

August 19, 2020  
File: PE4914-LET.02

**Taggart (O'Connor) Corporation**  
225 Metcalfe Street, Suite 708  
Ottawa, Ontario  
K2P 1P9

Attention: **Ms. Emily McGirr**

Subject: **Phase II - Environmental Site Assessment Update**  
**267 O'Connor Street**  
**Ottawa, Ontario**

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

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Materials Testing  
Building Science  
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Dear Madam,

Further to your request, Paterson Group (Paterson) carried out a Phase II - Environmental Site Assessment (ESA) Update for the aforementioned property. This report updates a previous Phase II-ESA report entitled, "Phase II Environmental Site Assessment, 267 O'Connor Street, Commercial Property, Ottawa, Ontario," prepared by Paterson Group, dated April 8, 2014.

This update report is intended to meet the requirements for an updated Phase II ESA, as per the MECP O.Reg 153/04, as amended. This report is to be read in conjunction with the 2014 report.

## Background Information

### Physical Setting

The Phase II Property is occupied by a multi-storey medical/office building with associated parking areas and is situated in a mixed-use urban setting. The adjacent properties are generally at the same grade as the Phase II ESA property, while the regional topography slopes downwards towards the north and east. Site drainage consists mainly of sheet flow to catch basins located on the Phase II ESA property and along the adjacent roadways.

No water bodies are present on the Phase II Property or within the Phase I ESA study area. No Areas of Natural or Scientific Interest (ANSIs) are present within the 250 m study area.

## Past Investigations

- ❑ Phase I Environmental Site Assessment, Commercial Property, 267 O'Connor Street, Ottawa, Ontario", prepared by Paterson Group. Dated March 19, 2014. Prepared for: Mastercraft Starwood.

Based on the historical review and site visit, several potentially contaminating activities (PCAs) which result in Areas of Potential Environmental Concern (APEC) on the Phase I ESA property were identified. The following APECs were considered to exist on the Phase I ESA property:

- ❑ Existing Above Ground Storage Tank – An above ground storage tank was identified in the basement mechanical room of the office building.
- ❑ Fill Material of Unknown Quality – Fill Material of Unknown Quality was identified during previous subsurface investigations on the Phase I ESA property.
- ❑ Former Portrait Studio – A former portrait studio was present in the northeast corner of the Phase I ESA property.

No other PCAs considered to represent APECs on the Phase I ESA property were identified during the Phase I ESA.

- ❑ "Phase II Environmental Site Assessment, Commercial Property, 267 O'Connor Street, Ottawa, Ontario", prepared by Paterson Group. Dated April 8, 2014. Prepared for: Mastercraft Starwood.

Paterson drilled three boreholes and installed two groundwater monitoring wells as part of the Phase II ESA. Paterson identified fill material in one borehole which exceeded the MECP Table 3 Residential Standards for Barium and Vanadium. All groundwater samples were in compliance with the MECP Table 3 Standards.

A remediation was recommended to be completed in conjunction with the redevelopment of the property. No further actions were recommended.

Paterson completed a Phase I ESA Update in August 2020. Based on the report, several potentially contaminating activities were identified on the Phase I ESA property and within the Phase I ESA study area. Four of these PCAs were identified on the Phase I ESA property and are considered APECs.

- ❑ APEC1 – Existing AST
- ❑ APEC2 – Former Portrait Studio
- ❑ APEC3 – Fill Material of Unknown Quality
- ❑ APEC4 – Existing Transformer.

Based on a review of the past investigations, Paterson completed additional Phase II ESA work to address APEC1 and APEC4.

## Investigation Method

As part of the Phase II ESA Update Paterson installed one monitoring well in the basement of the existing medical/office building. The monitoring well was installed by CCC Geotechnical and Environmental Drilling under the full-time supervision of Paterson personnel.

All soil samples collected underwent a preliminary screening procedure, which included visual screening for colour and evidence of deleterious fill, as well as screening with a photo ionization detector (PID). The detection limit is 0.1 ppm, with a precision of +/- 2 ppm or 10% of the reading. No environmental concerns were identified during the screen procedure.

Paterson completed groundwater sampling at BH1-14 and the newly installed groundwater monitoring well (BH4-20) to update the groundwater quality at the Phase II ESA property.

## Phase II Conceptual Site Model

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

Based on the results of the Phase I ESA and the Phase I ESA Update completed for the Phase II ESA property, four APECs were identified on the Phase II ESA property. The APECs are summarized in the table below.

<b>Area of Potential Environmental Concern</b>	<b>Location of Area of Potential Environmental Concern</b>	<b>Potentially Contaminating Activity</b>	<b>Location of PCA (on-site or off-site)</b>	<b>Contaminants of Potential Concern</b>	<b>Media Potentially Impacted (Groundwater, Soil, and/or Sediment)</b>
Existing AST	Within basement of the existing building	Item 28: Gasoline and Associated Products Storage in Fixed Tanks	On-site	BTEX, PHCs	Soil, Groundwater
Former Portrait Studio	Northwest corner of Phase I ESA property	Not Applicable	On-site	Metals	Soil, Groundwater
Fill Material of Unknown Quality	Throughout Phase I ESA property	Item 30: Importation of fill material of unknown quality	On-site	Metals	Soil, Groundwater
Transformer	Within basement of the existing building	Item 55: Transformer manufacturing, processing, and use	On-site	BTEX, PHCs, PCBs	Soil, Groundwater

## **Contaminants of Potential Concern**

The following contaminants of potential concern (CPCs) were identified with respect to the Phase II ESA property:

### Soil and Groundwater

- Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX)
- Petroleum Hydrocarbons Fractions 1 to 4 (PHCs)
- Metals (including CrVI and Hg)
- Polychlorinated Biphenyls (PCBs)

## **Subsurface Structures and Utilities**

Underground utilities, both public and private, are expected to be present on the Phase I ESA property, however they are not expected to affect contaminant distribution and transport, based on the known contaminants on the Phase I ESA property.

No concerns regarding vapour intrusion and utility trenches are considered to be present on the RSC property at this time.

## **Physical Setting**

### **Site Stratigraphy**

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on the attached cross-section. The stratigraphy of the Phase II Property generally consists of:

- Asphalt pavement structure with an approximate thickness of 0.06 m.
- Fill material consisting of sand and gravel with trace building debris. The fill material is not expected to be a significant water generating unit at the Phase II ESA property.
- Silty clay starting beneath the fill material extending to the full depth of all boreholes. This is the deepest unit investigated. The silty clay is considered to function as the main aquifer at the Phase II ESA property.

### **Hydrogeological Setting**

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on this information, bedrock in the

area of the site consists of shale of the Billings Formation. Overburden soils consist clay and offshore marine sediment, with a drift thickness of greater than 20m.

Based on the groundwater levels collected as part of the Phase II ESA Update, groundwater beneath the Phase II Property flows towards the northeast.

### **Approximate Depth to Bedrock**

Bedrock was not encountered during the Phase II ESA. During previous geotechnical investigations the bedrock depth was determined to be in excess of 20m below the existing ground surface.

### **Approximate Depth to Water Table**

Depth to water table at the Phase II Property was approximately 4.5m below the existing ground surface based on the most recent water levels.

### **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. A search for areas of natural significance and features was completed on the Ontario Ministry of Natural Resources (MNR) website as part of the Phase I ESA within the Phase I ESA Study Area (250m Radius from site boundary) and did not reveal any areas of natural significance or environmentally sensitive areas within the Phase I ESA Study Area.

Section 43.1 of the Regulation does not apply to the Phase II ESA Property in that the subject site is not a shallow soil property and is not within 30m of a water body or sensitive receptor.

### **Fill Placement**

No potential deleterious fill material was identified on the Phase I ESA Property during the Phase I ESA site visit. The only observed fill material at the time of the Phase I ESA was crushed stone/engineered fill related to the pavement structure and is not considered soil.

Fill material was identified across the Phase II ESA property beneath the pavement structure as part of the historical Phase II ESA work. The fill material is suspected to be a mixture of reworked native soil and engineered fill with trace demolition material from the historical buildings. The fill material is considered to be the result of grading and excavation operations during site development.

### **Existing Structures and Utilities**

The site is occupied with a six-storey office/medical building and associated parking areas, with the current footprint of the building constructed in the 1960s. The building is currently heated using a natural gas boiler, however the building was formerly heated using furnace oil, as evidenced by the existing AST in the basement and vent and fill pipes. Due to the tank location (in a concrete bunker), no observations were able to be made regarding the tank size, age, and condition.

Site drainage consists mainly of sheet flow to catch basins located within the parking areas and adjacent streets. No signs of staining or discolouration were observed on the asphalt. No distressed vegetation was observed on the property.

Underground utilities, both public and private, are expected to be present on the Phase I ESA property, however they are not expected to affect contaminant distribution and transport, based on the known contaminants on the Phase I ESA property.

### **Proposed Buildings and Other Structures**

It is our understanding that two multi-storey residential apartment buildings with underground parking areas covering the majority of the property footprint are proposed for the site.

## **Environmental Condition**

### **Areas Where Contaminants are Present**

Based on the results of the 2014 Phase II ESA and the Phase II ESA Update, fill material which exceeds the MECP Table 3 Standards for Barium and Vanadium was identified in the southeast corner of the Phase II ESA property.

### **Types of Contaminants**

Based on the results of the 2014 Phase II ESA and the Phase II ESA Update, the contaminants of concern on the Phase II ESA property are considered to be the following;

- Metals (Barium and Vanadium) in the fill material

### **Contaminated Media**

Based on the results of the Phase II ESA, the soil (fill material) at the Phase II ESA property is impacted above the MECP Table 3 Standards.

## **What Is Known About Areas where Contaminants are Present**

The impacted fill material is present in the southeast corner of the Phase II ESA property. The impacts (Barium and Vanadium) are consistent with the naturally occurring concentrations of silty clays in the City of Ottawa. The impacts are expected to be related to either the importation of silty clay material or re-working of native silty clay on the site for grading purposes during the development of the property.

## **Distribution of Contaminants**

The impacts are expected to be contained within the fill layer in the southeast corner of the Phase II ESA property.

## **Discharge of Contaminants**

The discharge of contaminants is anticipated to be related to the importation of silty clay or the re-working of native silty clay on the Phase II ESA property. The contaminant concentrations are representative of the natural background concentrations within the soil/fill and are not considered to be related to any anthropogenic causes.

## **Migration of Contaminants**

Based on the updated groundwater results, the contaminants are present only in the fill material above the water table and are not considered to have migrated.

## **Climatic and Meteorological Conditions**

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally. Based on the results of the subsurface investigation, the contaminated areas appear to be restricted to the overburden soils, and as such, the aforementioned climatic and meteorological conditions are not considered to have affected contaminant distribution at the subject site.

## **Potential for Vapour Intrusion**

Based on the nature of the contaminants (non-volatile) and the location (approximately 25m to the southeast of the building) the potential for vapour intrusion is negligible.

## **Recommendations**

Based on the 2014 soil results, fill material exists at the Phase II ESA Property which exceeds the MECP Table 3 Standards for Barium and Vanadium. It is our recommendation that a confirmatory sampling program be completed prior to redevelopment. If the confirmatory sampling program is unsuccessful, an environmental remediation will be required.

Following the confirmatory sampling program and/or environmental remediation, a record of site condition will be required to change the land use.

## **Statement of Limitations**

This Phase II - Environmental Site Assessment Update report has been prepared in general accordance with Ontario Regulation 153/04, as amended, 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 Taggart (O'Connor) Corporation. 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.**



Michael Beaudoin, P. Eng., QP<sub>ESA</sub>



Mark D'Arcy, P. Eng., QP<sub>ESA</sub>



**Report Distribution**

- Taggart (O'Connor) Corporation
- Paterson Group

**Appendix**

- Key Plan
- Drawing PE4914-3 – Test Hole Location Plan
- Drawing PE4914-4 – Analytical Testing Plan
- Drawing PE4914-4A – Cross-section A-A'
- Laboratory Certificates of Analysis

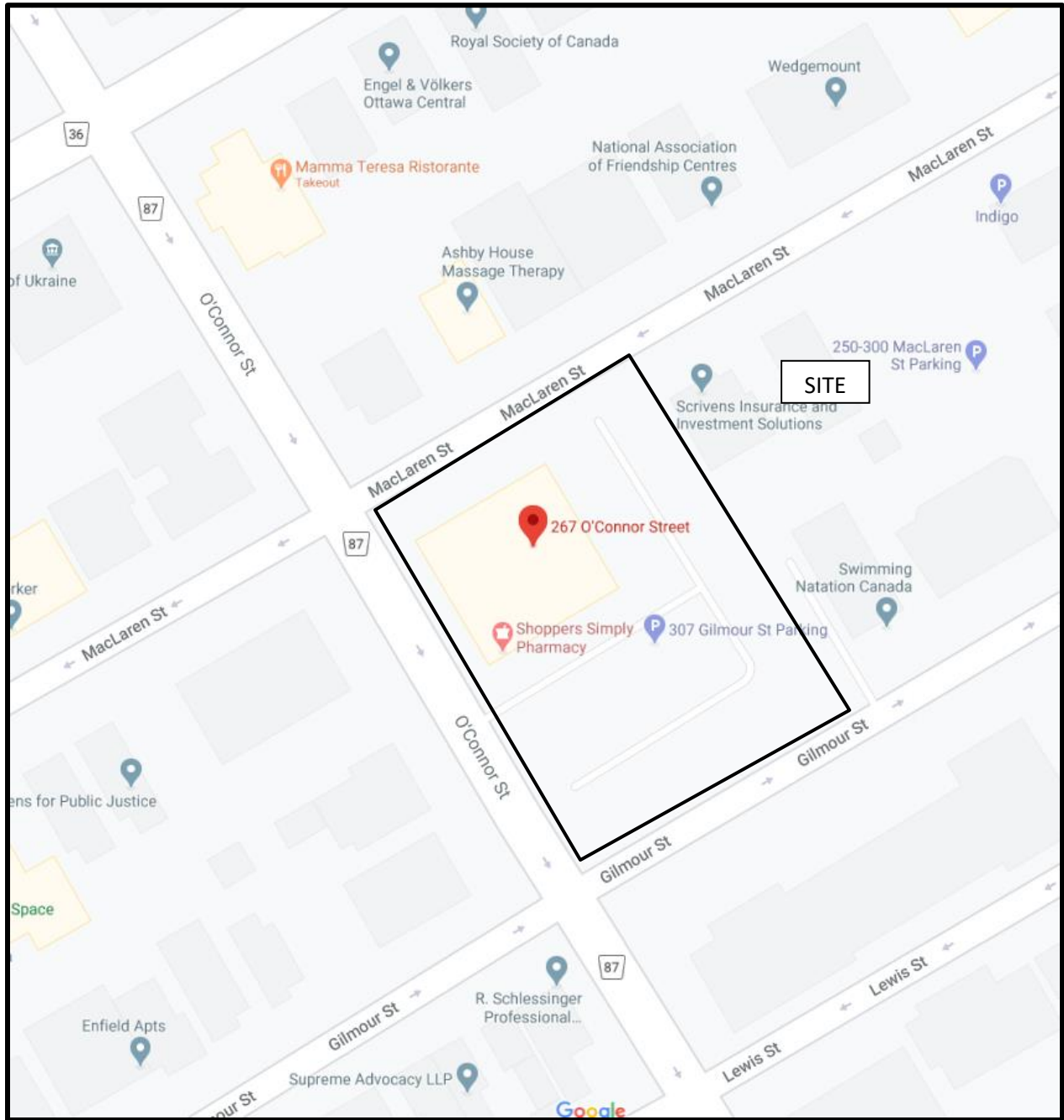


FIGURE 1  
KEY PLAN

#283-287 MACLAREN ST.  
RESIDENTIAL  
APARTMENT BUILDING

#293 MACLAREN STREET  
OFFICE BUILDING

#261 O'CONNOR STREET  
RESIDENTIAL

#250 O'CONNOR STREET  
RESIDENTIAL  
APARTMENT BUILDING

#270 MACLAREN STREET  
SCRIVENS OFFICE BUILDING

#307 GILMOUR STREET  
CASSAN MACLEAN OFFICE BUILDING

#330 GILMOUR ST.  
VACANT OFFICE  
BUILDING

MACLAREN STREET

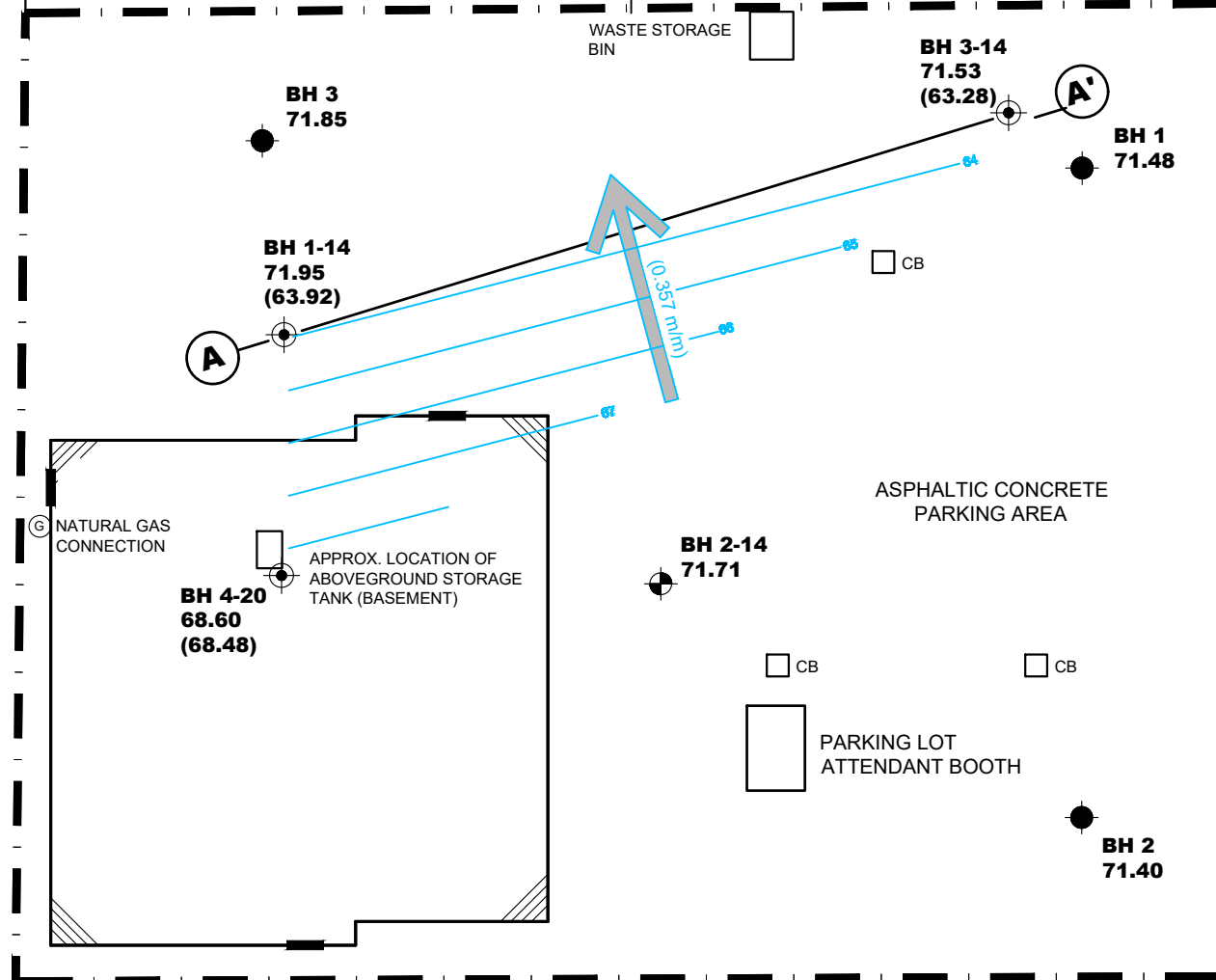
GILMOUR STREET

O'CONNOR STREET

#320 MACLAREN STREET  
RESIDENTIAL

#278 O'CONNOR STREET  
RESIDENTIAL

#280 O'CONNOR STREET  
RESIDENTIAL



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- GEOTECHNICAL BOREHOLE LOCATION, PATERSON GROUP REPORT PG3176
- 71.53 GROUND SURFACE ELEVATION (m)
- (63.28) GROUNDWATER SURFACE ELEVATION (m)
- 64.0 GROUNDWATER CONTOUR(m)
- APPROXIMATE GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

F.H.-TBM

TBM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 71.88m.

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consulting engineers

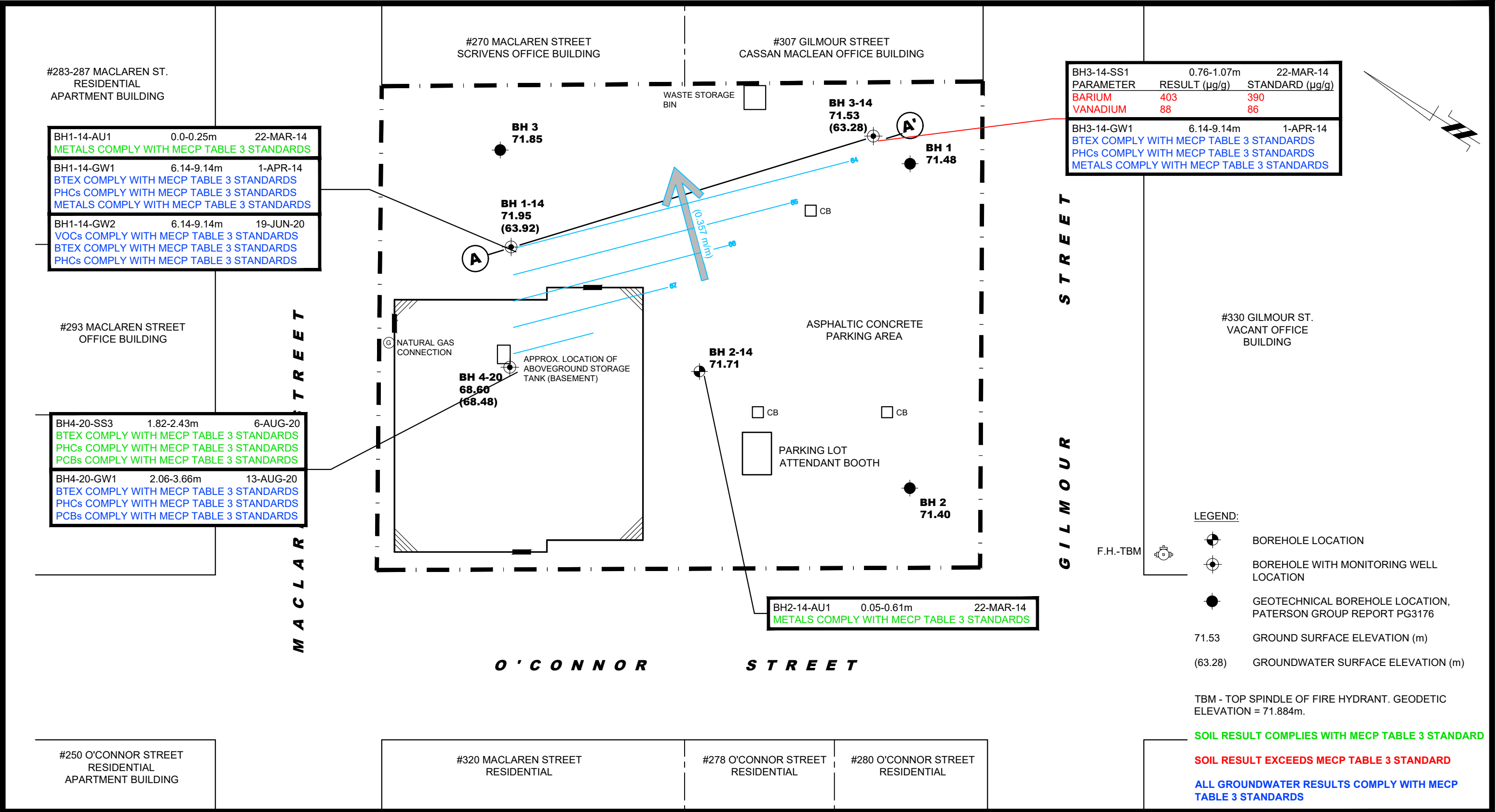
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NO.	REVISIONS	DATE	INITIAL

TAGGART (O'CONNOR) CORPORATION  
PHASE II- ENVIRONMENTAL SITE ASSESSMENT  
COMMERCIAL PROPERTY - 267 O'CONNOR STREET  
OTTAWA, ONTARIO

**TEST HOLE LOCATION PLAN**

Drawn by: RCG	Checked by: MSD	Date: 08/2020
Scale: 1:400	Drawing No.: <b>PE4914-3</b>	
Report No.: PE4914-LET.02		



#283-287 MACLAREN ST.  
RESIDENTIAL  
APARTMENT BUILDING

#270 MACLAREN STREET  
SCRIVENS OFFICE BUILDING

#307 GILMOUR STREET  
CASSAN MACLEAN OFFICE BUILDING

BH3-14-SS1	0.76-1.07m	22-MAR-14
PARAMETER	RESULT (µg/g)	STANDARD (µg/g)
BARIUM	403	390
VANADIUM	88	86
BH3-14-GW1	6.14-9.14m	1-APR-14
BTEX COMPLY WITH MECP TABLE 3 STANDARDS		
PHCs COMPLY WITH MECP TABLE 3 STANDARDS		
METALS COMPLY WITH MECP TABLE 3 STANDARDS		

BH1-14-AU1	0.0-0.25m	22-MAR-14
METALS COMPLY WITH MECP TABLE 3 STANDARDS		
BH1-14-GW1	6.14-9.14m	1-APR-14
BTEX COMPLY WITH MECP TABLE 3 STANDARDS		
PHCs COMPLY WITH MECP TABLE 3 STANDARDS		
METALS COMPLY WITH MECP TABLE 3 STANDARDS		
BH1-14-GW2	6.14-9.14m	19-JUN-20
VOCs COMPLY WITH MECP TABLE 3 STANDARDS		
BTEX COMPLY WITH MECP TABLE 3 STANDARDS		
PHCs COMPLY WITH MECP TABLE 3 STANDARDS		

#293 MACLAREN STREET  
OFFICE BUILDING

BH4-20-SS3	1.82-2.43m	6-AUG-20
BTEX COMPLY WITH MECP TABLE 3 STANDARDS		
PHCs COMPLY WITH MECP TABLE 3 STANDARDS		
PCBs COMPLY WITH MECP TABLE 3 STANDARDS		
BH4-20-GW1	2.06-3.66m	13-AUG-20
BTEX COMPLY WITH MECP TABLE 3 STANDARDS		
PHCs COMPLY WITH MECP TABLE 3 STANDARDS		
PCBs COMPLY WITH MECP TABLE 3 STANDARDS		

BH2-14-AU1	0.05-0.61m	22-MAR-14
METALS COMPLY WITH MECP TABLE 3 STANDARDS		

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- GEOTECHNICAL BOREHOLE LOCATION, PATERSON GROUP REPORT PG3176
- 71.53 GROUND SURFACE ELEVATION (m)
- (63.28) GROUNDWATER SURFACE ELEVATION (m)

TBM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 71.884m.

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARD

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARD

ALL GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

#250 O'CONNOR STREET  
RESIDENTIAL  
APARTMENT BUILDING

#320 MACLAREN STREET  
RESIDENTIAL

#278 O'CONNOR STREET  
RESIDENTIAL

#280 O'CONNOR STREET  
RESIDENTIAL

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consulting engineers

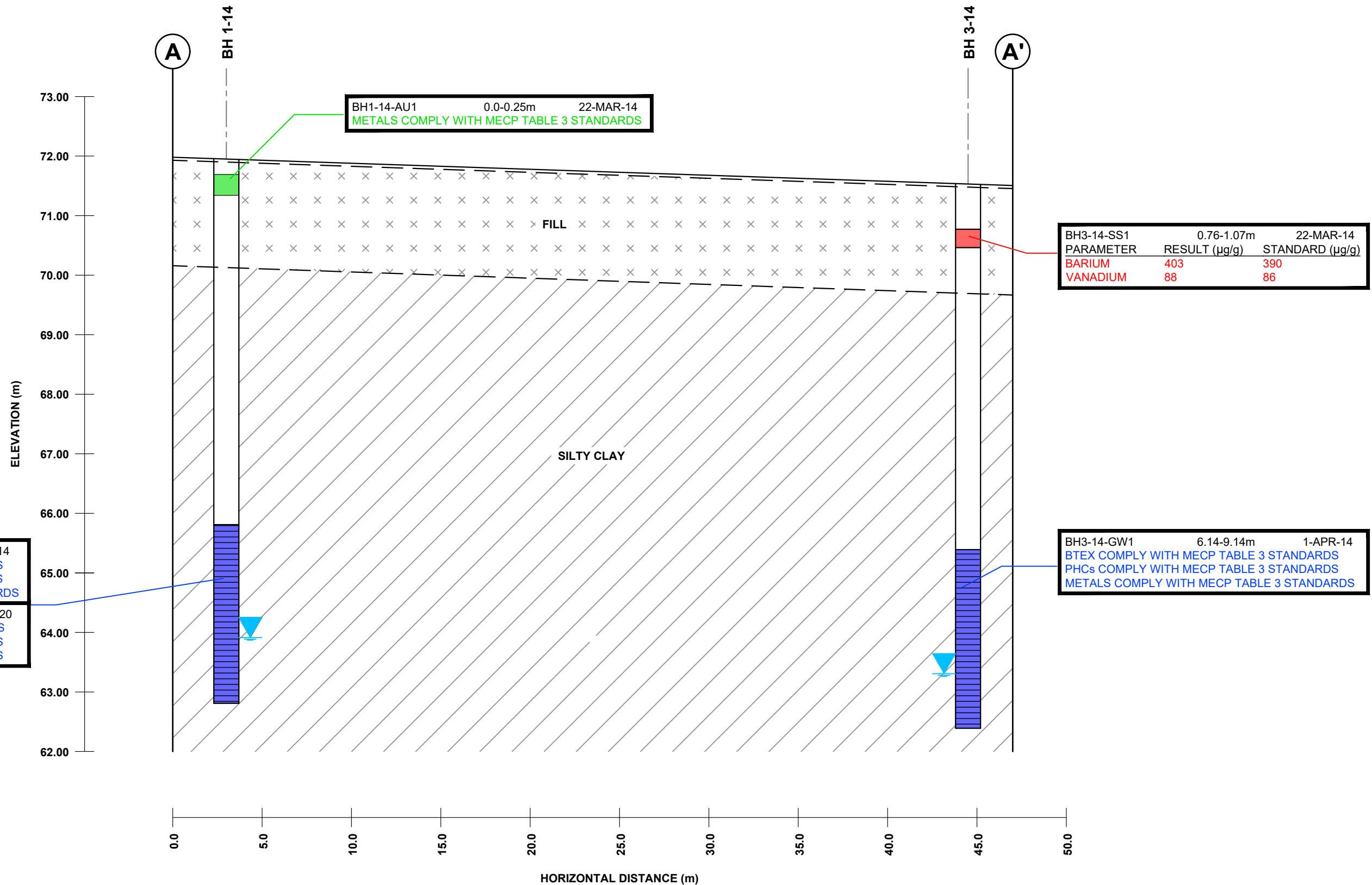
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NO.	REVISIONS	DATE	INITIAL

TAGGART (O'CONNOR) CORPORATION  
PHASE II- ENVIRONMENTAL SITE ASSESSMENT  
COMMERCIAL PROPERTY - 267 O'CONNOR STREET  
OTTAWA, ONTARIO

**ANALYTICAL TESTING PLAN**

Drawn by: RCG	Checked by: MSD	Date: 08/2020
Scale: 1:400	Drawing No.: <b>PE4914-4</b>	
Report No.: PE4914-LET.02		



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NO.	REVISIONS	DATE	INITIAL

TAGGART (O'CONNOR) CORPORATION  
PHASE II - ENVIRONMENTAL SITE ASSESSMENT  
COMMERCIAL PROPERTY - 267 O'CONNOR STREET  
OTTAWA, ONTARIO  
Title:  
**CROSS-SECTION A-A'**

Drawn by: RCG	Checked by: MSD	Date: 04/2014
Scale: AS SHOWN		Drawing No.:
Report No.:		<b>PE4914-4A</b>
PE4914-LET.02		

## Certificate of Analysis

**Paterson Group Consulting Engineers**

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

Client PO: 30067  
Project: PE4914  
Custody: 125758

Report Date: 26-Jun-2020  
Order Date: 19-Jun-2020

**Order #: 2026014**

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

Parcel ID	Client ID
2026014-01	BH1-14-GW2
2026014-02	Dup1

Approved By:



Dale Robertson, BSc  
Laboratory Director

Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	22-Jun-20	22-Jun-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	25-Jun-20	25-Jun-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	22-Jun-20	22-Jun-20

Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

	<b>Client ID:</b>	BH1-14-GW2	Dup1	-	-
	<b>Sample Date:</b>	19-Jun-20 09:00	19-Jun-20 09:00	-	-
	<b>Sample ID:</b>	2026014-01	2026014-02	-	-
	<b>MDL/Units</b>	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	<0.5	<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	<0.5	-	-
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, 1,2-)	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	<2.0	-	-
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	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-



Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

	Client ID:	BH1-14-GW2	Dup1	-	-
	Sample Date:	19-Jun-20 09:00	19-Jun-20 09:00	-	-
	Sample ID:	2026014-01	2026014-02	-	-
	MDL/Units	Water	Water	-	-
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	123%	115%	-	-
Dibromofluoromethane	Surrogate	89.7%	89.4%	-	-
Toluene-d8	Surrogate	107%	106%	-	-

**Hydrocarbons**

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

Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L						
<b>Volatiles</b>									
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	97.9		ug/L		122	50-140			
Surrogate: Dibromofluoromethane	72.0		ug/L		90.0	50-140			
Surrogate: Toluene-d8	90.9		ug/L		114	50-140			

Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
<b>Volatiles</b>									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	93.4		ug/L		117	50-140			
Surrogate: Dibromofluoromethane	70.4		ug/L		87.9	50-140			
Surrogate: Toluene-d8	74.5		ug/L		93.2	50-140			

Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	1760	25	ug/L	ND	88.1	68-117			
<b>Volatiles</b>									
Acetone	121	5.0	ug/L	ND	121	50-140			
Benzene	41.0	0.5	ug/L	ND	103	60-130			
Bromodichloromethane	45.4	0.5	ug/L	ND	114	60-130			
Bromoform	42.6	0.5	ug/L	ND	106	60-130			
Bromomethane	46.0	0.5	ug/L	ND	115	50-140			
Carbon Tetrachloride	45.5	0.2	ug/L	ND	114	60-130			
Chlorobenzene	44.0	0.5	ug/L	ND	110	60-130			
Chloroform	45.7	0.5	ug/L	ND	114	60-130			
Dibromochloromethane	44.3	0.5	ug/L	ND	111	60-130			
Dichlorodifluoromethane	46.1	1.0	ug/L	ND	115	50-140			
1,2-Dichlorobenzene	44.8	0.5	ug/L	ND	112	60-130			
1,3-Dichlorobenzene	48.9	0.5	ug/L	ND	122	60-130			
1,4-Dichlorobenzene	39.4	0.5	ug/L	ND	98.5	60-130			
1,1-Dichloroethane	42.3	0.5	ug/L	ND	106	60-130			
1,2-Dichloroethane	44.2	0.5	ug/L	ND	110	60-130			
1,1-Dichloroethylene	36.7	0.5	ug/L	ND	91.7	60-130			
cis-1,2-Dichloroethylene	49.4	0.5	ug/L	ND	123	60-130			
trans-1,2-Dichloroethylene	39.9	0.5	ug/L	ND	99.7	60-130			
1,2-Dichloropropane	38.8	0.5	ug/L	ND	97.0	60-130			
cis-1,3-Dichloropropylene	40.0	0.5	ug/L	ND	99.9	60-130			
trans-1,3-Dichloropropylene	41.2	0.5	ug/L	ND	103	60-130			
Ethylbenzene	45.9	0.5	ug/L	ND	115	60-130			
Ethylene dibromide (dibromoethane, 1,2)	41.7	0.2	ug/L	ND	104	60-130			
Hexane	49.3	1.0	ug/L	ND	123	60-130			
Methyl Ethyl Ketone (2-Butanone)	89.4	5.0	ug/L	ND	89.4	50-140			
Methyl Isobutyl Ketone	101	5.0	ug/L	ND	101	50-140			
Methyl tert-butyl ether	122	2.0	ug/L	ND	122	50-140			
Methylene Chloride	45.8	5.0	ug/L	ND	115	60-130			
Styrene	42.9	0.5	ug/L	ND	107	60-130			
1,1,1,2-Tetrachloroethane	40.2	0.5	ug/L	ND	101	60-130			
1,1,2,2-Tetrachloroethane	40.6	0.5	ug/L	ND	102	60-130			
Tetrachloroethylene	45.0	0.5	ug/L	ND	112	60-130			
Toluene	45.6	0.5	ug/L	ND	114	60-130			
1,1,1-Trichloroethane	48.9	0.5	ug/L	ND	122	60-130			
1,1,2-Trichloroethane	46.9	0.5	ug/L	ND	117	60-130			
Trichloroethylene	44.4	0.5	ug/L	ND	111	60-130			
Trichlorofluoromethane	43.9	1.0	ug/L	ND	110	60-130			
Vinyl chloride	44.1	0.5	ug/L	ND	110	50-140			
m,p-Xylenes	98.4	0.5	ug/L	ND	123	60-130			
o-Xylene	48.5	0.5	ug/L	ND	121	60-130			
Surrogate: 4-Bromofluorobenzene	62.2		ug/L		77.7	50-140			
Surrogate: Dibromofluoromethane	70.3		ug/L		87.9	50-140			
Surrogate: Toluene-d8	68.0		ug/L		85.0	50-140			

Certificate of Analysis

Report Date: 26-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 19-Jun-2020

Client PO: 30067

Project Description: PE4914

**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.



## Certificate of Analysis

**Paterson Group Consulting Engineers**

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

Client PO: 30542  
Project: PE4914  
Custody: 128052

Report Date: 12-Aug-2020  
Order Date: 7-Aug-2020

**Order #: 2032518**

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

Paracel ID	Client ID
2032518-01	BH4-20-SS3
2032518-02	BH10-20-SS20

Approved By:



Mark Foto, M.Sc.  
Lab Supervisor

Certificate of Analysis

Report Date: 12-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30542

Project Description: PE4914

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	10-Aug-20	10-Aug-20
PCBs, total	SW846 8082A - GC-ECD	10-Aug-20	11-Aug-20
PHC F1	CWS Tier 1 - P&T GC-FID	10-Aug-20	10-Aug-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	7-Aug-20	11-Aug-20
Solids, %	Gravimetric, calculation	10-Aug-20	10-Aug-20



Certificate of Analysis

Report Date: 12-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30542

Project Description: PE4914

<b>Client ID:</b>	BH4-20-SS3	BH10-20-SS20	-	-
<b>Sample Date:</b>	06-Aug-20 11:00	06-Aug-20 11:00	-	-
<b>Sample ID:</b>	2032518-01	2032518-02	-	-
<b>MDL/Units</b>	Soil	Soil	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	59.6	56.2	-	-
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**Volatiles**

Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	121%	121%	-	-

**Hydrocarbons**

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

**PCBs**

PCBs, total	0.05 ug/g dry	<0.05	-	-	-
Decachlorobiphenyl	Surrogate	111%	-	-	-

Certificate of Analysis

Report Date: 12-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30542

Project Description: PE4914

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>PCBs</b>									
PCBs, total	ND	0.05	ug/g						
Surrogate: Decachlorobiphenyl	0.107		ug/g		107	60-140			
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	3.86		ug/g		121	50-140			

Certificate of Analysis

Report Date: 12-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30542

Project Description: PE4914

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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	
<b>PCBs</b>									
PCBs, total	ND	0.05	ug/g dry	ND			NC	40	
Surrogate: Decachlorobiphenyl	0.130		ug/g dry		110	60-140			
<b>Physical Characteristics</b>									
% Solids	83.0	0.1	% by Wt.	83.9			1.1	25	
<b>Volatiles</b>									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	4.04		ug/g dry		116	50-140			

Certificate of Analysis

Report Date: 12-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30542

Project Description: PE4914

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	197	7	ug/g	ND	98.3	80-120			
F2 PHCs (C10-C16)	84	4	ug/g	ND	92.2	60-140			
F3 PHCs (C16-C34)	222	8	ug/g	ND	99.4	60-140			
F4 PHCs (C34-C50)	160	6	ug/g	ND	113	60-140			
<b>PCBs</b>									
PCBs, total	0.548	0.05	ug/g	ND	116	60-140			
<i>Surrogate: Decachlorobiphenyl</i>	0.132		ug/g		112	60-140			
<b>Volatiles</b>									
Benzene	2.65	0.02	ug/g	ND	66.4	60-130			
Ethylbenzene	4.04	0.05	ug/g	ND	101	60-130			
Toluene	3.90	0.05	ug/g	ND	97.5	60-130			
m,p-Xylenes	8.07	0.05	ug/g	ND	101	60-130			
o-Xylene	4.28	0.05	ug/g	ND	107	60-130			
<i>Surrogate: Toluene-d8</i>	3.01		ug/g		94.2	50-140			

Certificate of Analysis

Report Date: 12-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30542

Project Description: PE4914

**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.



Parcel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2032518	No: 128052

Client Name: <u>Puferson</u>	Project Ref: <u>PE4914</u>	Page <u>1</u> of <u>1</u>
Contact Name: <u>Mark D'Arcy</u>	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address:	PO #: <u>30542</u>	
Telephone: <u>226-7381</u>	E-mail:	
		Date Required: _____

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis											
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PCB's	
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA													
<input checked="" type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm													
For RSC: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Mun: _____		Other: _____													
Sample ID/Location Name				Date	Time												
1	BH4-20-SS3			S	-	2	Aug. 6	11:00	<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>
2	BH10-20-SS20			S	-	2	2020	"	<input checked="" type="checkbox"/>								
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:		Method of Delivery: <u>PARACEL COURIER</u>	
Relinquished By (Sign):	Received By Driver/Depot: <u>M. SCUDÉ</u>	Received at Lab: <u>Sam</u>	Verified By: <u>gem</u>
Relinquished By (Print): <u>Mark D'Arcy</u>	Date/Time: <u>07/08/20 3:10</u>	Date/Time: <u>Aug 07, 2020 16:39</u>	Date/Time: <u>AUG 07, 2020 17:16</u>
Date/Time: <u>Aug 7/2020</u>	Temperature: _____ °C	Temperature: <u>10.0</u> °C	pH Verified: <input type="checkbox"/> By: _____

## Certificate of Analysis

**Paterson Group Consulting Engineers**

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

Client PO: 30414  
Project: PE4914  
Custody: 125766

Report Date: 18-Aug-2020  
Order Date: 13-Aug-2020

**Order #: 2033502**

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

Parcel ID	Client ID
2033502-01	BH4-20-GW1
2033502-02	BH10-20-GW1

Approved By:



Dale Robertson, BSc  
Laboratory Director

Certificate of Analysis

Report Date: 18-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Aug-2020

Client PO: 30414

Project Description: PE4914

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	14-Aug-20	14-Aug-20
PCBs, total	EPA 608 - GC-ECD	14-Aug-20	14-Aug-20
PHC F1	CWS Tier 1 - P&T GC-FID	14-Aug-20	14-Aug-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	13-Aug-20	14-Aug-20



Certificate of Analysis

Report Date: 18-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Aug-2020

Client PO: 30414

Project Description: PE4914

<b>Client ID:</b>	BH4-20-GW1	BH10-20-GW1	-	-
<b>Sample Date:</b>	13-Aug-20 12:00	13-Aug-20 12:00	-	-
<b>Sample ID:</b>	2033502-01	2033502-02	-	-
<b>MDL/Units</b>	Water	Water	-	-

**Volatiles**

Benzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	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	-	-
Toluene-d8	Surrogate	119%	119%	-	-

**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	-	-

**PCBs**

PCBs, total	0.05 ug/L	<0.05	-	-	-
Decachlorobiphenyl	Surrogate	94.6%	-	-	-

Certificate of Analysis

Report Date: 18-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Aug-2020

Client PO: 30414

Project Description: PE4914

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
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						
<b>PCBs</b>									
PCBs, total	ND	0.05	ug/L						
Surrogate: Decachlorobiphenyl	0.636		ug/L		127	60-140			
<b>Volatiles</b>									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	98.9		ug/L		124	50-140			

Certificate of Analysis

Report Date: 18-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Aug-2020

Client PO: 30414

Project Description: PE4914

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
<b>Volatiles</b>									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	96.0		ug/L		120	50-140			

Certificate of Analysis

Report Date: 18-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Aug-2020

Client PO: 30414

Project Description: PE4914

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Hydrocarbons</b>									
F1 PHCs (C6-C10)	2120	25	ug/L	ND	106	68-117			
F2 PHCs (C10-C16)	1320	100	ug/L	ND	82.8	60-140			
F3 PHCs (C16-C34)	3470	100	ug/L	ND	88.5	60-140			
F4 PHCs (C34-C50)	2480	100	ug/L	ND	100	60-140			
<b>PCBs</b>									
PCBs, total	1.36	0.05	ug/L	ND	136	60-140			
Surrogate: Decachlorobiphenyl	0.390		ug/L		78.0	60-140			
<b>Volatiles</b>									
Benzene	24.3	0.5	ug/L	ND	60.7	60-130			
Ethylbenzene	30.6	0.5	ug/L	ND	76.6	60-130			
Toluene	25.6	0.5	ug/L	ND	64.0	60-130			
m,p-Xylenes	60.7	0.5	ug/L	ND	75.9	60-130			
o-Xylene	29.7	0.5	ug/L	ND	74.3	60-130			
Surrogate: Toluene-d8	82.4		ug/L		103	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30414

Report Date: 18-Aug-2020

Order Date: 13-Aug-2020

Project Description: PE4914

**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.

