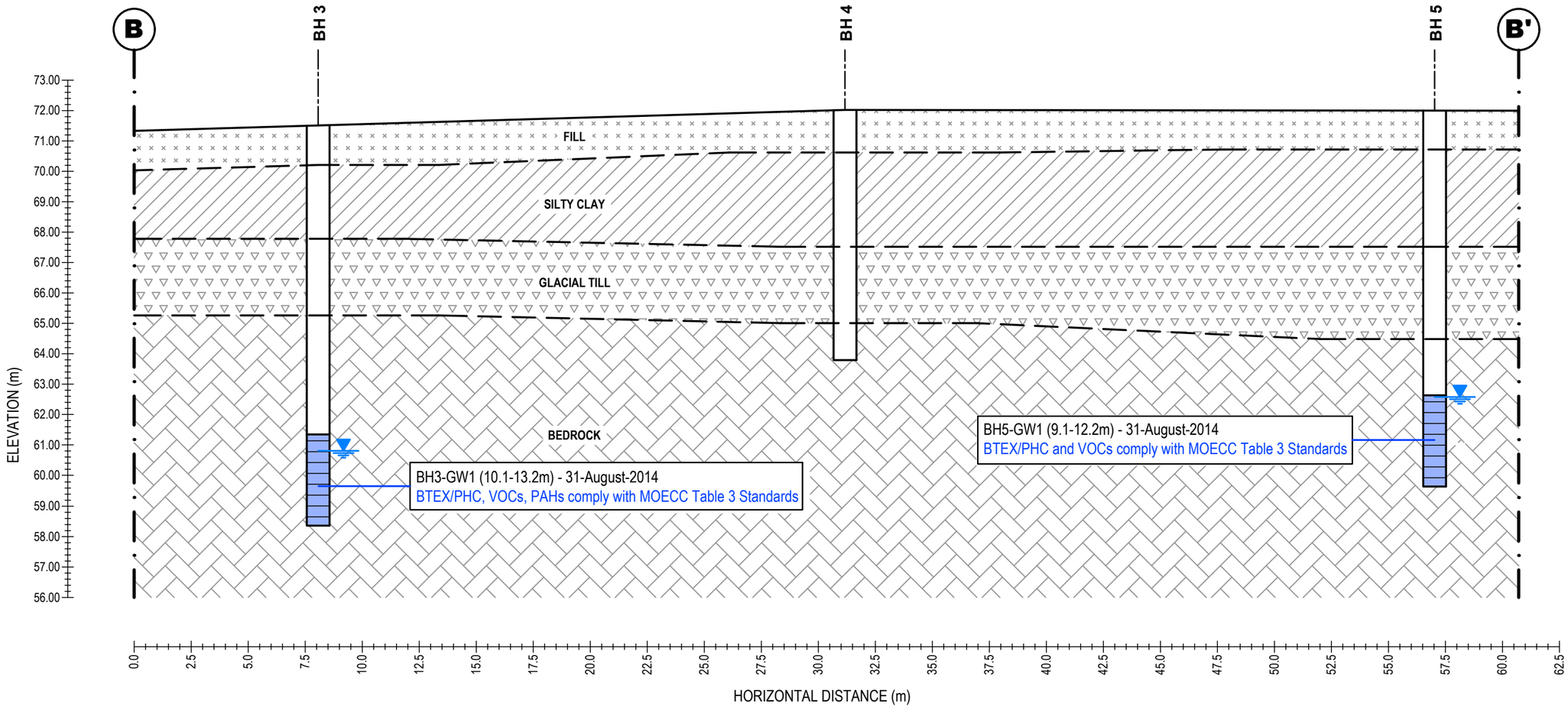
PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title: **CROSS-SECTION B-B' - SOIL PAHs**

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-8CR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-7 seca revision.dwg



LEGEND:

GROUNDWATER PARAMETERS IN COMPLIANCE WITH MOECC TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

RICHCRAFT HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
176 NEPEAN STREET AND 293 LISGAR STREET

OTTAWA, ONTARIO

Title: CROSS-SECTION B-B' - GROUNDWATER BTEX / PHC / VOC / PAH

Scale: AS SHOWN	Date: 10/2020
Drawn by: MPG	Report No.: PE3651-LET.03
Checked by: KM	Dwg. No.: PE3651-8DR
Approved by: MSD	Revision No.: 0

p:\autocad drawings\environmental\pe36xx\pe3651 - lisgar at nepean\pe3651-7 seca revision.dwg

PARACEL LABORATORIES LTD.

TRUSTED.
RESPONSIVE.
RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30864
Project: PE3651
Custody: 128204

Report Date: 28-Sep-2020
Order Date: 25-Sep-2020

Order #: 2039598

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

Paracel ID	Client ID
2039598-01	BH1A-GW2
2039598-02	BH7-GW2
2039598-03	Trip Blank

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 28-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30864

Project Description: PE3651

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	25-Sep-20	27-Sep-20

Certificate of Analysis

Report Date: 28-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30864

Project Description: PE3651

	Client ID:	BH1A-GW2	BH7-GW2	Trip Blank	-
	Sample Date:	24-Sep-20 09:00	24-Sep-20 09:00	23-Sep-20 09:00	-
	Sample ID:	2039598-01	2039598-02	2039598-03	-
	MDL/Units	Water	Water	Water	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 28-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30864

Project Description: PE3651

	Client ID:	BH1A-GW2	BH7-GW2	Trip Blank	-
	Sample Date:	24-Sep-20 09:00	24-Sep-20 09:00	23-Sep-20 09:00	-
	Sample ID:	2039598-01	2039598-02	2039598-03	-
	MDL/Units	Water	Water	Water	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	124%	124%	119%	-
Dibromofluoromethane	Surrogate	106%	106%	107%	-
Toluene-d8	Surrogate	104%	107%	108%	-

Certificate of Analysis

Report Date: 28-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30864

Project Description: PE3651

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*96.0*		*ug/L*		*120*	*50-140*			
Surrogate: Dibromofluoromethane	*79.0*		*ug/L*		*98.8*	*50-140*			
Surrogate: Toluene-d8	*86.9*		*ug/L*		*109*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	9.23	0.5	ug/L	9.40			1.8	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*95.7*		*ug/L*		*120*	*50-140*			
Surrogate: Dibromofluoromethane	*84.8*		*ug/L*		*106*	*50-140*			
Surrogate: Toluene-d8	*86.8*		*ug/L*		*109*	*50-140*			

Certificate of Analysis

Report Date: 28-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Sep-2020

Client PO: 30864

Project Description: PE3651

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	57.4	5.0	ug/L	ND	57.4	50-140			
Benzene	35.0	0.5	ug/L	ND	87.6	60-130			
Bromodichloromethane	36.6	0.5	ug/L	ND	91.5	60-130			
Bromoform	43.3	0.5	ug/L	ND	108	60-130			
Bromomethane	27.6	0.5	ug/L	ND	69.0	50-140			
Carbon Tetrachloride	41.8	0.2	ug/L	ND	105	60-130			
Chlorobenzene	34.3	0.5	ug/L	ND	85.8	60-130			
Chloroform	32.7	0.5	ug/L	ND	81.8	60-130			
Dibromochloromethane	40.1	0.5	ug/L	ND	100	60-130			
Dichlorodifluoromethane	33.2	1.0	ug/L	ND	82.9	50-140			
1,2-Dichlorobenzene	33.2	0.5	ug/L	ND	82.9	60-130			
1,3-Dichlorobenzene	32.8	0.5	ug/L	ND	82.0	60-130			
1,4-Dichlorobenzene	34.1	0.5	ug/L	ND	85.2	60-130			
1,1-Dichloroethane	32.4	0.5	ug/L	ND	81.0	60-130			
1,2-Dichloroethane	28.9	0.5	ug/L	ND	72.2	60-130			
1,1-Dichloroethylene	35.2	0.5	ug/L	ND	87.9	60-130			
cis-1,2-Dichloroethylene	35.8	0.5	ug/L	ND	89.4	60-130			
trans-1,2-Dichloroethylene	36.0	0.5	ug/L	ND	89.9	60-130			
1,2-Dichloropropane	34.3	0.5	ug/L	ND	85.7	60-130			
cis-1,3-Dichloropropylene	35.0	0.5	ug/L	ND	87.6	60-130			
trans-1,3-Dichloropropylene	33.5	0.5	ug/L	ND	83.7	60-130			
Ethylbenzene	33.8	0.5	ug/L	ND	84.5	60-130			
Ethylene dibromide (dibromoethane, 1,2	33.4	0.2	ug/L	ND	83.5	60-130			
Hexane	25.3	1.0	ug/L	ND	63.2	60-130			
Methyl Ethyl Ketone (2-Butanone)	64.9	5.0	ug/L	ND	64.9	50-140			
Methyl Isobutyl Ketone	68.0	5.0	ug/L	ND	68.0	50-140			
Methyl tert-butyl ether	75.2	2.0	ug/L	ND	75.2	50-140			
Methylene Chloride	31.6	5.0	ug/L	ND	78.9	60-130			
Styrene	38.0	0.5	ug/L	ND	94.9	60-130			
1,1,1,2-Tetrachloroethane	37.1	0.5	ug/L	ND	92.8	60-130			
1,1,2,2-Tetrachloroethane	39.6	0.5	ug/L	ND	99.0	60-130			
Tetrachloroethylene	35.4	0.5	ug/L	ND	88.4	60-130			
Toluene	34.4	0.5	ug/L	ND	85.9	60-130			
1,1,1-Trichloroethane	37.8	0.5	ug/L	ND	94.6	60-130			
1,1,2-Trichloroethane	34.5	0.5	ug/L	ND	86.2	60-130			
Trichloroethylene	34.8	0.5	ug/L	ND	86.9	60-130			
Trichlorofluoromethane	34.6	1.0	ug/L	ND	86.6	60-130			
Vinyl chloride	30.0	0.5	ug/L	ND	75.0	50-140			
m,p-Xylenes	70.9	0.5	ug/L	ND	88.6	60-130			
o-Xylene	34.3	0.5	ug/L	ND	85.8	60-130			
Surrogate: 4-Bromofluorobenzene	*76.4*		*ug/L*		*95.4*	*50-140*			
Surrogate: Dibromofluoromethane	*81.3*		*ug/L*		*102*	*50-140*			
Surrogate: Toluene-d8	*74.3*		*ug/L*		*92.9*	*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

PARACEL
LABORATORIES LTD

Paracel ID: 2039598

Paracel Order Number (Lab Use Only): 2039598

Chain Of Custody (Lab Use Only)
Nº 128204

Client Name: Paterson	Project Ref: PE 3651	Page 1 of 1
Contact Name: Karyn Munch	Quote #:	**Turnaround Time**
Address: 154 Colonnade	PO #: 30864	☐ 1 day ☐ 3 day
	E-mail: kmunch@patersongroup.ca	☐ 2 day ☑ Regular
Telephone: 613 226 7381		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	Sample Taken Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
1	BH1A-GW2	GW		2	Sep 24			✓											
2	BH7-GW2	GW		2	Sep 24			✓											
3	Trip blank	O		1	Sep 23														
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): GPat	Received By Driver/Depot: [illegible]	Received at Lab: Suneeparn Dohmal	Verified By: [illegible]
Relinquished By (Print): Grant Paterson	Date/Time: 25/09/20 3:34	Date/Time: Sep 25, 2020 04.45	Date/Time: 9-25-20 17:12
Date/Time: Sep 23 2020	Temperature: °C	Temperature: 15.1 °C	pH Verified: ☐ By: