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Phase II - Environmental Site Assessment

Vacant Property
900 Albert Street
Ottawa, Ontario

Prepared For

Trinity Development Group Inc.

January 25, 2016

Report: PE3302-3R

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EXECUTIVE SUMMARY

Assessment

A Phase II-Environmental Site Assessment (ESA) was conducted for the property at 900 Albert Street (formerly 801 Albert Street), Ottawa, Ontario. The Phase II-ESA consisted of the drilling of 13 boreholes, the excavation of 10 test pits, and the installation of 13 groundwater monitoring wells to assess soil and groundwater quality at the subject site.

Soil samples were obtained from the boreholes and test pits and were screened using visual observations and vapour measurements. Site soils consist of fill over an intermittent layer of silty clay, underlain by glacial till and interbedded limestone and shaley limestone bedrock. Based on the screening results, various samples were selected for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) and petroleum hydrocarbons, fractions 1 through 4 (PHCs F_1-F_4), metals, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), electrical conductivity (EC) and sodium adsorption ratio (SAR). Based on the analytical results, some of the fill material at the subject site exceeds the MOECC Table 3 standards for metals, PAHs, and PHCs.

Three groundwater samples and two duplicate samples were collected from the monitoring wells installed in BH1, BH2 and BH3 and analyzed for PHCs, VOCs, metals, and PAHs. All groundwater samples exceeded MOECC Table 3 standards for chloroform, and the concentration of 1,1,2-trichloroethane exceeded the MOECC Table 3 standard in the groundwater sample collected from the monitoring well installed in BH3. The presence of chloroform is interpreted to be the result of the use of municipally-treated water used during the drilling program.

A second groundwater sampling event was subsequently completed in July 2014. Four groundwater samples were analyzed for VOCs. Although a general decrease in chloroform concentrations were noted, chloroform concentrations in the groundwater samples collected from the monitoring wells installed in BH2 and BH4 exceeded the MOECC Table 3 standards. All other VOC concentrations were in compliance with the Table 3 standards.

A third groundwater sampling event was completed in December 2015. Nine groundwater samples were collected from the monitoring wells installed in BH9-15 through BH17-15 and were analyzed for a combination of PHC (F_1-F_4), BTEX, VOC, PAH, metals, sodium and chloride parameters. The concentration of PHC (F_2) exceeded the MOECC Table 3 standard in the groundwater sample collected from the

monitoring well installed in BH16-15. Concentrations of chloroform exceeded the MOECC Table 3 Standards in the groundwater samples collected from the monitoring wells installed in BH11-15, BH14-15 and BH16-15. The presence of chloroform is interpreted to be the result of the use of municipally-treated water used during the drilling program.

Recommendations

Based on the above results, metals, PAH, and PHC concentrations in soil and PHC (F_2) concentrations in groundwater at the subject site exceed the applicable MOECC Table 3 standards. It is our understanding that the proposed development consists of three residential towers, a 10 storey office building and retail galleria with three levels of underground parking. It is our recommendation that an environmental site remediation program, consisting of the excavation and off-site disposal of all contaminated soil, be completed concurrently with site redevelopment.

Soil

It is recommended that impacted soil from the property be removed as part of the site redevelopment program. Any impacted soil removed from the site during redevelopment will require disposal at an approved waste disposal facility. It is recommended that Paterson personnel be present onsite during the soil excavation program to direct excavation activities in the areas where impacted material has been identified or is expected to exist. Also, confirmatory soil samples will be collected upon completion of the soil remediation program to ensure that the site meets the MOECC Table 3 standards.

Groundwater

Depending upon the volume of impacted groundwater encountered, several options may be available to treat the groundwater. The removal of impacted groundwater from the site by a licensed pumping contractor would be a feasible option for smaller volumes, while an on-site treatment system would likely be more economical for larger volumes over a longer period of time. An on-site treatment system would discharge to the City of Ottawa sewer system. Prior to discharging treated groundwater to the municipal sewer system, a Sanitary Sewer Agreement will be required from the City of Ottawa's Sewer Use Program. It is recommended that groundwater monitoring wells be installed upon completion of the site remediation program to ensure that the site meets the MOECC Table 3 standards.

1.0 INTRODUCTION

At the request of Trinity Development Group, Paterson Group (Paterson) carried out a Phase II-Environmental Site Assessment (ESA) of the property at 900 Albert Street (formerly 801 Albert Street), in the City of Ottawa, Ontario. The purpose of this Phase II-ESA was to address concerns identified in the Phase I-ESA, including the historical presence of rail lines and associated buildings on the subject site.

1.1 Site Description

Address:	900 Albert Street, Ottawa, Ontario.
Legal Description:	Parts 1 through 12, Registered Plan 4R-26480, in the City of Ottawa, Ontario.
Property Identification Number:	04098-0005.
Location:	The subject site is located on the south side of Albert Street, to the west of City Centre Avenue. The subject site is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 24' 34" N, 75° 43' 13" W.
Configuration:	Irregular.
Site Area:	1.44 hectares (approximate).

1.2 Property Ownership

The subject property is currently owned by Trinity Properties Investments Inc. Paterson was engaged to complete the Phase II-ESA at the subject site by Trinity Development Group. Paterson's contact at Trinity is Mr. Ryan Moore. Mr. Moore can be reached by telephone at (416) 255-8800.

1.3 Current and Proposed Future Uses

The subject site was originally developed as a rail yard in the early 1900s. In the 1960s, the rail yard was decommissioned, and the site served as a snow dump until the 1990s. The site has been vacant and unused since that time.

It is our understanding that the proposed development consists of three residential towers, a 10 storey office building and retail galleria with three levels of underground parking.

1.4 Applicable Site Condition Standard

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

- Coarse-grained soil conditions
- Non-potable groundwater conditions
- Residential land use

Soil results were also compared to Table 1 of the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", prepared by the Ontario Ministry of the Environment and Climate Change (MOECC), April 2011. The MOECC Table 1 background standards represent the criteria for any excess soil generated on-site to be considered as 'clean fill' for off-site disposal, and are presented for comparison purposes.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject site is located on the south side of Albert Street, to the west of City Centre Avenue (formerly Champagne Avenue North). At the time of the Phase I ESA, the subject site was vacant and covered with trees, grass, and brush. A gravel access road was present along the south boundary of the subject site. Site drainage consisted primarily of infiltration. Sanitary and storm sewers are present on the subject site. An embankment sloping downward from Albert Street is present along the north boundary of the subject site, and the remainder of the subject site slopes gently downward in a westerly direction towards the O-Train tracks.

2.2 Past Investigations

The following reports were available for review:

- 'Phase I-II-Environmental Site Assessment, Scott at Champagne Property, City of Ottawa', prepared by Oliver, Mangione, McCalla and Associates (A Division of Trow), dated February 1998.
- 'Phase II-Environmental Site Assessment, Vacant Commercial Property, Scott Street at Champagne Avenue North, Ottawa, Ontario', prepared by John D. Paterson and Associates Limited, dated May 8, 2001.
- 'Phase I-Environmental Site Assessment, Vacant Property, Inersection of Scott Street and Champagne Avenue, Ottawa, Ontario', prepared by Trow Associates Inc., dated December 2007.
- 'Consolidated Report, Geotechnical Investigation, Proposed Residential Development, 801 Albert Street, Ottawa, Ontario', prepared by Trow Associates Inc., dated February 10, 2011.
- 'Consolidated Report, Geotechnical Investigation (Draft), Proposed Commercial Development, 801 Albert Street, Ottawa, Ontario', prepared by EXP, dated March 2, 2012.
- 'Phase I-Environmental Site Assessment, Vacant Property, 801 Albert Street, Ottawa, Ontario', prepared by Paterson, dated June 23, 2014.

The above-noted reports, and additional information in Paterson's files, provide an outline of the investigative work done at the subject site and neighbouring properties. The 1998 and 2001 environmental reports identified concentrations of lead, boron, copper, and benzo[a]pyrene in site soils which exceeded the CCME and Ontario Ministry of the Environment Table B standards in effect at the time. Groundwater samples were in compliance with applicable standards. The locations of boreholes, monitoring wells, and test pits from previous investigations are shown on Drawing PE3302-7-Test Hole Location Plan, appended to this report. Based on the results of the previous investigations, it is our opinion that fill material impacted with metals and PAHs is present on-site.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The initial 2014 subsurface investigation conducted as a component of this Phase II-ESA consisted of the drilling of 3 boreholes (BH1 through BH3) and the excavation of 10 test pits (TP1 through TP10) at the subject site. A fourth borehole (BH4) was subsequently drilled at the subject site in 2014. Boreholes were drilled through overburden soils to a maximum depth of 33.17 m below ground surface. Groundwater monitoring wells were installed in all four of the boreholes. Test pits were excavated to the maximum practical reach of the backhoe given soil conditions. The 2015 supplemental subsurface investigation consisted of the drilling of nine boreholes (BH9-15 through BH17-15) and the installation of nine groundwater monitoring wells.

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern identified in the Phase I ESA. Contaminants of concern for soil and groundwater are metals, polycyclic aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbons, fractions 1 through 4 (PHCs F_1-F_4), and volatile organic compounds (VOCs), as well as electrical conductivity (EC) and sodium adsorption ratio (SAR) in soil and sodium and chloride in groundwater.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on information from the Geological Survey of Canada and subsurface investigations at the subject site, the site is located in an area of silty clay underlain by glacial till, with the bedrock surface encountered between 5 and 14 m below existing ground surface. Groundwater was encountered at depths ranging from 1.8 to 7.7 m below existing grade.

Subsurface conditions encountered during the Phase II-ESA are discussed in greater detail in Subsection 5.1.

Contaminants of Potential Concern

Based on the past and current uses of the subject site, the following Contaminants of Potential Concern (CPCs) have been identified:

- VOCs – this suite of parameters includes chlorinated solvents (tetrachloroethylene, trichloroethylene, dichloroethylenes, and vinyl chloride) associated with de-greasing and dry cleaning. These parameters were selected as CPCs for the Phase I-ESA study area due to the presence of the Brown's Cleaners depot to the south of the subject site. Chlorinated solvents may be present in the soil matrix as well as in the dissolved phase in the groundwater system.

- BTEX – this suite of parameters includes benzene, toluene, ethylbenzene, and xylenes (BTEX), associated with gasoline. These parameters were selected as CPCs for the Phase I-ESA study area based on the historical presence of the 'oil house' on the subject site as identified by the Fire Insurance Plans. BTEX may be present in the soil matrix as well as in the dissolved phase in the groundwater system.

- Metals – this suite of parameters encompasses various metals for which MOECC standards exist. Metals may be present in the soil matrix or dissolved in site groundwater. Metals were selected as CPCs for the Phase I-ESA property based on the historical presence of the rail lines on the subject site.

- PHCs F_1-F_4 – this suite of parameters encompasses gasoline (Fraction 1), diesel and fuel oil (Fraction 2), and heavy oils (Fractions 3 and 4). PHCs F_1-F_4 were selected as CPCs for the Phase I-ESA property based on the historical presence of the 'oil house' identified on the subject site by the FIPs. Gasoline and diesel are commonly used motor vehicle fuels, and diesel-fraction hydrocarbons were commonly used as heating oil. Heavy oils may be present in the form of lubricants and transmission or hydraulic fluids. PHCs may be present in the soil matrix, sorbed to soil particles, as well as in free or dissolved phase in the groundwater system. PHCs are generally considered to be LNAPLs – light non-aqueous phase liquids, indicating that when present in sufficient concentrations above the solubility limit, they will partition into a separate phase above the water table, due to their lower density.

- PAHs – this suite of parameters encompasses various complex hydrocarbons, commonly associated with coal and/or combustion. PAHs were selected as a CPC for the site based on the historical presence of the rail lines on the subject site. PAHs may be present in the soil matrix or dissolved in site groundwater.

- EC, SAR, sodium and chloride were selected as a CPC for the site based on the historical use of the subject site as a snow dump.

The mechanisms of contaminant transport within the site soils include physical transportation and leaching. Physical transportation includes any intentional or unintentional movement or distribution of soil by physical means. Contamination arising from localized spills or runoff from the washing area on-site may be physically transported by vehicle movement or site grading. Leaching may occur in areas where the ground surface consists of grass or gravel; precipitation infiltrating in these areas may transport surficial contaminants into lower strata. As such, this mechanism represents a potential pathway for soil contaminants to migrate into site groundwater.

The mechanisms of contaminant transport within the groundwater system include advection, dispersion, and diffusion. Advection and dispersion will be the dominant mechanisms of contaminant transport in soils with higher hydraulic conductivities, such as sands, gravels, silts, and some glacial till soils, whereas diffusion will dominate in soils with lower hydraulic conductivity, such as clays.

Buildings and Structures

There are currently no buildings or structures present at the subject site.

Water Bodies

There are no water bodies on the subject site or within the Phase I study area. The closest water body is the Ottawa River, located approximately 320 m to the west of the site.

Areas of Natural Significance

No areas of natural significance were identified on the site or in the Phase I study area.

Drinking Water Wells

A search of the MOECC water well database returned 62 water well records within the Phase I-ESA study area, of which two are drinking water wells and the remainder are monitoring wells. Based on the availability of municipal water within the Phase I-ESA study area, these drinking water wells are no longer considered to be in use.

Neighbouring Land Use

Neighbouring land use in the Phase I-ESA study area is currently commercial and residential. Land use is shown on Drawing PE3302-2 - Surrounding Land Use Plan in the Phase I-ESA.

Potentially Contaminating Activities and

Areas of Potential Environmental Concern

Potentially contaminating activities at the Phase I-ESA property include the historical presence of rail lines, an 'oil house' and a snow dump on the subject site. Additional Potentially Contaminating Activities were present within the Phase I-ESA study area. Based on their separation distance and/or their inferred down-gradient or cross-gradient location with respect to the subject site and previous investigations, the majority of the off-site PCAs are not considered to represent Areas of Potential Environmental Concern with respect to the subject site. The exception is the Brown's Cleaners depot to the south of the subject site, which is considered to be an APEC with respect to the subject site.

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I-ESA is considered to be sufficient to conclude that Potentially Contaminating Activities are present at the subject site. The presence of potentially contaminating activities was confirmed by a variety of independent sources. As such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

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

- Trip blanks were not submitted during VOC sampling events.

3.5 Impediments

The borehole locations were constrained by the presence of underground services at the subject site, however adequate site coverage was obtained. No other physical impediments or denial of access were encountered during the Phase II-Environmental Site Assessment.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The initial 2014 subsurface investigation was conducted between June 4 and 11, 2014, and consisted of drilling 3 boreholes and the excavation of 10 test pits on the subject site. A fourth borehole was drilled on July 24, 2014. A total of 9 additional boreholes were drilled between November 13 and 18, 2015. The boreholes and test pits were placed to provide general site coverage for environmental and geotechnical purposes and to address the Areas of Potential Environmental Concern identified in the Phase I-ESA Conceptual Site Model. The boreholes were drilled using a truck-mounted CME 55 power auger drill rig. The drilling contractor was George Downing Estate Drilling of Hawkesbury, Ontario. The excavation contractor was George W. Drummond of Ottawa, Ontario. Drilling and test pit excavation occurred under full-time supervision of Paterson personnel. Borehole locations are shown on Drawing PE3302-7-Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 141 soil samples were obtained from the boreholes and test pits by means of split spoon sampling, the sampling of shallow soils directly from auger flights, and grab sampling from test pits. Split spoon samples were taken at approximate 0.76 to 1.52 m intervals. The depths at which split spoon, auger flight, and grab samples were obtained from the boreholes and test pits are shown as "**SS**", "**AU**", and "**G**" respectively on the Soil Profile and Test Data Sheets, appended to this report.

Upon refusal of the augers, the boreholes were advanced into bedrock using a diamond coring system. Rock core samples were recovered, and are shown as "**RC**" on the Soil Profile and Test Data Sheets.

Site soils consist of crushed stone and silty sand fill over an intermittent layer of silty clay, underlain by glacial till and interbedded limestone and shale bedrock. The fill material consists of silty sand with crushed stone, metal and wood debris, coal, and ash. The glacial till material consists of a silt, sand and clay matrix with gravel, cobbles, and boulders. Bedrock was encountered at depths varying from 5.6 to 10.7 m below existing grade. Based on available mapping, bedrock at the subject site is interpreted to be interbedded limestone and black limestone of the Verulam formation.

4.3 Field Screening Measurements

All soil samples collected were submitted to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as screening with an RKI Eagle combustible gas detector and/or a MiniRae photoionization detector (PID). The detection limit of the RKI Eagle is 5 ppm, with a precision of +/- 5 ppm. The detection limit of the PID is 0.1 ppm, with a precision of +/- 0.1 ppm

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated and the peak readings recorded. Vapour readings varied from 0 to 250 ppm. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

Soil samples were selected for analysis based on visual appearance, location, and vapour readings.

4.4 Groundwater Monitoring Well Installation

Thirteen groundwater monitoring wells were installed during the drilling program by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision by Paterson personnel. The monitoring wells consisted of 51 mm or 32 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen, and a bentonite seal was placed above the screen to minimize cross-contamination. Monitoring well construction details are provided on the Soil Profile and Test Data Sheets in Appendix 1. A summary of monitoring well construction details is provided below in Table 1.

Table 1: Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	56.35	16.46	13.41-16.46	12.95-16.46	0.00-12.95	None
BH2	55.22	18.06	15.01-18.06	14.40-18.06	0.00-14.40	None
BH3	55.62	18.04	14.99-18.04	14.53-18.04	0.00-14.53	None
BH4	55.21	33.17	30.12-33.17	29.82-33.17	0.00-29.82	None
BH9-15	57.12	6.10	3.05-6.10	2.77-6.10	1.52-2.77	None
BH10-15	56.29	10.13	8.61-10.13	8.13-10.13	4.57-8.13	None
BH11-15	55.94	10.13	7.09-10.13	6.78-10.13	5.49-6.78	None
BH12-15	55.15	4.57	1.52-4.57	1.29-4.57	0.00-1.29	None
BH13-15	55.02	4.27	1.22-4.27	1.02-4.27	0.00-1.02	None
BH14-15	54.81	4.83	1.78-4.83	1.42-4.83	0.00-1.42	None
BH15-15	55.06	11.35	10.13-11.35	9.98-11.35	8.46-9.98	None

Table 1: Monitoring Well Construction Details						
Well ID	**Ground Surface Elevation**	**Total Depth (m BGS)**	**Screened Interval (m BGS)**	**Sand Pack (m BGS)**	**Bentonite Seal (m BGS)**	**Casing Type**
BH16-15	55.01	4.88	1.83-4.88	1.55-4.88	0.00-1.55	None
BH17-15	55.02	4.88	1.83-4.88	1.57-4.88	0.00-1.57	None

4.5 Field Measurement of Water Quality Parameters

During the June 2014 and December 2015 sampling events, water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field included temperature, pH, electrical conductivity, and total dissolved solids. Field parameters were measured after each purged well volume. Wells were purged prior to sampling until at least three well volumes had been removed or the field parameters were relatively stable. Stabilized field parameter values are summarized below in Table 2.

Table 2: Field Measurement of Water Quality Parameters				
Parameter	**Temperature (°C)**	**pH**	**Electrical Conductivity (µS/cm)**	**Total Dissolved Solids (ppm)**
June 16, 2014				
BH1	12.9	7.67	1075	538
BH2	13	8.31	711	356
BH3	12.9	7.15	2979	1494
December 1, 2015				
BH9-15	10.8	7.35	1385	961
BH10-15	8.9	7.29	2300	1145
BH11-15	10.81	7.63	772	487
BH12-15	7.4	7.14	2301	1170
BH14-15	11.1	7.04	1938	975
BH15-15	8.3	6.88	3593	1884
BH17-15	9.9	6.9	3508	1730

4.6 Groundwater Sampling

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

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

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following groundwater and soil samples were submitted for analysis:

Table 3: Soil Samples Submitted (2014-2015)

Sample ID	Sample Depth; Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX & PHCs F_1-F_4	PAHs	VOCs	Metals	EC/SAR	
BH1-AU1	0.00 m-0.61 m; fill		X				Assess quality of fill; general site coverage
BH1-SS6	3.81 m-4.42 m; fill	X		X			Assess vertical extent of contamination
BH3-AU1	0.00 m-0.61 m; fill	X	X				Assess quality of fill; general site coverage
BH3-SS5	3.05 m-3.66 m; fill	X					Assess vertical extent of contamination
TP1-G3	2.44 m-2.74 m; fill		X		X		Assess quality of fill; general site coverage
TP2-G5	2.74 m-3.05 m; fill		X		X		
TP3-G1	0.61 m-0.91 m; fill		X		X		
TP4-G1	1.52 m-1.83 m; fill		X				
TP4-G2	2.13 m-2.44 m; till		X				
TP6-G2	1.52 m-1.83 m; silty sand		X		X		Assess vertical extent of contamination
TP9-G2	1.04 m-1.22 m; fill		X		X		Assess quality of fill; general site coverage
TP10-G2	1.83 m-2.08 m; fill				X		
TP10-G3	2.74 m-3.05 m; fill				X		
TP8-G1	0-.00 0.61 m; fill		X		X		
TP8-G4	2.13 m-2.44 m; silty clay	X	X	X	X		Assess vertical extent of contamination
BH9-15-SS4	2.29 m-2.90 m; fill		X				Visual appearance and horizontal delineation

Table 3: Soil Samples Submitted (2014-2015)

Sample ID	Sample Depth; Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX & PHCs F_1-F_4	PAHs	VOCs	Metals	EC/SAR	
BH10-15-SS5	3.05 m-3.66 m; fill		X				Visual appearance and horizontal delineation
BH11-15-SS2	0.76 m-0.97 m; fill		X				Visual appearance and horizontal delineation
BH12-15-AU1	0-0.61 m ; fill					X	Assess quality of fill in area of former snow dump
BH12-15-SS2	0.76 m-1.37 m; fill		X				Visual appearance and horizontal delineation
BH13-15-SS4	2.29 m-2.90 m; fill		X		X		Visual appearance and horizontal delineation
BH14-15-AU1	0.0 m - 0.61 m; fill					X	Assess quality of fill in area of former snow dump
BH14-15-SS4	2.29 m-2.90 m; fill	X					Highest vapour reading in borehole and odour
BH15-15-AU1	0.0 m - 0.61 m; fill					X	Assess quality of fill in area of former snow dump
BH15-15-SS2	0.76 m-1.37 m; fill		X				Visual appearance and horizontal delineation
BH16-15-SS5	3.05 m-3.23 m; fill	X					Highest vapour reading in borehole and odour
BH17-15 – AU1	0.0 m – 0.61 m; fill					X	Assess quality of fill in area of former snow dump
BH17-15-SS3	1.52 m-1.90 m; fill		X				Visual appearance and horizontal delineation

Table 4: Groundwater Samples Submitted (2014-2015)

Sample ID	Sample Depth; Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX & PHCs F_1-F_4	PAHs	VOCs	Metals	Sodium Chloride	
BH1-GW1	13.41-16.46; limestone	X	X	X	X		General assessment of groundwater quality at the subject site.
BH2-GW1	15.01-18.06; limestone	X	X	X	X		
BH3-GW1	14.99-18.04; limestone	X	X	X	X		
BH1-GW2	13.41-16.46; limestone			X			Re-sampling to confirm VOC concentrations
BH2-GW2	15.01-18.06; limestone			X			
BH3-GW2	14.99-18.04; limestone			X			
BH4-GW1	30.12-33.17; limestone			X			General assessment of groundwater quality
BH9-15-GW1	3.05-6.10; fill,	X	X	X			
BH10-15-GW1	8.61-10.13; limestone		X	X			
BH11-15-GW1	7.09-10.13; limestone			X			
BH12-15-GW1	1.52-4.57; fill	X	X	X			
BH13-15-GW1	1.22-4.27; fill	X	X		X		
BH14-15-GW1	1.78-4.83; till	X		X		X	
BH15-15-GW1	10.13-11.35; limestone		X	X			
BH16-15-GW1	1.83-4.88;fill/ silty clay	X		X			
BH17-15-GW1	1.83-4.88; fill		X			X	

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

4.8 Residue Management

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

4.9 Elevation Surveying

Borehole locations (BH1 through BH4) and test pit locations (TP1 through TP10) were surveyed using a laser level. Elevations were surveyed relative to a manhole located on the northwest portion of the site. Based on a topographical survey of the subject site provided by Stantec, the geodetic elevation of the catch basin is 56.3 m. The location of the site benchmark is shown on Drawing PE3302-7– Test Hole Location Plan. The borehole locations and ground surface elevations from the 2015 investigation (BH9-15 through BH17-15) were provided by Stantec Geomatics Limited.

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1. Site soils consist of fill overlying an intermittent silty clay layer, underlain by glacial till and interbedded black limestone and limestone bedrock. The fill material consists of silty sand with crushed stone, metal and wood debris, coal, and ash. The glacial till material consists of a silt, sand and clay matrix with gravel, cobbles, and boulders.

Bedrock was encountered at the site at depths varying from 5.6 to 10.7 m below existing grade. Groundwater was encountered in the lower silty sand layer and glacial till layer at depths ranging from 1.8 to 7.7 m below existing grade.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter. Groundwater levels are summarized below in Table 5. All elevations are geodetic.

Table 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	56.35	3.12	53.23	June 16, 2014
		3.36	52.99	July 31, 2014
BH2	55.22	7.68	47.54	June 16, 2014
		7.01	48.21	July 31, 2014
BH3	55.62	1.84	53.78	June 16, 2014
		2.03	53.59	July 31, 2014
BH4	55.21	1.91	53.30	July 31, 2014
BH9-15	57.12	3.81	53.31	December 1, 2015
BH10-15	56.28	3.52	52.76	December 1, 2015
BH11-15	55.94	1.92	54.02	December 1, 2015
BH12-15	55.15	2.08	53.07	December 1, 2015
BH13-15	55.02	1.92	53.1	December 1, 2015
BH14-15	54.81	2.09	52.72	December 1, 2015
BH15-15	55.06	2.02	53.04	December 1, 2015
BH16-15	55.01	2.02	52.99	December 1, 2015
BH17-15	55.02	2.02	53.00	December 1, 2015

Based on the groundwater elevations from the December 2015 monitoring event, groundwater contour mapping was completed for the overburden and bedrock strata. Groundwater contours are shown on Drawing PE3302-18 - Groundwater Contour Plan – Overburden Monitoring Wells and Drawing PE3302-19- Groundwater Contour Plan – Bedrock Monitoring Wells. Based on the contour mapping, groundwater flow in the bedrock at the subject site appears to be in a northern direction. A horizontal hydraulic gradient of approximately 0.07 m/m was calculated. The groundwater flow in the overburden at the subject site appears to be in a southern direction, with a horizontal hydraulic gradient of approximately 0.014 m/m, in our opinion, groundwater flow at the subject site may be influenced by site services. It is noted that water levels fluctuate with seasonal variations.

A sheen was observed in monitoring wells BH13-15 and BH16-15 at the subject site during the December 1, 2015 sampling event.

5.3 Fine-Medium Soil Texture

Based on observed soil conditions, it is our opinion that fine- to medium-grained soil standards are not applicable at the subject site. Coarse-grained soil standards have been used for the subject site. Grain size analysis was not completed.

5.4 Soil - Field Screening

Field screening of the soil samples collected during drilling resulted in soil vapour readings of 0 to 250 ppm. Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

Based on visual observations, soil samples from the fill unit were identified as having the potential for metals and/or PAH contamination.

5.5 Soil Quality

Two soil samples from the 2014 subsurface investigation were submitted for analysis of VOCs. The results of the analytical testing are presented below. The laboratory certificates of analysis are provided in Appendix 1.

Table 6:
Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4-11, 2014		MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH1-SS6	TP8-G4		
Acetone	0.50	nd	nd	16	0.5
Benzene	0.02	nd	nd	0.21	0.02
Bromodichloromethane	0.05	nd	nd	13	0.05
Bromoform	0.05	nd	nd	0.27	0.05
Bromomethane	0.05	nd	nd	0.05	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05	0.05
Chlorobenzene	0.05	nd	nd	2.4	0.05
Chloroform	0.05	nd	nd	0.05	0.05
Dibromochloromethane	0.05	nd	nd	9.4	0.05
Dichlorodifluoromethane	0.05	nd	nd	16	0.05
1,2-Dichlorobenzene	0.05	nd	nd	3.4	0.05
1,3-Dichlorobenzene	0.05	nd	nd	4.8	0.05
1,4-Dichlorobenzene	0.05	nd	nd	0.083	0.05
1,1-Dichloroethane	0.05	nd	nd	3.5	0.05
1,2-Dichloroethane	0.05	nd	nd	0.05	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.05	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	3.4	0.05
trans-1,2-Dichloroethylene	0.05	nd	nd	0.084	0.05
1,2-Dichloropropane	0.05	nd	nd	0.05	0.05
1,3-Dichloropropylene, total	0.05	nd	nd	0.05	0.05
Ethylbenzene	0.05	nd	nd	2	0.05
Hexane	0.05	nd	nd	2.8	0.05
Methyl Ethyl Ketone	0.50	nd	nd	16	0.5
Methyl Isobutyl Ketone	0.50	nd	nd	1.7	0.5
Methyl tert-butyl ether	0.05	nd	nd	0.75	0.05
Methylene Chloride	0.05	nd	nd	0.1	0.05
Styrene	0.05	nd	nd	0.7	0.05
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.058	0.05
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05	0.05
Tetrachloroethylene	0.05	nd	nd	0.28	0.05
Toluene	0.05	nd	nd	2.3	0.2
1,2,4-Trichlorobenzene	0.05	nd	nd	0.36	0.05
1,1,1-Trichloroethane	0.05	nd	nd	0.38	0.05
1,1,2-Trichloroethane	0.05	nd	nd	0.05	0.05
Trichloroethylene	0.05	nd	nd	0.061	0.05
Trichlrofluoromethane	0.05	nd	nd	4	0.25
Vinyl Chloride	0.02	nd	nd	0.02	0.02
Xylenes, total	0.05	nd	nd	3.1	0.05

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 Standard
- **Bold** - Value exceeds MOECC Table 1 Standard

No VOC concentrations were detected above laboratory detection limits. The test results are in compliance with the selected MOECC Table 3 and Table 1 standards.

Nine soil samples from the 2014 subsurface investigation and one soil sample from the 2015 subsurface investigation were submitted for analysis of metals. The results of the analytical testing are presented below. The laboratory certificates of analysis are provided in Appendix 1.

Table 7:
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014			MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		TP1-G3	TP2-G5	TP3-G1		
Antimony	1	nd	nd	nd	7.5	1.3
Arsenic	1	4.3	9.4	5.3	18	18
Barium	1	146	186	112	390	220
Beryllium	1	nd	nd	nd	4	2.5
Boron	1	9.7	8.5	12.4	120	36
Cadmium	0.5	nd	nd	nd	1.2	1.2
Chromium	1	31.3	23.6	13.7	160	70
Chromium (VI)	0.2	nd	nd	nd	8	0.66
Cobalt	1	8.7	7.7	5.7	22	21
Copper	1	33.5	49	13.4	140	92
Lead	1	52.2	116	27.6	120	120
Mercury	0.1	0.1	**0.3**	nd	0.27	0.27
Molybdenum	1	nd	1.2	nd	6.9	2
Nickel	1	24.7	17.6	10.7	100	82
Selenium	1	nd	nd	nd	2.4	1.5
Silver	0.5	nd	nd	nd	20	0.5
Thallium	1	nd	nd	nd	1	1
Uranium	1	nd	nd	nd	23	2.5
Vanadium	1	38.6	35.6	19.9	86	86
Zinc	1	73	**298**	28	340	290

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 7 (continued):
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014			MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		TP6-G2	TP9-G2	TP10-G2		
Antimony	1	nd	**3.6**	nd	7.5	1.3
Arsenic	1	2.5	**355**	4.8	18	18
Barium	1	44.1	**234**	61.4	390	220
Beryllium	1	nd	nd	nd	4	2.5
Boron	1	11.9	7.7	9.1	120	36
Cadmium	0.5	nd	**2.0**	nd	1.2	1.2
Chromium	1	15.9	47.8	19.8	160	70
Chromium (VI)	0.2	nd	0.5	nd	8	0.66
Cobalt	1	6.3	5.9	6.8	22	21
Copper	1	17.3	37.2	22.5	140	92
Lead	1	7.9	21.8	81.7	120	120
Mercury	0.1	nd	nd	0.2	0.27	0.27
Molybdenum	1	nd	**2.5**	nd	6.9	2
Nickel	1	12.6	16.2	13.5	100	82
Selenium	1	nd	**41.4**	nd	2.4	1.5
Silver	0.5	nd	nd	nd	20	0.5
Thallium	1	nd	nd	nd	1	1
Uranium	1	nd	nd	nd	23	2.5
Vanadium	1	38.0	**86.7**	34.1	86	86
Zinc	1	31.8	58.8	59.1	340	290

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 7 (continued):
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		TP10-G3	TP8-G1	TP8-G4	BH13-15-SS4		
		June 4 to 11, 2014			November 17, 2015		
Antimony	1	nd	nd	nd	nd	7.5	1.3
Arsenic	1	2.7	5.7	1.2	11.8	18	18
Barium	1	47.8	76.1	116	69.9	390	220
Beryllium	1	nd	nd	nd	nd	4	2.5
Boron	1	7.3	6.8	4.0	8.6	120	36
Cadmium	0.5	nd	0.6	nd	0.7	1.2	1.2
Chromium	1	19.6	23.3	22.1	28.6	160	70
Chromium (VI)	0.2	nd	nd	nd	nd	8	0.66
Cobalt	1	7.3	5.6	7.2	13.8	22	21
Copper	1	21.8	61.4	15.6	37.4	140	92
Lead	1	32.5	**334**	5.2	**322**	120	120
Mercury	0.1	nd	0.2	nd	nd	0.27	0.27
Molybdenum	1	nd	**2.4**	nd	1.5	6.9	2
Nickel	1	13.3	18.0	13.9	31.2	100	82
Selenium	1	nd	nd	nd	nd	2.4	1.5
Silver	0.5	nd	nd	nd	nd	20	0.5
Thallium	1	nd	nd	nd	nd	1	1
Uranium	1	nd	nd	nd	nd	23	2.5
Vanadium	1	35.3	28.6	35.4	45.0	86	86
Zinc	1	42.3	159	34.5	87.4	340	290

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

The concentration of mercury exceeds the MOECC Table 3 Standards at sample location TP2-G5. The concentrations of arsenic, cadmium, selenium, and vanadium exceed the MOECC Table 3 Standards at sample location TP9-G2. The concentration of lead exceeds the MOECC Table 3 Standards at sample locations TP8-G1 and BH13-15-SS4. Additional metal parameters exceed the MOECC Table 1 Standards.

Eleven soil samples from the 2014 investigation and seven soil samples from the 2015 investigation were submitted for analysis of PAHs. The results of the analytical testing are presented below. The laboratory certificates of analysis are provided in Appendix 1.

Table 8:
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014			MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH1-AU1	BH3-AU1	TP1-G3		
Acenaphthene	0.02	**0.13**	0.03	0.04	7.9	0.072
Acenaphthylene	0.02	**0.21**	0.04	**0.10**	0.15	0.093
Anthracene	0.02	**0.82**	0.08	0.13	0.67	0.16
Benzo[a]anthracene	0.02	**3.21**	0.21	**0.41**	0.5	0.36
Benzo[a]pyrene	0.02	**3.05**	0.22	**0.41**	0.3	0.3
Benzo[b]fluoranthene	0.02	**4.34**	0.36	**0.66**	0.78	0.47
Benzo[g,h,i]perylene	0.02	**1.70**	0.20	0.23	6.6	0.68
Benzo[k]fluoranthene	0.02	**2.59**	0.18	0.33	0.78	0.48
Chrysene	0.02	**3.06**	0.28	0.52	7	2.8
Dibenzo[a,h]anthracene	0.02	**0.44**	0.03	0.05	0.1	0.1
Fluoranthene	0.02	**5.39**	0.44	**0.76**	0.69	0.56
Fluorene	0.02	**0.16**	0.03	0.04	62	0.12
Indeno[1,2,3-cd]pyrene	0.02	**1.67**	0.16	0.23	0.38	0.23
Methylnaphthalene (1&2)	0.04	0.11	0.16	**1.02**	0.99	0.59
Naphthalene	0.01	**0.11**	0.07	**0.40**	0.6	0.09
Phenanthrene	0.02	**2.15**	0.31	0.60	6.2	0.69
Pyrene	0.02	**4.92**	0.38	0.70	78	1

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 8 (continued):
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014			MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		TP2-G5	TP3-G1	TP4-G1		
Acenaphthene	0.02	0.04	0.02	0.02	7.9	0.072
Acenaphthylene	0.02	**0.10**	0.07	**0.15**	0.15	0.093
Anthracene	0.02	0.14	0.10	**0.21**	0.67	0.16
Benzo[a]anthracene	0.02	**0.53**	0.19	**1.01**	0.5	0.36
Benzo[a]pyrene	0.02	**0.54**	0.26	**0.94**	0.3	0.3
Benzo[b]fluoranthene	0.02	**0.97**	0.44	**1.94**	0.78	0.47
Benzo[g,h,i]perylene	0.02	0.37	0.20	0.53	6.6	0.68
Benzo[k]fluoranthene	0.02	0.46	0.22	**0.78**	0.78	0.48
Chrysene	0.02	0.71	0.28	1.38	7	2.8
Dibenzo[a,h]anthracene	0.02	0.08	0.04	**0.14**	0.1	0.1
Fluoranthene	0.02	**0.95**	0.27	**1.52**	0.69	0.56
Fluorene	0.02	0.02	nd	0.04	62	0.12
Indeno[1,2,3-cd]pyrene	0.02	**0.37**	0.17	**0.55**	0.38	0.23
Methylnaphthalene (1&2)	0.04	0.48	0.13	**0.86**	0.99	0.59
Naphthalene	0.01	**0.18**	0.06	**0.19**	0.6	0.09
Phenanthrene	0.02	0.47	0.18	**0.96**	6.2	0.69
Pyrene	0.02	0.94	0.27	**1.58**	78	1

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 8 (continued):
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014			MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		TP4-G2	TP6-G2	TP9-G2		
Acenaphthene	0.02	nd	nd	nd	7.9	0.072
Acenaphthylene	0.02	nd	nd	nd	0.15	0.093
Anthracene	0.02	nd	nd	nd	0.67	0.16
Benzo[a]anthracene	0.02	0.02	nd	nd	0.5	0.36
Benzo[a]pyrene	0.02	nd	nd	nd	0.3	0.3
Benzo[b]fluoranthene	0.02	0.03	nd	nd	0.78	0.47
Benzo[g,h,i]perylene	0.02	nd	nd	nd	6.6	0.68
Benzo[k]fluoranthene	0.02	0.02	nd	nd	0.78	0.48
Chrysene	0.02	0.02	nd	nd	7	2.8
Dibenzo[a,h]anthracene	0.02	nd	nd	nd	0.1	0.1
Fluoranthene	0.02	0.04	nd	nd	0.69	0.56
Fluorene	0.02	nd	nd	nd	62	0.12
Indeno[1,2,3-cd]pyrene	0.02	nd	nd	nd	0.38	0.23
Methylnaphthalene (1&2)	0.04	nd	nd	nd	0.99	0.59
Naphthalene	0.01	0.01	nd	0.01	0.6	0.09
Phenanthrene	0.02	0.03	nd	nd	6.2	0.69
Pyrene	0.02	0.03	nd	nd	78	1

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 8 (continued):
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014		MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		TP8-G1	TP8-G4		
Acenaphthene	0.02	0.04	nd	7.9	0.072
Acenaphthylene	0.02	0.09	nd	0.15	0.093
Anthracene	0.02	**0.18**	nd	0.67	0.16
Benzo[a]anthracene	0.02	**0.38**	nd	0.5	0.36
Benzo[a]pyrene	0.02	**0.38**	nd	0.3	0.3
Benzo[b]fluoranthene	0.02	**0.72**	nd	0.78	0.47
Benzo[g,h,i]perylene	0.02	0.30	nd	6.6	0.68
Benzo[k]fluoranthene	0.02	0.35	nd	0.78	0.48
Chrysene	0.02	0.52	nd	7	2.8
Dibenzo[a,h]anthracene	0.02	0.06	nd	0.1	0.1
Fluoranthene	0.02	**0.76**	nd	0.69	0.56
Fluorene	0.02	0.03	nd	62	0.12
Indeno[1,2,3-cd]pyrene	0.02	**0.27**	nd	0.38	0.23
Methylnaphthalene (1&2)	0.04	0.35	nd	0.99	0.59
Naphthalene	0.01	**0.14**	nd	0.6	0.09
Phenanthrene	0.02	0.51	nd	6.2	0.69
Pyrene	0.02	0.73	nd	78	1

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 8 (continued):
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH9-15-SS4	BH10-15-SS5	BH11-15-SS2		
		November 13, 2015		November 16, 2016		
Acenaphthene	0.02	**0.31**	nd	nd	7.9	0.072
Acenaphthylene	0.02	**0.44**	**0.13**	nd	0.15	0.093
Anthracene	0.02	**1.02**	**0.20**	nd	0.67	0.16
Benzo[a]anthracene	0.02	**2.11**	0.33	0.02	0.5	0.36
Benzo[a]pyrene	0.02	**2.74**	**0.51**	0.03	0.3	0.3
Benzo[b]fluoranthene	0.02	**3.83**	**0.78**	0.04	0.78	0.47
Benzo[g,h,i]perylene	0.02	**1.87**	0.47	0.03	6.6	0.68
Benzo[k]fluoranthene	0.02	**2.82**	0.47	0.03	0.78	0.48
Chrysene	0.02	2.19	0.38	0.03	7	2.8
Dibenzo[a,h]anthracene	0.02	**0.35**	0.09	nd	0.1	0.1
Fluoranthene	0.02	**5.57**	**0.78**	0.06	0.69	0.56
Fluorene	0.02	**0.39**	0.04	nd	62	0.12
Indeno[1,2,3-cd]pyrene	0.02	**1.83**	**0.45**	0.02	0.38	0.23
Methylnaphthalene (1&2)	0.04	**1.87**	0.49	nd	0.99	0.59
Naphthalene	0.01	**0.58**	**0.14**	0.01	0.6	0.09
Phenanthrene	0.02	**3.72**	0.48	0.04	6.2	0.69
Pyrene	0.02	**4.70**	0.72	0.05	78	1

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 8 (continued):
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH12-15-SS2	BH13-15-SS4	BH15-15-SS2	BH17-15-SS3		
		Nov 16, 2015	Nov 17, 2015		Nov 18, 2015		
Acenaphthene	0.02	0.05	nd	**0.36**	nd	7.9	0.072
Acenaphthylene	0.02	**0.56**	0.05	0.07	nd	0.15	0.093
Anthracene	0.02	**2.54**	0.06	**0.55**	nd	0.67	0.16
Benzo[a]anthracene	0.02	**1.08**	0.20	**0.73**	0.05	0.5	0.36
Benzo[a]pyrene	0.02	**1.43**	0.16	**0.74**	0.04	0.3	0.3
Benzo[b]fluoranthene	0.02	**3.39**	0.38	**0.91**	0.06	0.78	0.47
Benzo[g,h,i]perylene	0.02	**1.14**	0.15	0.53	0.05	6.6	0.68
Benzo[k]fluoranthene	0.02	**1.53**	0.16	**0.63**	0.04	0.78	0.48
Chrysene	0.02	1.76	0.27	0.73	0.08	7	2.8
Dibenzo[a,h]anthracene	0.02	**0.29**	0.03	0.10	nd	0.1	0.1
Fluoranthene	0.02	**9.56**	0.20	**1.89**	0.08	0.69	0.56
Fluorene	0.02	0.11	0.04	**0.35**	nd	62	0.12
Indeno[1,2,3-cd]pyrene	0.02	**1.29**	0.13	**0.44**	0.03	0.38	0.23
Methylnaphthalene (1&2)	0.04	**4.38**	**0.99**	**0.97**	0.25	0.99	0.59
Naphthalene	0.01	**1.26**	**0.24**	**0.32**	0.05	0.6	0.09
Phenanthrene	0.02	**7.53**	0.32	**2.33**	0.15	6.2	0.69
Pyrene	0.02	**8.61**	0.15	**1.72**	0.09	78	1

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 1 standard
- **Bold** – Value exceeds MOECC Table 3 standard

The concentrations of various PAH parameters at BH1-AU1, TP1-G3, TP2-G5, TP4-G1, TP8-G1, BH9-15-SS4, BH1015-SS5, BH12-15-SS2 and BH15-15-SS2 exceeded the applicable MOECC Table 3 standards. Additional PAH parameters at these locations and BH13-15-SS4 exceeded MOECC Table 1 standards. PAH concentrations at BH3-AU1, TP3-G1, TP4-G2, TP6-G2, TP8-G4, TP9-G2, BH11-15-SS2 and BH17-15-SS3 are in compliance with MOECC Table 3 and Table 1 standards.

Four soil samples from the 2014 investigation and two soil samples from the 2015 investigation were submitted for analysis of BTEX and PHCs. The results of the analytical testing are presented below. The laboratory certificates of analysis are provided in Appendix 1.

Table 9:
Analytical Test Results – Soil
BTEX/PHCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) June 4 to 11, 2014				MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH1-SS6	BH3-AU1	BH3-SS5	TP8-G4		
Benzene	0.02	nd	nd	nd	nd	0.21	0.02
Ethylbenzene	0.05	nd	nd	nd	nd	2	0.05
Toluene	0.05	nd	nd	nd	nd	2.3	0.2
Xylenes	0.05	nd	nd	nd	nd	3.1	0.05
PHCs F1	7	nd	nd	nd	nd	55	25
PHCs F2	4	nd	nd	nd	nd	98	10
PHCs F3	8	nd	166	52	nd	300	240
PHCs F4	6	nd	**187**	44	nd	2,800	120

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

Table 9 (continued):
Analytical Test Results – Soil
BTEX/PHCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 18, 2015		MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH14-15-SS4	BH16-15-SS5		
Benzene	0.02	nd	nd	0.21	0.02
Ethylbenzene	0.05	nd	nd	2	0.05
Toluene	0.05	nd	nd	2.3	0.2
Xylenes	0.05	nd	nd	3.1	0.05
PHCs F1	7	8	**39**	55	25
PHCs F2	4	**186**	**395**	98	10
PHCs F3	8	163	**253**	300	240
PHCs F4	6	31	21	2,800	120

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

The concentrations of PHC (F_2) exceeded the MOECC Table 3 standards at BH14-15-SS4 and BH16-15-SS5. Additional PHC parameters at BH16-15-SS5 exceed the MOECC Table 1 standards.

Table 10:
Analytical Test Results – Soil
EC/SAR

Parameter	MDL	Soil Samples				MOECC Table 3 Residential Coarse	MOECC Table 1 Residential
		BH12-15-AU1	BH14-15-AU1	BH15-15-AU1	BH17-15-AU1		
		Nov 16, 2015	Nov 18, 2015	Nov 17, 2015	Nov 18, 2015		
SAR	0.01	0.10	0.25	0.45	0.34	5	2.4
EC(µS/cm)	5	264	265	183	162	700	570

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- **Bold** - Value exceeds MOECC Table 1 Standard
- **Bold** – Value exceeds MOECC Table 3 Standard

SAR and EC results are in compliance with the MOECC Table 1 and Table 3 standards.

Sample locations and analytical results are shown on Drawings PE3302-8 through PE3302-17 and PE3302-20 through PE3302-21.

Based on the analytical results, no contaminants were identified as being by-products of chemical or biological transformations which have or may have occurred.

The maximum concentrations of analyzed parameters in the soil at the site are summarized below in Table 11.

Table 11:
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Borehole/ Test Pit	Depth Interval (m BGS)
Antimony	3.6	TP9-G2	1.07-1.22 m; fill
Arsenic	**355**	TP9-G2	1.07-1.22 m; fill
Barium	234	TP9-G2	1.07-1.22 m; fill
Boron	12.4	TP3-G1	0.61-0.91 m; fill
Cadmium	**2.0**	TP9-G2	1.07-1.22 m; fill
Chromium	47.8	TP9-G2	1.07-1.22 m; fill
Chromium (VI)	0.5	TP9-G2	1.07-1.22 m; fill
Cobalt	13.8	BH13-15-SS4	2.29-2.90 m; fill
Copper	61.4	TP8-G1	0.61-0.91 m; fill
Lead	**334**	TP8-G1	0.61-0.91 m; fill
Mercury	**0.3**	TP2-G5	2.74-3.05 m; fill
Molybdenum	2.5	TP9-G2	1.07-1.22 m; fill
Nickel	31.2	BH13-15-SS4	2.29-2.90 m; fill
Selenium	**41.4**	TP9-G2	1.07-1.22 m; fill
Vanadium	**86.7**	TP9-G2	1.07-1.22 m; fill
Zinc	298	TP2-G5	2.74-3.05 m; fill
Acenaphthene	0.36	BH15-15-SS2	0.76-1.37 m; fill
Acenaphthylene	**0.56**	BH12-15-SS2	0.76-1.37 m; fill
Anthracene	**2.54**	BH12-15-SS2	0.76-1.37 m; fill
Benzo[a]anthracene	**3.21**	BH1-AU1	0.00-0.60 m; fill
Benzo[a]pyrene	**3.05**	BH1-AU1	0.00-0.60 m; fill
Benzo[b]fluoranthene	**4.34**	BH1-AU1	0.00-0.60 m; fill
Benzo[g,h,i]perylene	1.87	BH9-15-SS4	2.29-2.90 m; fill
Benzo[k]fluoranthene	**2.82**	BH9-15-SS4	2.29-2.90 m; fill
Chrysene	3.06	BH1-AU1	0.00-0.60 m; fill
Dibenzo[a,h]anthracene	**0.44**	BH1-AU1	0.00-0.60 m; fill
Fluoranthene	**9.56**	BH12-15-SS2	0.76 -1.37 m; fill
Fluorene	0.39	BH9-15-SS4	2.29 -2.90 m; fill
Indeno[1,2,3-cd]pyrene	**1.83**	BH9-15-SS4	2.29 -2.90 m; fill
Methylnaphthalene (1&2)	**4.38**	BH12-15-SS2	0.76 -1.37 m; fill
Naphthalene	**1.26**	BH12-15-SS2	0.76 -1.37 m; fill
Phenanthrene	**7.53**	BH12-15-SS2	0.76 -1.37 m; fill
Pyrene	8.61	BH12-15-SS2	0.76 -1.37 m; fill
PHC F1	39	BH16-15-SS5	3.05 -3.23 m; fill
PHC F2	**395**	BH16-15-SS5	3.05 -3.23 m; fill
PHC F3	253	BH16-15-SS5	3.05 -3.23 m; fill
PHC F4	187	BH1-AU1	0.00-0.60; fill
SAR	0.45	BH14-15-AU1	0.00-0.61; fill
EC	2.65 mS/cm	BH15-15-AU1	0.00-0.61; fill

Notes:
- **Bold** – Value exceeds MOECC Table 3 standard

All other parameter concentrations were below laboratory detection limits.

5.6 Groundwater Quality

Groundwater samples from the monitoring wells were submitted for laboratory analysis of a combination of VOCs, PHCs, PAHs, metals and chloride parameters. The groundwater samples were obtained from the screened intervals noted on Table 1, above. The results of the analytical testing are presented below. The laboratory certificates of analysis are provided in Appendix 1.

Table 12:
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) June 16, 2014				MOECC Table 3 Residential Coarse
		BH1-GW1	BH2-GW1	BH3-GW1	Dup. 1 (BH3-GW1)	
Acenaphthene	0.05	0.08	nd	nd	nd	600
Acenaphthylene	0.05	nd	nd	nd	nd	1.8
Anthracene	0.01	0.08	nd	nd	nd	2.4
Benzo[a]anthracene	0.01	0.18	nd	nd	nd	4.7
Benzo[a]pyrene	0.01	0.10	nd	nd	nd	0.81
Benzo[b]fluoranthene	0.05	0.16	nd	nd	nd	0.75
Benzo[g,h,i]perylene	0.05	0.07	nd	nd	nd	0.2
Benzo[k]fluoranthene	0.05	0.11	nd	nd	nd	0.4
Chrysene	0.05	0.24	nd	nd	nd	1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	nd	0.52
Fluoranthene	0.01	0.40	0.07	nd	nd	130
Fluorene	0.05	0.09	nd	nd	nd	400
Indeno[1,2,3-cd]pyrene	0.05	0.05	nd	nd	nd	0.2
Methylnaphthalene (1&2)	0.10	0.29	nd	nd	nd	1,800
Naphthalene	0.05	0.43	0.08	0.07	0.06	1,400
Phenanthrene	0.05	1.30	0.51	0.10	0.08	580
Pyrene	0.01	0.34	0.05	0.02	0.02	68

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 standard

Table 12 (continued):
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) December 1, 2015			MOECC Table 3 Residential Coarse
		BH9-15-GW1	BH10-15-GW1	BH12-15-GW1	
Acenaphthene	0.05	nd	nd	nd	600
Acenaphthylene	0.05	nd	nd	nd	1.8
Anthracene	0.01	nd	nd	nd	2.4
Benzo[a]anthracene	0.01	nd	nd	nd	4.7
Benzo[a]pyrene	0.01	nd	nd	nd	0.81
Benzo[b]fluoranthene	0.05	nd	nd	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	nd	nd	0.2
Benzo[k]fluoranthene	0.05	nd	nd	nd	0.4
Chrysene	0.05	nd	nd	nd	1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	0.52
Fluoranthene	0.01	nd	nd	nd	130
Fluorene	0.05	nd	nd	nd	400
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	nd	0.2
Methylnaphthalene (1&2)	0.10	nd	nd	nd	1,800
Naphthalene	0.05	nd	nd	nd	1,400
Phenanthrene	0.05	nd	nd	nd	580
Pyrene	0.01	nd	nd	nd	68

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 standard

Table 12 (continued):
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) December 1, 2015			MOECC Table 3 Residential Coarse
		BH13-15-GW1	BH15-15-GW1	BH17-15-GW1*	
Acenaphthene	0.05	nd	nd	nd(0.10)	600
Acenaphthylene	0.05	nd	nd	nd(0.10)	1.8
Anthracene	0.01	nd	nd	nd(0.02)	2.4
Benzo[a]anthracene	0.01	nd	nd	nd(0.02)	4.7
Benzo[a]pyrene	0.01	nd	nd	nd(0.02)	0.81
Benzo[b]fluoranthene	0.05	nd	nd	nd(0.10)	0.75
Benzo[g,h,i]perylene	0.05	nd	nd	nd(0.10)	0.2
Benzo[k]fluoranthene	0.05	nd	nd	nd(0.10)	0.4
Chrysene	0.05	nd	nd	nd(0.10)	1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd(0.10)	0.52
Fluoranthene	0.01	0.05	nd	nd(0.02)	130
Fluorene	0.05	nd	nd	nd(0.10)	400
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	nd(0.10)	0.2
Methylnaphthalene (1&2)	0.10	nd	nd	nd(0.20)	1,800
Naphthalene	0.05	nd	nd	nd(0.10)	1,400
Phenanthrene	0.05	nd	nd	nd(0.10)	580
Pyrene	0.01	0.04	nd	nd(0.02)	68

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** - Value exceeds MOECC Table 3 standard
- * Elevated reporting limits due to limited sample volume

All PAH concentrations are in compliance with the MOECC Table 3 standards.

Table 13:
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Soil Samples (µg/L)				MOECC Table 3 Residential Coarse
		BH1-GW1	BH2-GW1	BH3-GW1	BH13-15-GW1	
		June 16, 2014			Dec 1, 2015	
Mercury	0.1	-	-	-	nd	0.29
Antimony	1	3.2	1.6	0.8	nd	20,000
Arsenic	1	2	2	1	2	1,900
Barium	1	68	106	219	310	29,000
Beryllium	0.5	nd	nd	nd	nd	67
Boron	5.0	184	129	152	100	45,000
Cadmium	0.5	nd	nd	nd	nd	2.7
Chromium	5	2	2	7	nd	810
Chromium (VI)	10	-	-	-	nd	140
Cobalt	1	3.3	1.4	1.7	nd	66
Copper	5	13.7	4.0	5.4	nd	87
Lead	1	3.1	nd	nd	nd	25
Molybdenum	1	17.9	13.4	4.3	1.7	9,200
Nickel	5	5	2	3	nd	1,400
Selenium	1	1	2	nd	nd	63
Sodium	200	161,000	135,000	333,000	251,000	2,300,000
Silver	0.3	nd	nd	nd	nd	1.5
Thallium	1	nd	nd	nd	nd	510
Uranium	1	3.7	3.0	0.7	1.3	420
Vanadium	10	3.3	4.3	12.7	nd	250
Zinc	20	23	6	6	7	1,100

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 standard

Table 13:
Analytical Test Results – Groundwater
Metals (Sodium)

Parameter	MDL (µg/L)	Soil Samples (µg/L) December 1, 2015		MOECC Table 3 Residential Coarse
		BH14-15-GW1	BH17-15-GW1	
Sodium	200	299,000	477,000	2,300,000

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 standard

All metals concentrations are in compliance with the MOECC Table 3 standards.

Table 14:
Analytical Test Results – Groundwater
Chloride

Parameter	MDL (µg/L)	Soil Samples (µg/L) December 1, 2015		MOECC Table 3 Residential Coarse
		BH14-15-GW1	BH17-15-GW1	
Chloride	1000	499,000	749,000	2,300,000

Notes:
- MDL – Method Detection Limit
- Nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 Standard

All chloride concentrations are in compliance with the MOECC Table 3 standards.

Table 15:
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) June 16, 2014				MOECC Table 3 Residential Coarse
		BH1-GW1	BH2-GW1	BH3-GW1	Dup. 2 (BH1-GW1)	
Acetone	5.0	nd	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	0.6	44
Bromodichloromethane	0.5	nd	3.1	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	630
Chloroform	0.5	**10.7**	**27.1**	**4.0**	**10.6**	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	2,300
Hexane	1.0	2.6	nd	nd	4.9	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	1.6
Toluene	0.5	2.4	1.9	0.7	2.2	18,000
1,2,4-Trichlorobenzene	0.5	nd	nd	nd	nd	180
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	**4.9**	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes	0.5	2.5	nd	0.7	2.3	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 standards

Table 15 (continued):
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 31, 2014				MOECC Table 3 Residential Coarse
		BH1-GW2	BH2-GW2	BH3-GW2	BH4-GW1	
Acetone	5.0	nd	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	4.5	85,000
Bromoform	0.5	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	630
Chloroform	0.5	nd	**5.2**	nd	**53.7**	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	2,300
Hexane	1.0	nd	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	nd	18,000
1,2,4-Trichlorobenzene	0.5	nd	nd	nd	nd	180
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 Standards

Table 15 (continued):
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) December 1, 2015				MOECC Table 3 Residential Coarse
		BH9-15-GW1	BH10-15-GW1	BH11-15-GW1	BH12-15-GW1	
Acetone	5.0	nd	nd	nd	nd	130,000
Benzene	0.5	nd	nd	0.5	nd	44
Bromodichloromethane	0.5	nd	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	630
Chloroform	0.5	1.6	0.7	**4.3**	1.7	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	2,300
Ethylene dibromide	0.2	nd	nd	nd	nd	0.25
Hexane	1.0	nd	nd	5.8	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	1.6
Toluene	0.5	0.7	nd	3.7	1.4	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	4.6	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 Standards

Table 15 (continued):
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) December 1, 2015			MOECC Table 3 Residential Coarse
		BH14-15-GW1	BH15-15-GW1	BH16-15-GW1	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	0.6	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	**7.3**	nd	**3.5**	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Ethylene dibromide	0.2	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	1.0	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	1.6	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- N/V – no value provided by the MOECC
- **Bold** – Value exceeds MOECC Table 3 standards

Concentrations of chloroform in various samples exceeded the MOECC Table 3 standards. In our opinion, the presence of chloroform is due to the use of municipally treated water as core water during the drilling process.

Reductions in chloroform concentrations were observed at BH1 through BH3 during a second sampling event and are considered to be indicative of the removal of core water from the monitoring wells through purging. In our opinion, additional purging will result in further lowering of chloroform concentrations. Additionally, the concentration of 1,1,2-trichloroethane at BH3 from the initial groundwater sampling event exceeded MOECC Table 3 standards. The concentration of 1,1,2-trichloroethane at BH3 was in compliance with the MOECC Table 3 standard during the second sampling event.

All other VOC concentrations were in compliance with the MOECC Table 3 standards.

Table 16:
Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) June 16, 2014			MOECC Table 3 Residential Coarse
		BH1-GW1	BH2-GW1	BH3-GW1	
PHCs F_1	25	nd	nd	nd	750
PHCs F_2	100	nd	nd	nd	150
PHCs F_3	100	nd	nd	nd	500
PHCs F_4	100	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold** – Value exceeds MOECC Table 3 standards

Table 16 (continued):
Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) December 1, 2015			MOECC Table 3 Residential Coarse
		BH9-15-GW1	BH12-15-GW1	BH13-15-GW1	
Benzene	0.5	nd	nd	nd	44
Ethylbenzene	0.5	nd	nd	nd	2,300
Toluene	0.5	0.7	1.4	nd	18,000
Xylenes	0.5	nd	nd	nd	4,200
PHCs F_1	25	nd	nd	nd	750
PHCs F_2	100	nd	nd	nd	150
PHCs F_3	100	nd	nd	nd	500
PHCs F_4	100	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold** – Value exceeds MOECC Table 3 standards

Table 16 (continued):
Analytical Test Results – Groundwater
PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) December 1, 2015		MOECC Table 3 Residential Coarse
		BH14-15-GW1	BH16-15-GW1	
Benzene	0.5	nd	0.6	44
Ethylbenzene	0.5	nd	nd	2,300
Toluene	0.5	nd	1.0	18,000
Xylenes	0.5	nd	1.6	4,200
PHCs F_1	25	nd	419	750
PHCs F_2	100	nd	**449**	150
PHCs F_3	100	nd	151	500
PHCs F_4	100	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold** – Value exceeds MOECC Table 3 standards

The concentration of PHC (F_2) exceeded the MOECC Table 3 standards in the groundwater sample collected from the monitoring well installed in BH16-15. All other PHC concentrations were in compliance with the selected MOECC Table 3 standards.

The maximum final concentrations of all parameters analyzed in groundwater are summarized below.

Table 17: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Borehole/Sample Location	Depth Interval (m BGS)
Acenaphthene	0.08	BH1-GW1	12.95-16.46; limestone
Anthracene	0.08	BH1-GW1	12.95-16.46; limestone
Benzo[a]anthracene	0.18	BH1-GW1	12.95-16.46; limestone
Benzo[a]pyrene	0.10	BH1-GW1	12.95-16.46; limestone
Benzo[b]fluoranthene	0.16	BH1-GW1	12.95-16.46; limestone
Benzo[g,h,i]perylene	0.07	BH1-GW1	12.95-16.46; limestone
Benzo[k]fluoranthene	0.11	BH1-GW1	12.95-16.46; limestone
Chrysene	0.24	BH1-GW1	12.95-16.46; limestone
Fluoranthene	0.40	BH1-GW1	12.95-16.46; limestone
Fluorene	0.09	BH1-GW1	12.95-16.46; limestone
Indeno[1,2,3-cd]pyrene	0.05	BH1-GW1	12.95-16.46; limestone
Methylnaphthalene (1&2)	0.29	BH1-GW1	12.95-16.46; limestone
Naphthalene	0.43	BH1-GW1	12.95-16.46; limestone
Phenanthrene	1.30	BH1-GW1	12.95-16.46; limestone
Pyrene	0.34	BH1-GW1	12.95-16.46; limestone
Antimony	3.2	BH1-GW1	12.95-16.46; limestone
Arsenic	2	BH1-GW1; BH2-GW1; BH13-15-GW1	12.95-16.46; limestone; 14.40-18.06; limestone 1.22-4.27; fill
Barium	310	BH13-15-GW1	1.22-4.27; fill
Boron	184	BH1-GW1	12.95-16.46; limestone
Chromium	7	BH3-GW1;	14.99-18.04; limestone
Cobalt	3.3	BH1-GW1	12.95-16.46; limestone
Copper	13.7	BH1-GW1	12.95-16.46; limestone
Lead	3.1	BH1-GW1	12.95-16.46; limestone
Molybdenum	17.9	BH1-GW1	12.95-16.46; limestone
Nickel	5	BH1-GW1	12.95-16.46; limestone
Selenium	2	BH2-GW1	14.40-18.06; limestone
Uranium	3.7	BH1-GW1	12.95-16.46; limestone
Vanadium	12.7	BH3-GW1	14.53-18.04; limestone
Zinc	23	BH1-GW1	12.95-16.46; limestone
Sodium	477,000	BH17-15-GW1	1.83-4.88; fill
Chloride	749	BH17-15-GW1	1.83-4.88; fill
Bromodichloromethane	4.5	BH4-GW1	30.12-33.17; limestone
Chloroform	**53.7**	BH4-GW1	29.82-33.17; limestone
Hexane	5.8	BH11-15-GW1	7.09-10.13; limestone
Benzene	0.6	BH16-15-GW1	1.83-4.88;fill/ silty clay
Toluene	3.7	BH11-15-GW1	7.09-10.13; limestone
Xylenes	4.6	BH11-15-GW1	7.09-10.13; limestone
PHC (F_1)	419	BH16-15-GW1	1.83-4.88;fill/ silty clay
PHC (F_2)	**449**	BH16-15-GW1	1.83-4.88;fill/ silty clay
PHC (F_3)	151	BH16-15-GW1	1.83-4.88;fill/ silty clay

The concentrations of all other parameters were below laboratory detection limits.

5.7 Quality Assurance and Quality Control Results

As per the Sampling and Analysis Plan, duplicate groundwater samples were obtained at BH1 and BH3 during the June 2014 sampling event and analyzed for PAHs and VOCs respectively. The relative percent difference (RPD) calculations for the original and duplicate samples are provided below.

Table 18:
QA/QC Calculations – Groundwater – PAHs

Parameter	MDL (µg/L)	BH3-GW1	Dup. 1	RPD (%)	QA/QC Result
Naphthalene	0.05	0.07	0.06	15.4%	Meets target
Phenanthrene	0.05	0.10	0.08	22.2%	Exceeds target
Pyrene	0.01	0.02	0.02	0%	Meets target

Notes:
*All other parameter concentrations were below laboratory detection limits for both original and duplicate samples, and as such, are within acceptable QA/QC parameters.
** Where one parameter concentration is below the laboratory detection limit, the value of the detection limit is used for RPD calculations.

Table 19:
QA/QC Calculations – Groundwater – VOCs

Parameter	MDL (µg/L)	BH1-GW1	Dup. 2	RPD (%)	QA/QC Result
Benzene	0.5	<0.5	0.6	18.2%	Meets target
Chloroform	0.5	**10.7**	**10.6**	0.9%	Meets target
Hexane	0.5	2.6	4.9	61.3%	Exceeds target
Toluene	0.5	2.4	2.2	8.7%	Meets target
Xylenes	0.5	2.5	2.3	8.3%	Meets target

Notes:
- All other parameter concentrations were below laboratory detection limits for both original and duplicate samples, and as such, are within acceptable QA/QC parameters.

** Where one parameter concentration is below the laboratory detection limit, the value of the detection limit is used for RPD calculations.

All other parameter concentrations were below laboratory detection limits.

The majority of calculated RPD values were within 20%, and as such, are considered acceptable. The target range was exceeded for hexane and phenanthrene. However, both the original and duplicate concentrations of these parameters are well below the selected MOECC Table 3 standards. As such, the conclusions of the report are not considered to be affected.

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

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.

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

5.8 Phase II-ESA Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04 as amended by O.Reg. 269/11 - Record of Site Condition regulation, made under the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Potentially Contaminating Activities

Potentially contaminating activities at the Phase I-ESA property include the historical presence of rail lines, an 'oil house' and a snow dump on the subject site. Additional PCAs were present within the Phase I-ESA study area. Based on their separation distance and/or their inferred downgradient or cross-gradient location with respect to the subject site and previous investigations, the majority of the off-site PCAs are not considered to represent Areas of Potential Environmental Concern (APEC) with respect to the subject site. The exception is the Brown's Cleaners depot to the south of the subject site, which is considered to be an APEC with respect to the subject site.

Areas of Potential Environmental Concern

Based on the results of the Phase I-ESA completed for the subject site, several APECs were identified at the subject site. The APECs with respect to the subject site are summarized below:

- Historical presence of rail yards on the subject site; Item 46, Table 2, O.Reg. 153/04 as amended ("Rail yards, Tracks, and Spurs").

- Historical presence of 'oil house' identified on subject property; Item 28, Table 2, O.Reg. 153/04 as amended ("Gasoline and Associated Products Storage in Fixed Tanks").
- Brown's Cleaners depot to the south of the subject site; Item 37, Table 2, O.Reg. 153/04 as amended ("Operation of Dry Cleaning Equipment").
- Historical presence of a snow dump identified on the subject property.

Other PCAs within the Phase I-ESA study area are not considered to pose an environmental concern to the subject site due to their separation distance and/or location down-gradient or cross-gradient of the subject site.

Contaminants of Potential Concern

The Phase I-ESA identified BTEX, PHCs, PAHs, metals, VOCs, sodium adsorption ratio, electrical conductivity, sodium and chloride as contaminants of concern in soil and/or groundwater. Based on the results of the Phase II-ESA, the contaminants of concern at the subject site are considered to be PHCs, metals, and PAHs in soil, and PHCs in groundwater. Detailed descriptions of these contaminants are provided in Subsection 3.3 of this report.

Subsurface Structures and Utilities

The subject site is located in a municipally serviced area. There are currently no buildings on the subject site. Sanitary and storm sewers are present beneath the subject site. Electrical services in the vicinity of the subject site are overhead.

Physical Setting

Site Stratigraphy

Site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets provided in Appendix 1 and illustrated on Drawing PE3302-20 - Cross-Section A-A' and Drawing PE3302-21 – Cross-Section B-B'. Stratigraphy consists of:

- A layer of fill material, consisting of silty sand with gravel, cobble, boulders, ash, coal, and intermittent wood and metal debris, from approximately surface to 6.6 m deep.
- An intermittent layer of silty clay, encountered in TP8 and BH2 at depths varying from 2.1 to 1.4 m and varying in thickness from 0.9 to 3.7 m.

- A layer of glacial till, varying in thickness from 0.7 to 5.7 m, and encountered at depths varying from 1.1 to 6.1 m below existing grade. The glacial till consists of a silt, sand and clay matrix with gravel, cobbles, and boulders.
- A layer of bedrock, consisting of interbedded limestone and shale of the Verulam Formation, encountered at depths ranging from 5.6 to 14.5 m below existing grade. This is the deepest unit investigated.

Hydrogeological Characteristics

Groundwater levels were measured at the subject site on June 16, 2014 and December 1, 2015. Groundwater was encountered at depths between 1.8 and 7.7 m below existing grade. Seasonal variation of water levels is expected.

Based on the groundwater elevations from the December 2015 monitoring event, groundwater contour mapping was completed for the overburden and bedrock strata. Groundwater contours are shown on Drawing PE3302-18 - Groundwater Contour Plan – Overburden Monitoring Wells and Drawing PE3302-19- Groundwater Contour Plan – Bedrock Monitoring Wells. Based on the contour mapping, groundwater flow in the bedrock at the subject site appears to be in a northern direction. A horizontal hydraulic gradient of approximately 0.07 m/m was calculated. The groundwater flow in the overburden at the subject site appears to be in a southern direction, with a horizontal hydraulic gradient of approximately 0.014 m/m, it is our opinion that groundwater flow at the subject site may be influenced by site services. It is noted that water levels fluctuate with seasonal variations.

Approximate Depth to Bedrock

Based on the results of the current investigation and previous subsurface investigations at the subject site, approximate depth to bedrock at the subject site varies between approximately 5.6 to 14.5 m below existing ground surface.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 1.84 and 7.68 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the subject site.

Section 43.1 of the Regulation does not apply to the subject site in that the subject site is not a Shallow Soil Property and is not within 30 m of a water body.

Fill Placement

Fill placement has occurred at the subject site. The fill material consists primarily of silty sand with clay, gravel, crushed stone, and trace coal, ash, wood, and metal debris. Samples of the fill material were analyzed for metals, EC, SAR, PAHs, and BTEX/PHCs. Analytical results are summarized in Section 5.5 of this report and shown on Drawings PE3302-8 through PE3302-17 and Drawings PE3302-20 through PE3302-21. No further details are available concerning the origins of the fill material.

Proposed Buildings and Other Structures

It is our understanding that the proposed development consists of three residential towers, a 10 storey office building and retail galleria with three levels of underground parking.

Existing Buildings and Structures

There are currently no buildings or structures at the subject site.

Water Bodies

There are no water bodies on or in the immediate vicinity of the subject property. The closest water body is the Ottawa River, located approximately 320 m to the north of the RSC property.

Areas of Natural Significance

No areas of natural significance are present on the subject site.

Environmental Condition

Areas Where Contaminants are Present

Based on the results of the Phase II-ESA, the horizontal and vertical extents of the areas where contaminants are present at concentrations greater than the applicable site condition Standards are shown on Drawings PE3302-8 through PE3302-17 and Drawings PE3302-20 through PE3302-21.

Types of Contaminants

The Phase I-ESA identified BTEX, PHCs, PAHs, metals, VOCs, electrical conductivity, SAR, sodium, and chloride as contaminants of concern in soil and groundwater. Based on the results of the Phase II-ESA, the contaminants of potential concern at the subject site are considered to be metals and PAHs in soil, and PHCs in groundwater. It is our interpretation that the chloroform concentrations in groundwater are the result of the use of municipally-treated core water during drilling, and are not considered to be representative of site conditions. Detailed descriptions of these contaminants are provided in Subsection 3.3 of this report.

Contaminated Media

Based on the results of the Phase II-ESA and previous subsurface investigations, some of the fill material at the subject site is contaminated with metals, PAHs, and PHCs. Concentrations of chloroform and PHC (F_2) exceeding MOECC Table 3 standards were observed in groundwater. However, in our interpretation, the concentrations of chloroform in groundwater are the result of the use of municipally-treated water used during the bedrock core drilling operation, and are not considered to be representative of site conditions.

What Is Known About Areas Where Contaminants Are Present

Impacted fill material was noted throughout the subject site and is considered to be associated with those areas of the subject site formerly used as a rail yard. Chloroform concentrations were observed in site groundwater, in our interpretation, the concentrations of chloroform in the groundwater samples are the result of the use of municipally-treated water used during bedrock core drilling operations.

Distribution of Contaminants

The approximate vertical and horizontal distributions of contaminants are shown on Drawings PE3302-8 through PE3302-17 and Drawings PE3302-20 through PE3302-21.

Discharge of Contaminants

In our interpretation, the presence of the impacted fill at the subject site is the result of the historical presence of the rail yards at the subject site. No documentation or records of discharges were available for review. In our interpretation, the concentrations of chloroform in site groundwater are the result of the use of municipally-treated water during the bedrock core drilling operation, and are not considered to be representative of site conditions.

Migration of Contaminants

Physical transport of contaminated soil at the subject site does not appear to be occurring. It appears migration of contaminants in site soils have been affected by downward leaching. Based on analytical testing, concentrations of PHCs are present in the groundwater on the subject site.

PHCs are generally considered to be light non-aqueous phase liquids (LNAPLs) indicating that when present in sufficient concentrations above the solubility limit, they will partition into a separate phase above the water table, due to their lower density.

Metal and PAH soil impacts are not considered to have migrated beyond the fill layer as the analytical testing for metals and PAHs in the site groundwater complies with MOECC Table 3 standards.

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. Downward leaching may have affected the vertical distribution of PHCs in the area of BH16-15. Metals and PAHs are not considered to have been affected by downward leaching as analytical testing for metals and PAHs in the site groundwater complies with MOECC Table 3 standards.

Potential for Vapour Intrusion

There are currently no buildings or subsurface structures other than sewers on the subject site. It is our understanding that any contamination on the site will be remediated prior to site redevelopment. As such, the potential for vapour intrusion at the subject site is considered to be negligible.

6.0 CONCLUSIONS

Assessment

A Phase II- ESA was conducted for the property at 900 Albert Street (formerly 801 Albert Street), Ottawa, Ontario. The Phase II-ESA consisted of the drilling of 13 boreholes, the excavation of 10 test pits, and the installation of 13 groundwater monitoring wells to assess soil and groundwater quality at the subject site.

Soil samples were obtained from the boreholes and test pits and were screened using visual observations and vapour measurements. Site soils consist of fill over an intermittent layer of silty clay, underlain by glacial till and interbedded limestone and shale bedrock. Based on the screening results, various samples were selected for analysis of BTEX, PHCs F_1-F_4, metals, VOCs, PAHs, EC and SAR. Based on the analytical results, some of the fill material at the subject site exceeds the MOECC Table 3 standards for metals, PAHs, and PHCs.

Three groundwater samples and two duplicate samples were collected from the monitoring wells installed in BH1, BH2 and BH3 and analyzed for PHCs, VOCs, metals, and PAHs. All groundwater samples exceeded MOECC Table 3 standards for chloroform, and the concentration of 1,1,2-trichloroethane exceeded the MOECC Table 3 standard in the groundwater sample collected from the monitoring well installed in BH3. The presence of chloroform is interpreted to be the result of the use of municipally-treated water used during the drilling program.

A second groundwater sampling event was subsequently completed in July 2014. Four groundwater samples were analyzed for VOCs. Although a general decrease in chloroform concentrations were noted, chloroform concentrations in the groundwater samples collected from the monitoring wells installed in BH2 and BH4 exceeded the MOECC Table 3 standards. All other VOC concentrations were in compliance with the Table 3 standards.

A third groundwater sampling event was completed in December 2015. Nine groundwater samples were collected from the monitoring wells installed in BH9-15 through BH17-15 and were analyzed for a combination of PHC (F_1-F_4), BTEX, VOC, PAH, metals, sodium and chloride parameters. The concentration of PHC (F_2) exceeded the MOECC Table 3 standard in the groundwater sample collected from the monitoring well installed in BH16-15. Concentrations of chloroform exceeded the MOECC Table 3 standards in the groundwater samples

collected from the monitoring wells installed in BH11-15, BH14-15 and BH16-15. The presence of chloroform is interpreted to be the result of the use of municipally-treated water used during the drilling program.

Recommendations

Based on the above results, metals, PAH, and PHC concentrations in soil and PHC (F_2) concentrations in groundwater at the subject site exceed the applicable MOECC Table 3 standards. It is our understanding that the proposed development consists of three residential towers, a 10 storey office building and retail galleria with three levels of underground parking. The environmental site remediation program, consisting of the excavation and off-site disposal of all contaminated soil, can be completed concurrently with site redevelopment.

Soil

It is recommended that impacted soil from the property be removed as part of the site redevelopment program. Any impacted soil removed from the site during redevelopment will require disposal at an approved waste disposal facility. It is recommended that Paterson personnel be present onsite during the soil excavation program to direct excavation activities in the areas where impacted material has been identified or is expected to exist. It is recommended that confirmatory soil samples be collected upon completion of the soil remediation program to ensure that the site meets MOECC Table 3 standards.

Groundwater

Depending upon the volume of impacted groundwater encountered, several options may be available to treat the groundwater. The removal of impacted groundwater from the site by a licensed pumping contractor would be a feasible option for smaller volumes, while an on-site treatment system would likely be more economical for larger volumes over a longer period of time. An on-site treatment system would discharge to the City of Ottawa sewer system. Prior to discharging treated groundwater to the municipal sewer system, a Sanitary Sewer Agreement will be required from the City of Ottawa's Sewer Use Program. It is recommended that groundwater monitoring wells be installed upon completion of the site remediation program to ensure that the site meets MOECC Table 3 standards.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04 as amended by O.Reg. 269/11, and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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

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

This report was prepared for the sole use of Trinity Development Group Inc. Permission and notification from Trinity and Paterson will be required to release this report to any other party.

Paterson Group Inc.

Lauren Kratz, B.Eng.

Carlos P. Da Silva, P.Eng., QP_{ESA}

Report Distribution

- Trinity Development Group Inc.
- Paterson Group

FIGURES

FIGURE 1 - KEY PLAN

DRAWING PE3302- 7 – TEST HOLE LOCATION PLAN

DRAWING PE3302- 8 – SOIL ANALYTICAL TESTING PLAN – PHC (F_1-F_4)/BTEX

DRAWING PE3302- 9 – SOIL ANALYTICAL TESTING PLAN – VOCS

DRAWING PE3302- 10 – SOIL ANALYTICAL TESTING PLAN – PAHS

DRAWING PE3302- 11 – SOIL ANALYTICAL TESTING PLAN – METALS

DRAWING PE3302- 12 – SOIL ANALYTICAL TESTING PLAN – SAR/EC

DRAWING PE3302- 13 – GROUNDWATER ANALYTICAL TESTING PLAN – PHC (F_1-F_4)/BTEX

DRAWING PE3302- 14 – GROUNDWATER ANALYTICAL TESTING PLAN – VOCS

DRAWING PE3302- 15 – GROUNDWATER ANALYTICAL TESTING PLAN – PAHS

DRAWING PE3302- 16 – GROUNDWATER ANALYTICAL TESTING PLAN – METALS

DRAWING PE3302- 17 – GROUNDWATER ANALYTICAL TESTING PLAN – SAR/EC

DRAWING PE3302-18 – GROUNDWATER CONTOUR PLAN – OVERBURDEN MONITORING WELLS

DRAWING PE3302-19 – GROUNDWATER CONTOUR PLAN – BEDROCK MONITORING WELLS

DRAWING PE3302-20 – CROSS-SECTION A-A'

DRAWING PE3302-21 – CROSS-SECTION B-B'

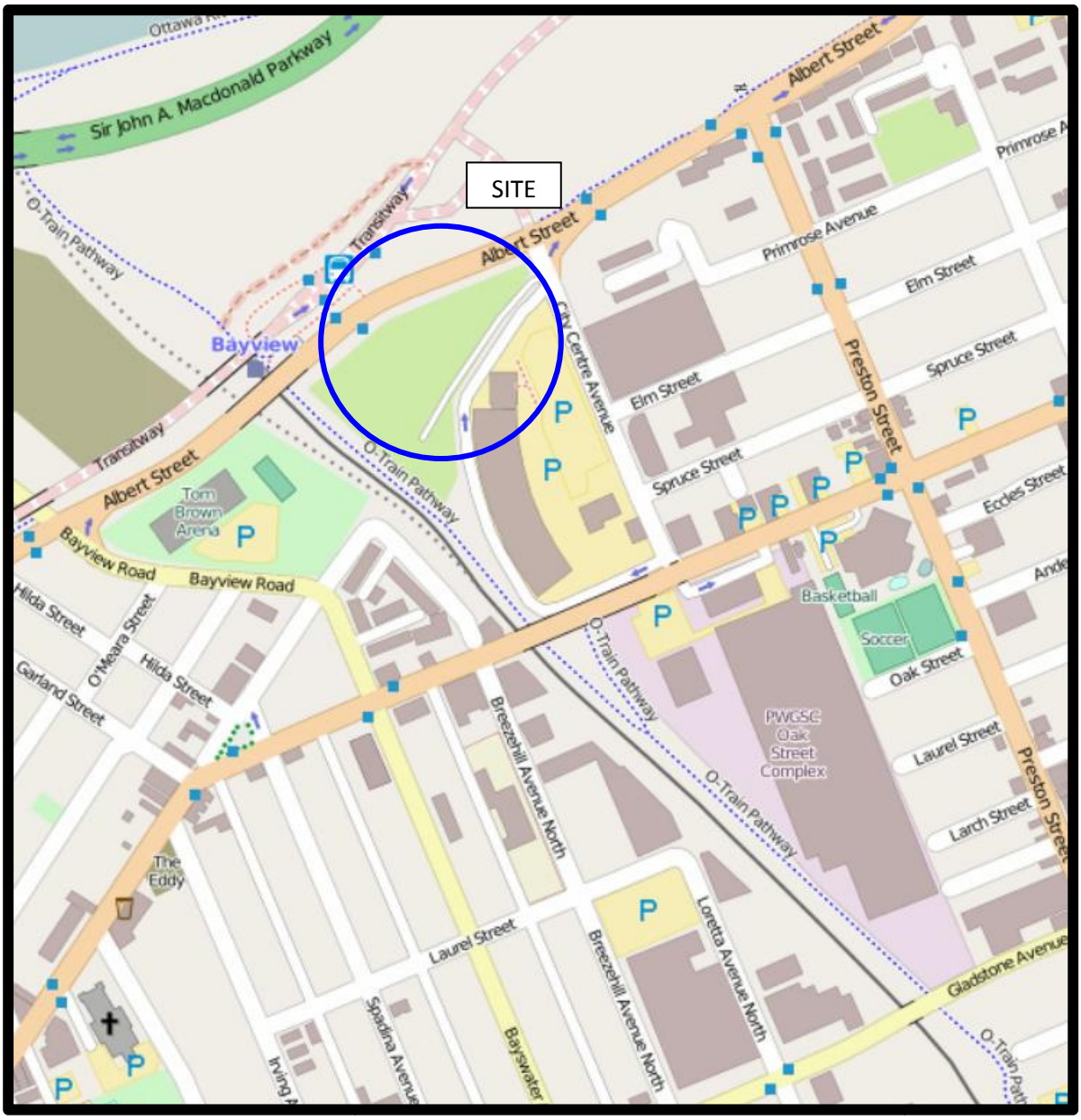
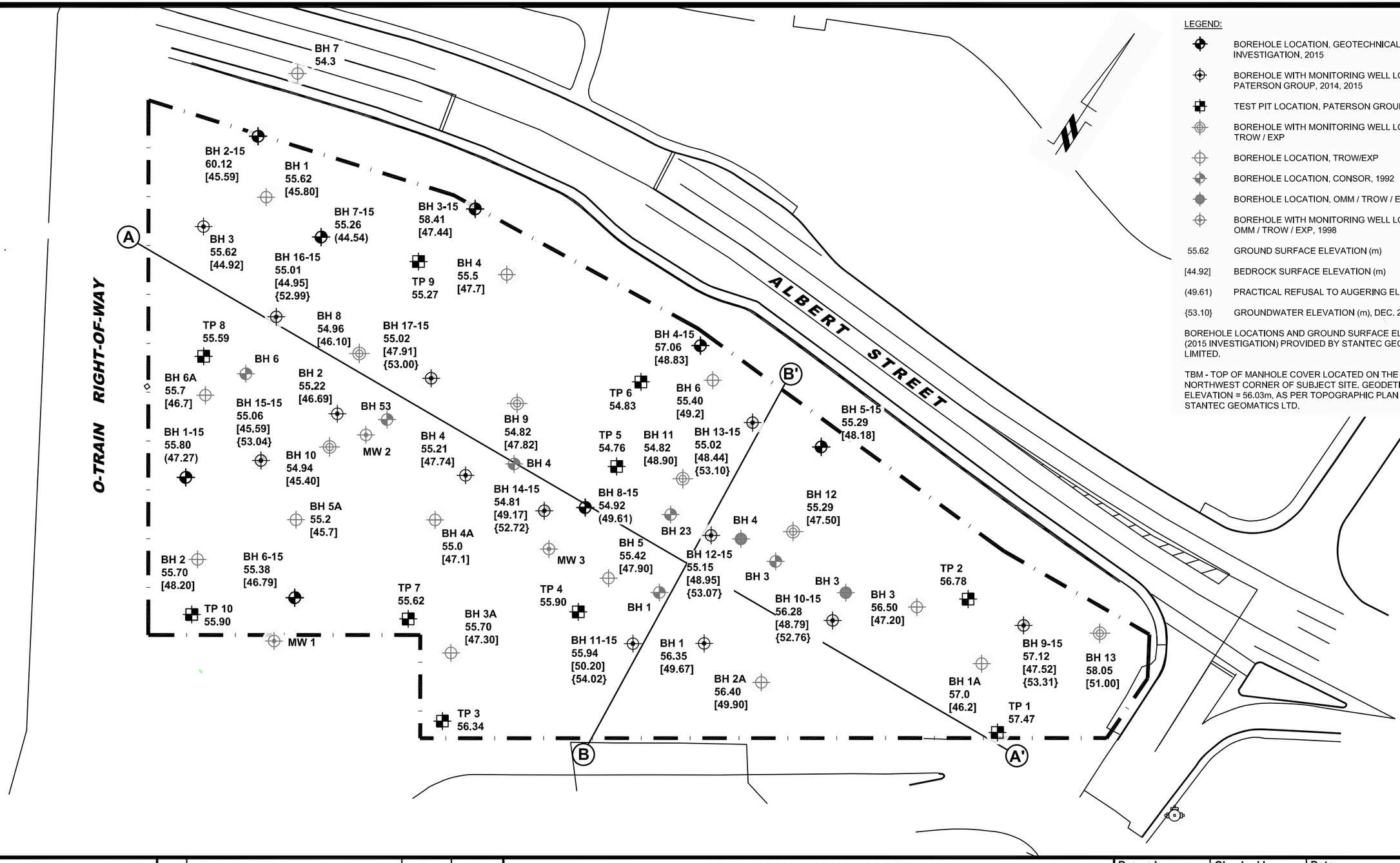


FIGURE 1

KEY PLAN



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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-7
Report No.: PE3302-2R		

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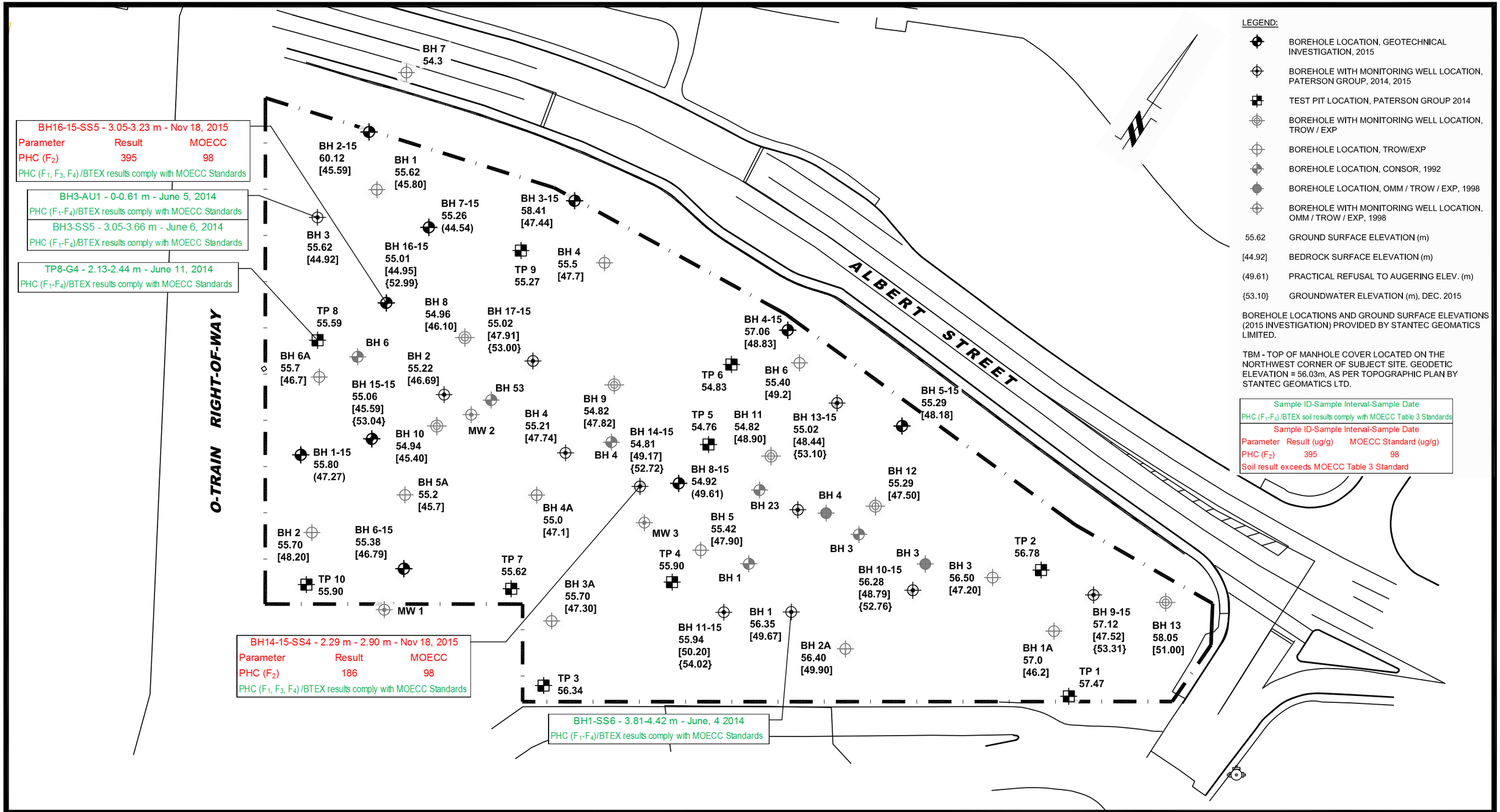

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OTTAWA, ONTARIO

Title:

SOIL ANALYTICAL TESTING PLAN - PHC(F1-F4)/BTEX

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-8
Report No.: PE3302-2R		

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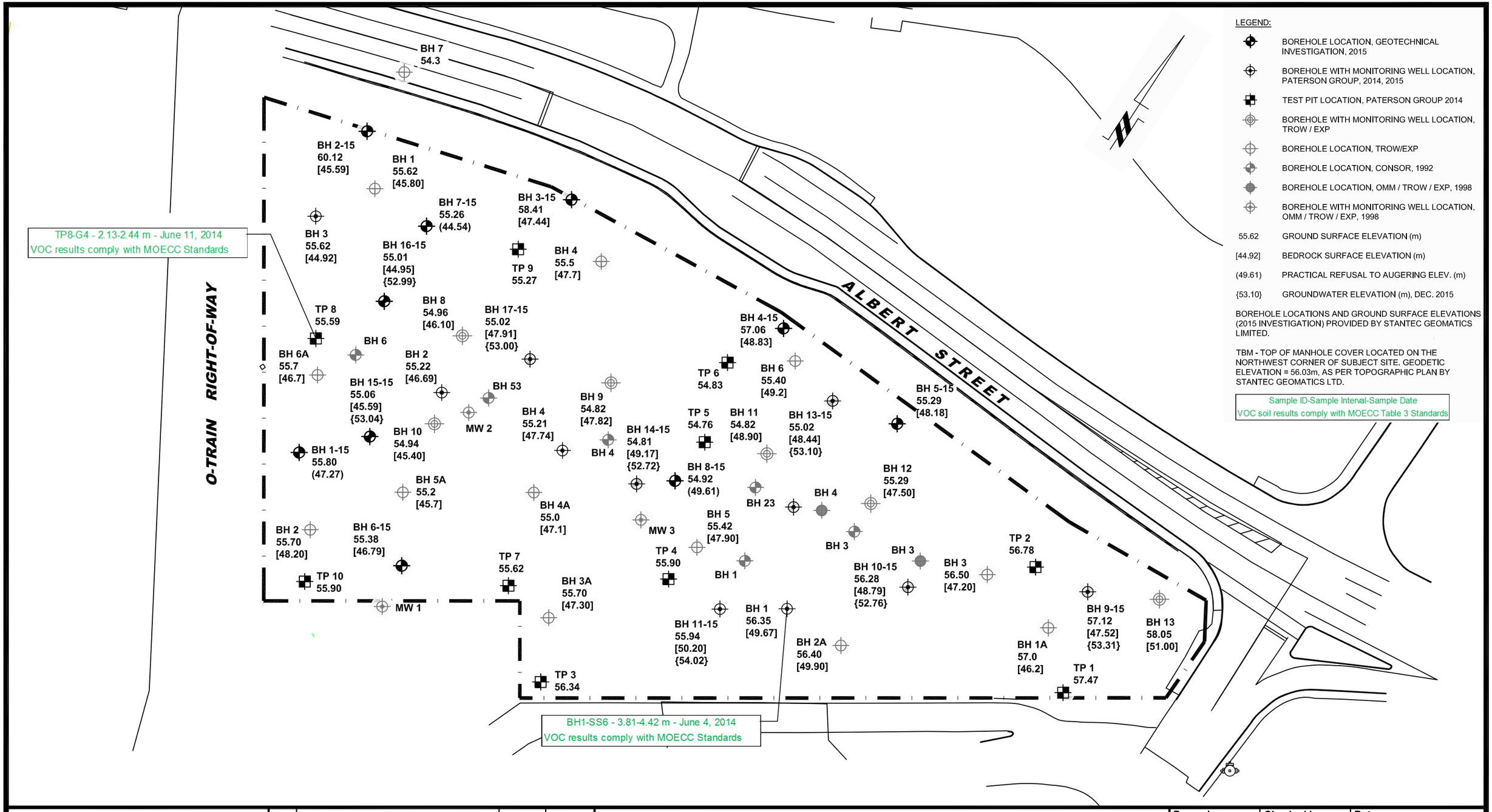

LEGEND:

- BOREHOLE LOCATION, GEOTECHNICAL INVESTIGATION, 2015
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP, 2014, 2015
- TEST PIT LOCATION, PATERSON GROUP 2014
- BOREHOLE WITH MONITORING WELL LOCATION, TROW / EXP
- BOREHOLE LOCATION, TROW/EXP
- BOREHOLE LOCATION, CONSOR, 1992
- BOREHOLE LOCATION, OMM / TROW / EXP, 1998
- BOREHOLE WITH MONITORING WELL LOCATION, OMM / TROW / EXP, 1998

55.62 GROUND SURFACE ELEVATION (m)

[44.92] BEDROCK SURFACE ELEVATION (m)

(49.61) PRACTICAL REFUSAL TO AUGERING ELEV. (m)

{53.10} GROUNDWATER ELEVATION (m), DEC. 2015

BOREHOLE LOCATIONS AND GROUND SURFACE ELEVATIONS (2015 INVESTIGATION) PROVIDED BY STANTEC GEOMATICS LIMITED.

TBM - TOP OF MANHOLE COVER LOCATED ON THE NORTHWEST CORNER OF SUBJECT SITE. GEODETIC ELEVATION = 56.03m, AS PER TOPOGRAPHIC PLAN BY STANTEC GEOMATICS LTD.

Sample ID-Sample Interval-Sample Date
VOC soil results comply with MOECC Table 3 Standards

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Title:

SOIL ANALYTICAL TESTING PLAN - VOCs

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
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Report No.: PE3302-2R		

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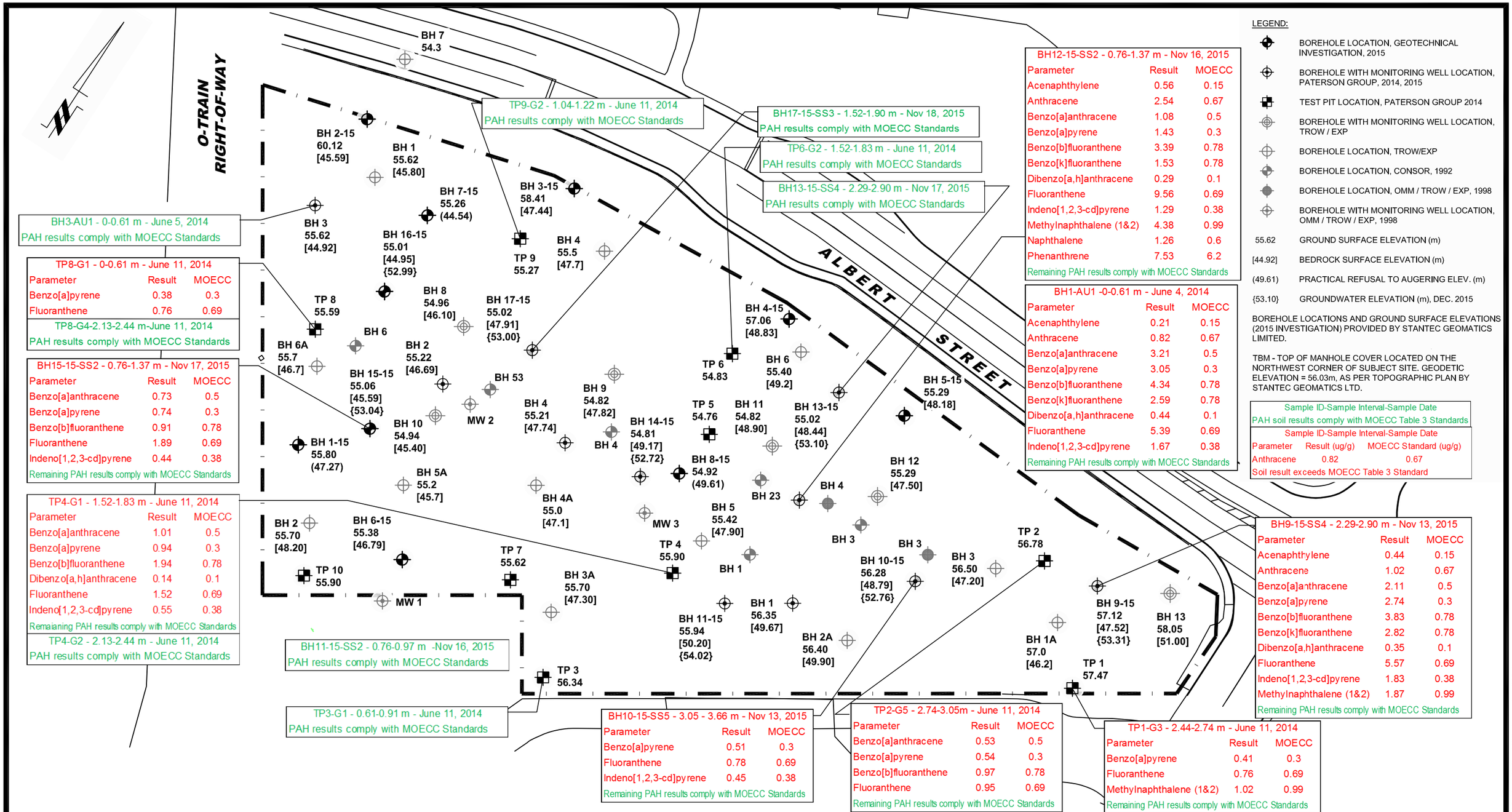

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OTTAWA, ONTARIO

Title:

SOIL ANALYTICAL TESTING PLAN - PAHs

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CPB	LK	1/2016
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Report No.: PE3302-2R		

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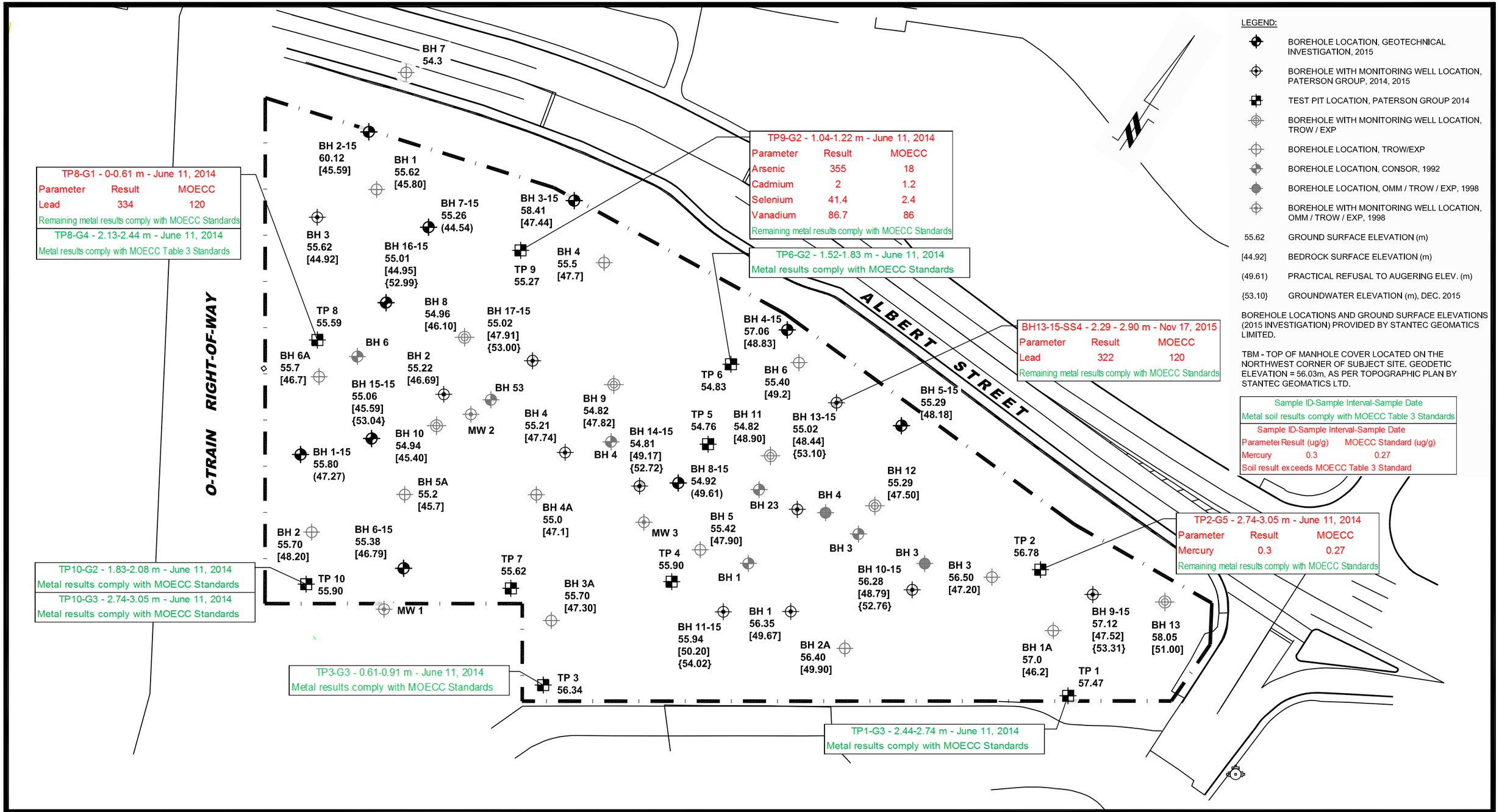

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Title:

SOIL ANALYTICAL TESTING PLAN - METALS

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
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Report No.: PE3302-2R		

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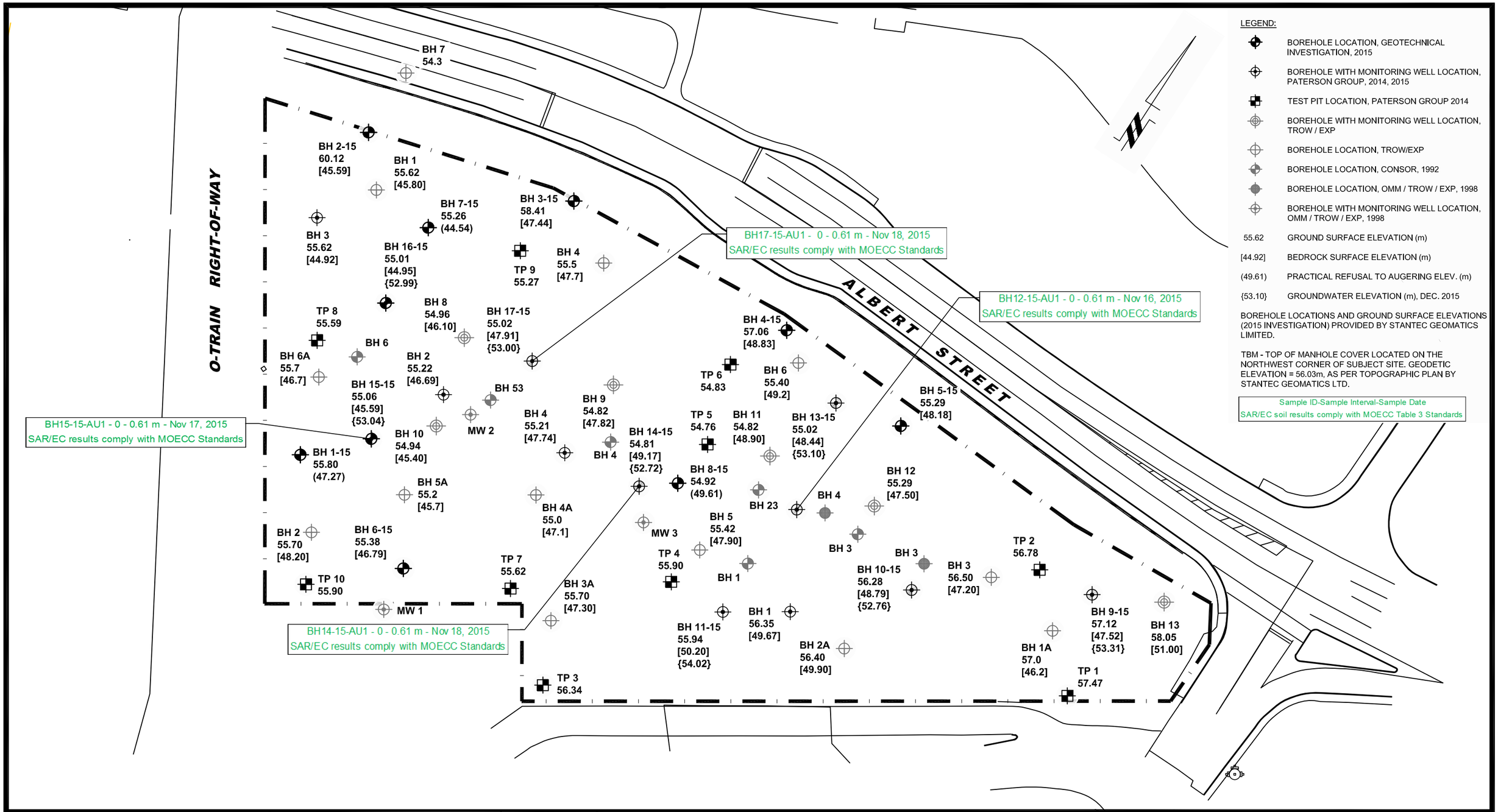

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OTTAWA, ONTARIO

Title:

SOIL ANALYTICAL TESTING PLAN - SAR/EC

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-12
Report No.: PE3302-2R		

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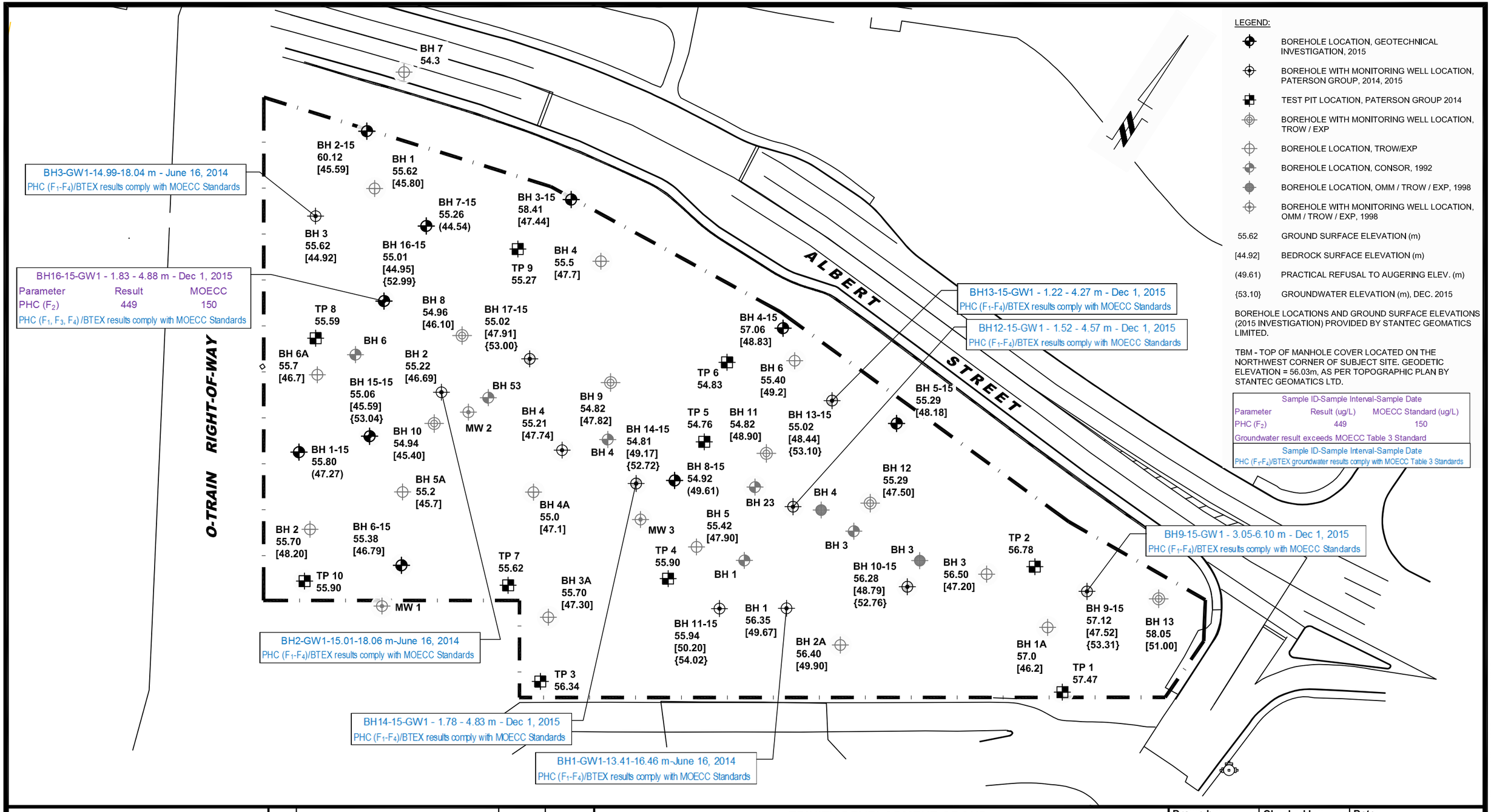

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OTTAWA, ONTARIO

Title:

GROUNDWATER ANALYTICAL TESTING PLAN - PHC(F1-F4)/BTEX

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
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Report No.: PE3302-2R		

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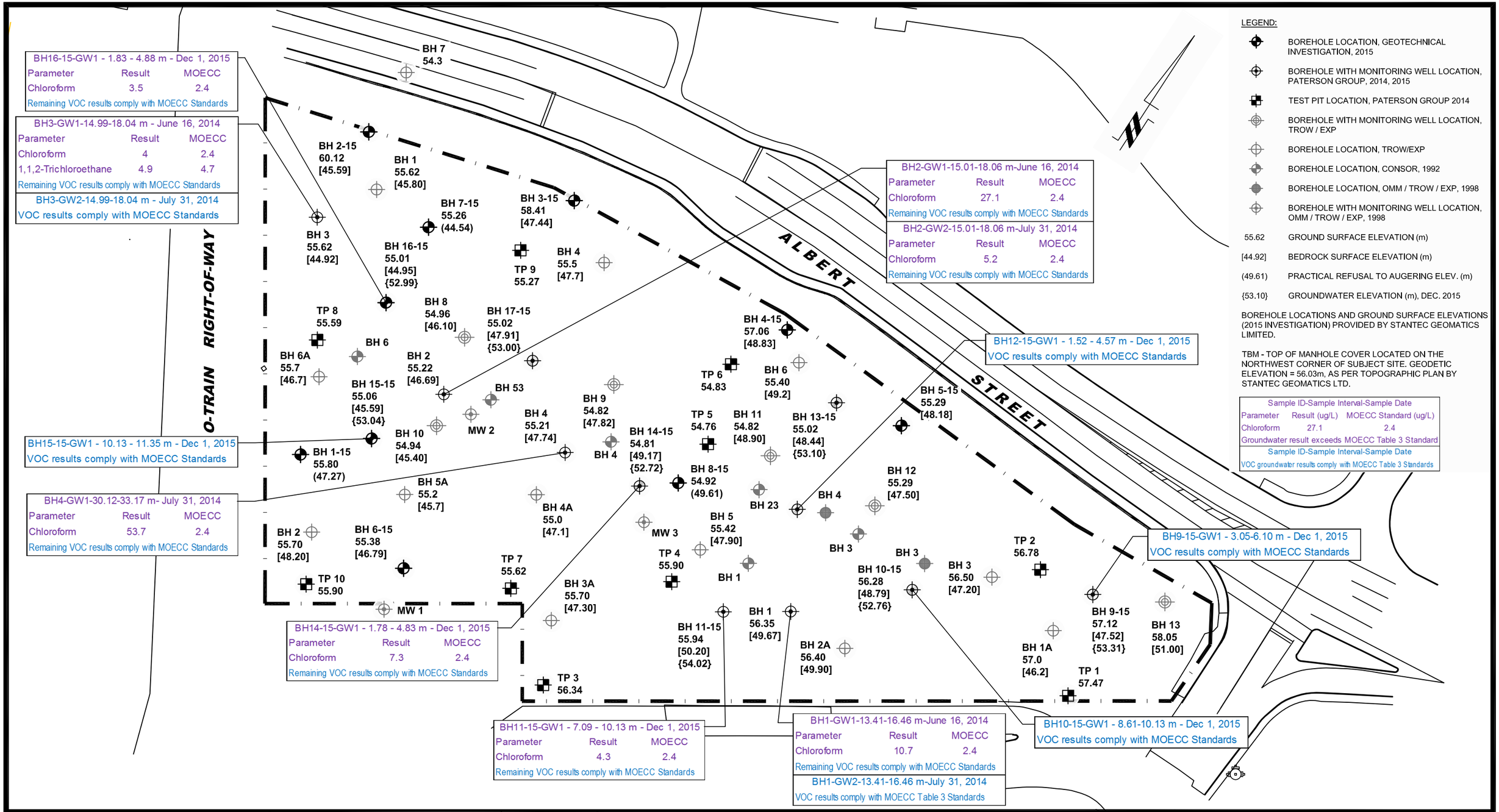

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
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Title:

GROUNDWATER ANALYTICAL TESTING PLAN - VOCs

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-14
Report No.: PE3302-2R		

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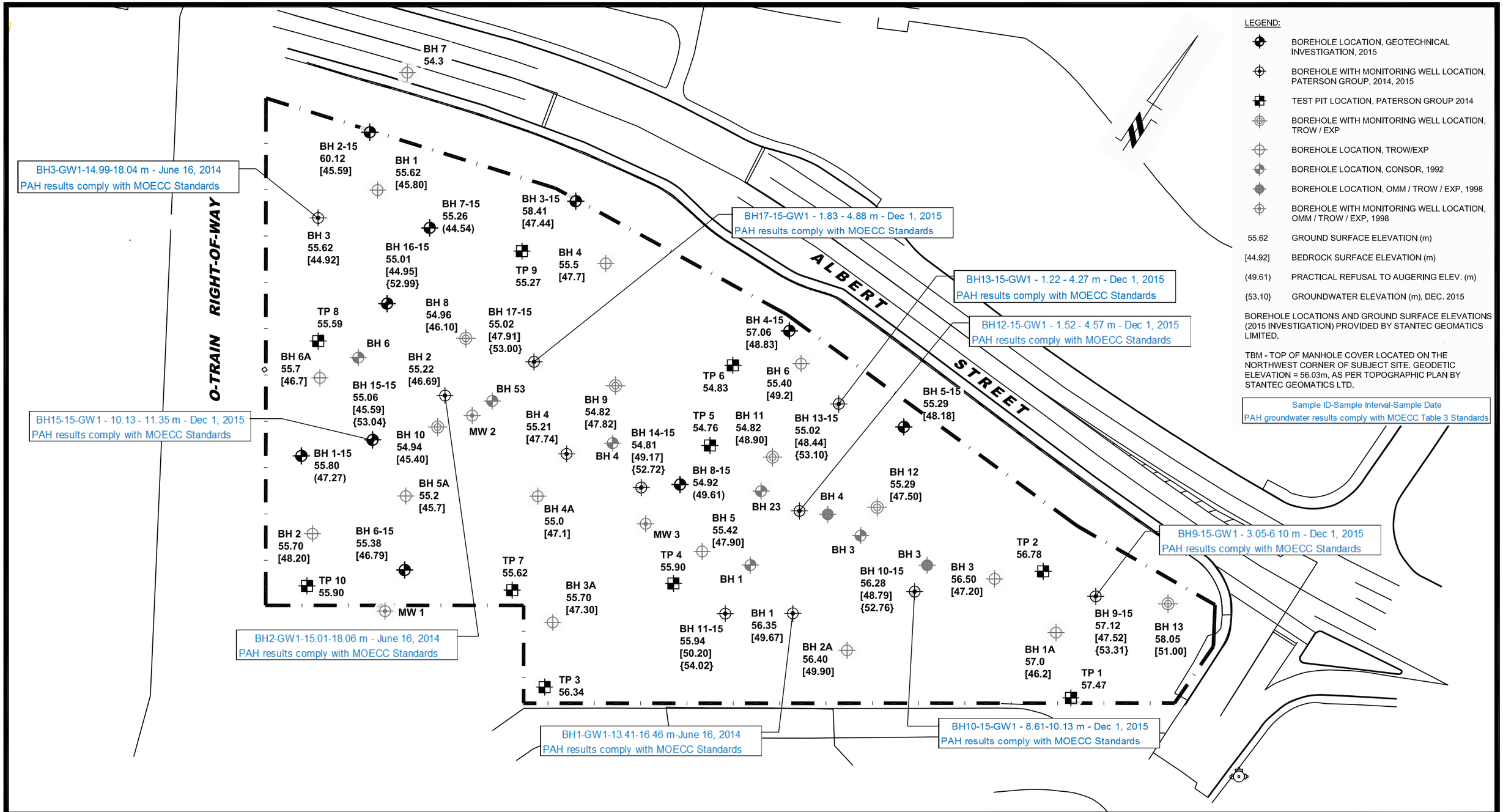

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Title:

GROUNDWATER ANALYTICAL TESTING PLAN - PAHs

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
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Report No.: PE3302-2R		

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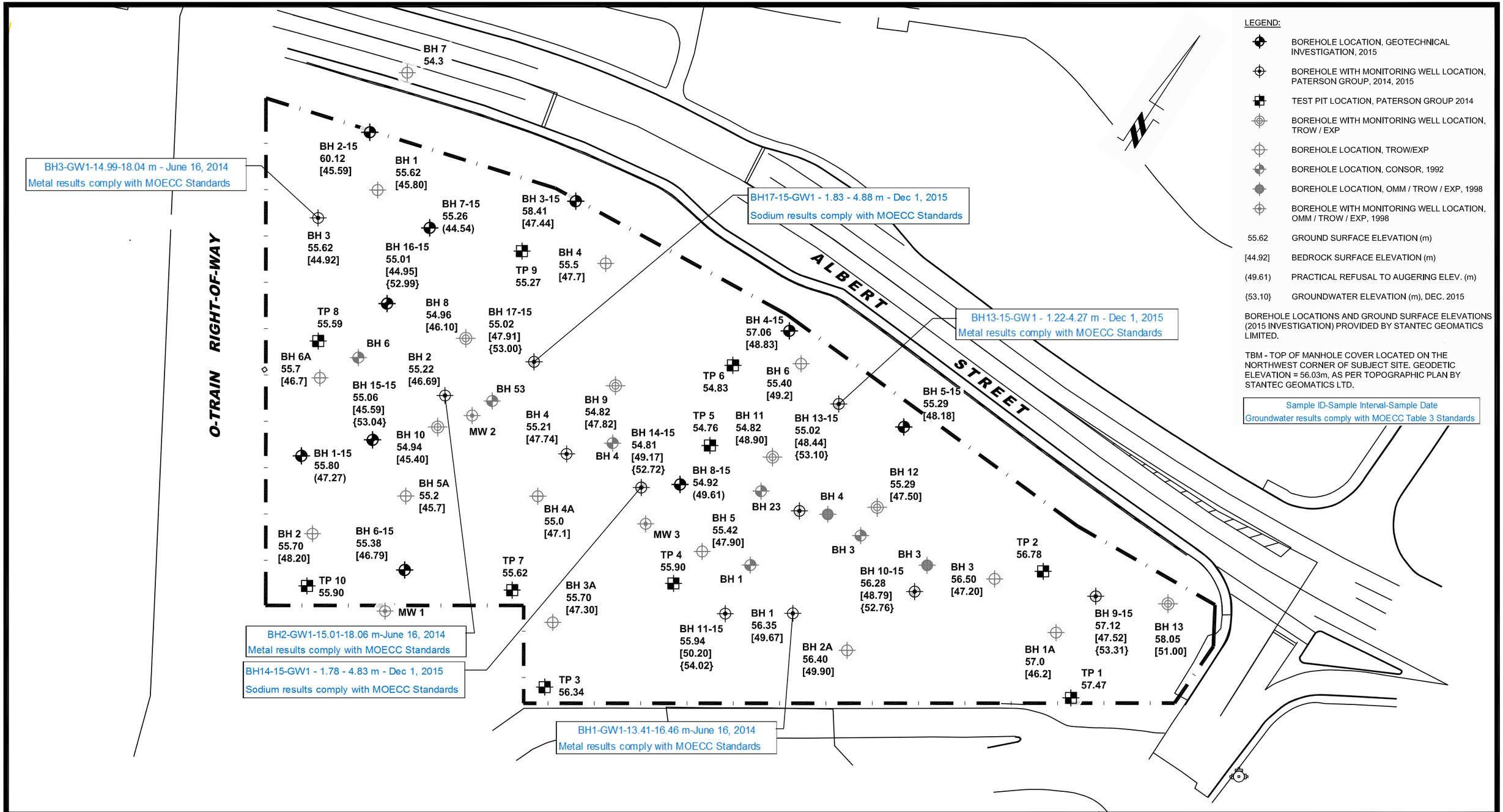

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- BOREHOLE WITH MONITORING WELL LOCATION, TROW / EXP
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55.62 GROUND SURFACE ELEVATION (m)

[44.92] BEDROCK SURFACE ELEVATION (m)

(49.61) PRACTICAL REFUSAL TO AUGERING ELEV. (m)

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BOREHOLE LOCATIONS AND GROUND SURFACE ELEVATIONS (2015 INVESTIGATION) PROVIDED BY STANTEC GEOMATICS LIMITED.

TBM - TOP OF MANHOLE COVER LOCATED ON THE NORTHWEST CORNER OF SUBJECT SITE. GEODETIC ELEVATION = 56.03m, AS PER TOPOGRAPHIC PLAN BY STANTEC GEOMATICS LTD.

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

GROUNDWATER ANALYTICAL TESTING PLAN - METALS

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-16
Report No.: PE3302-2R		

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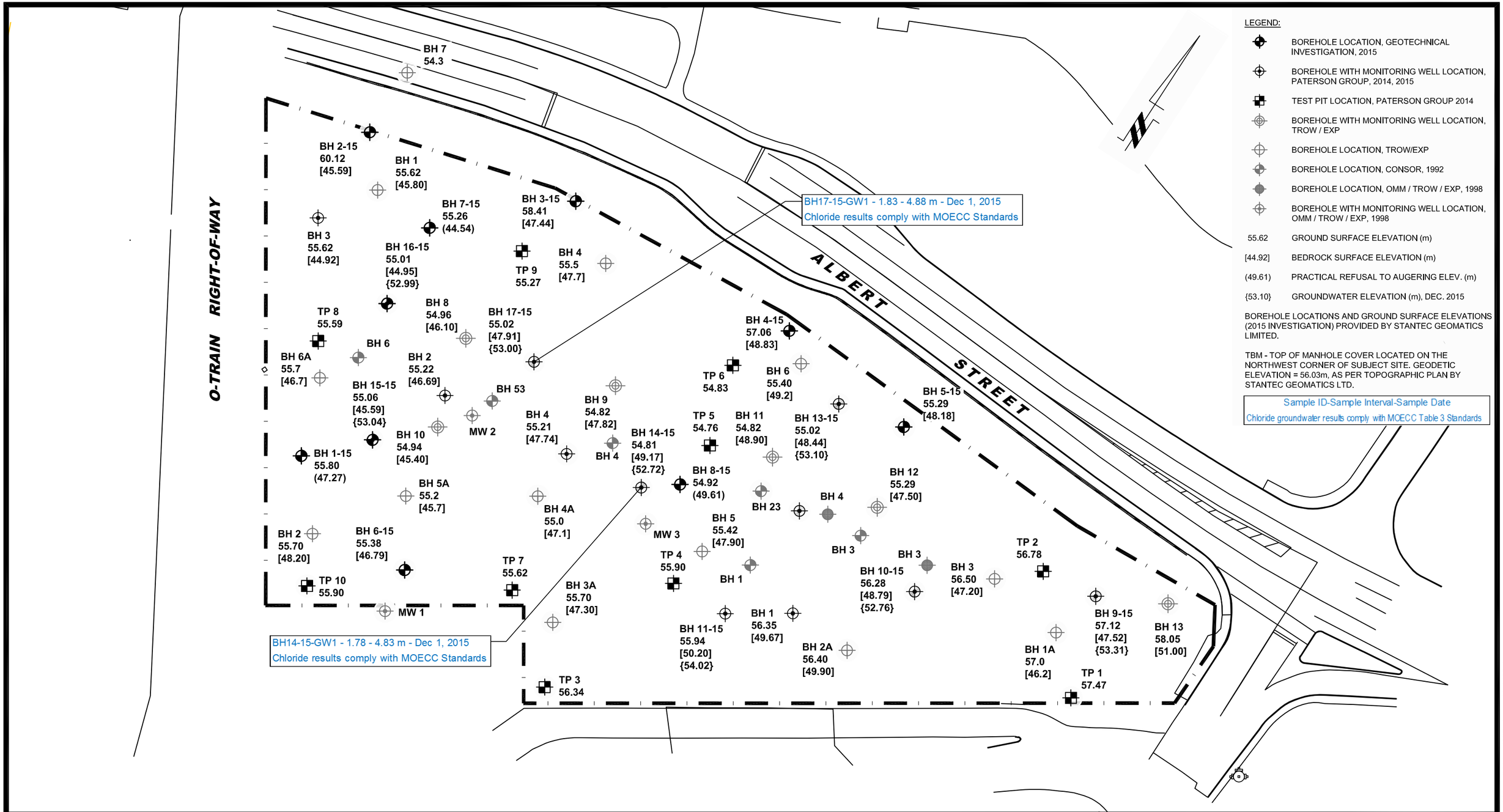

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

GROUNDWATER ANALYTICAL TESTING PLAN - CHLORIDE

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-17
Report No.: PE3302-2R		

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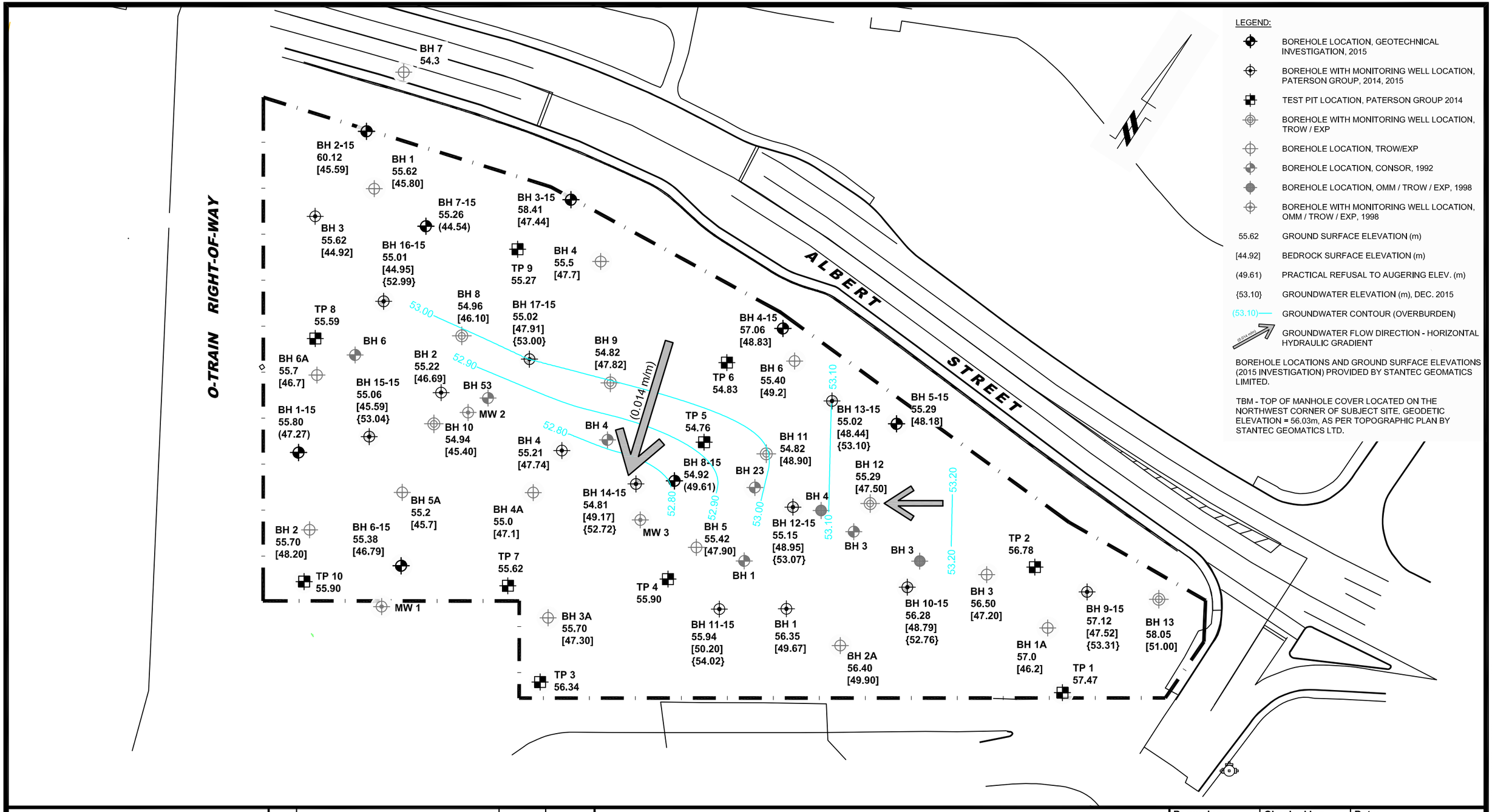

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

GROUNDWATER CONTOUR PLAN - OVERBURDEN MONITORING WELLS

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-18
Report No.: PE3302-2R		

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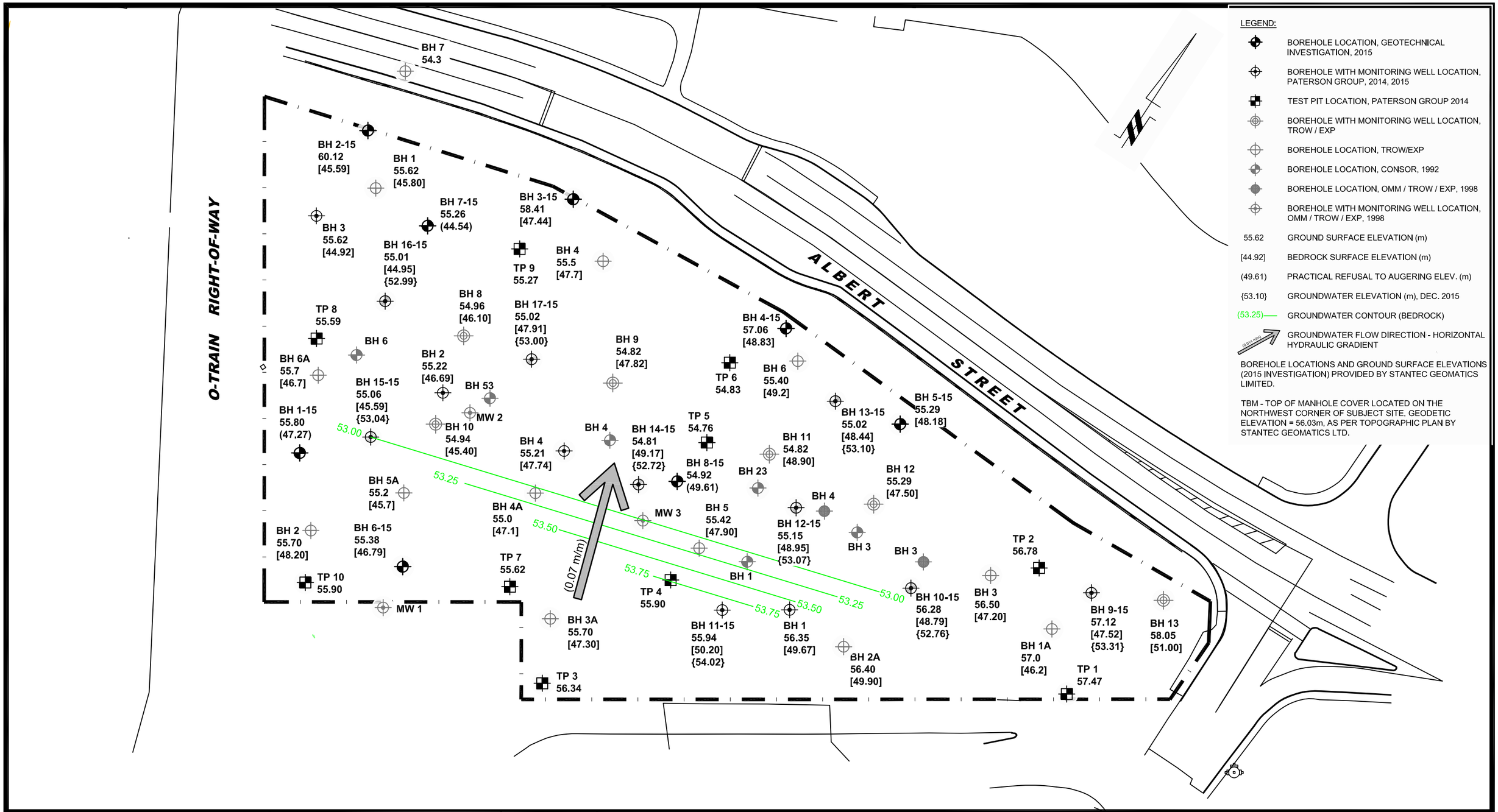

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NO.	REVISIONS	DATE	INITIAL

TRINITY DEVELOPMENT GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

GROUNDWATER CONTOUR PLAN - BEDROCK MONITORING WELLS

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: 1:750		Drawing No.: PE3302-19
Report No.: PE3302-2R		

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BH17-15-AU1 - 0 - 0.61 m - Nov 18, 2015
SAR/EC results comply with MOECC Standards

BH17-15-SS3 - 1.52-1.90 m - Nov 18, 2015
PAH results comply with MOECC Standards

BH16-15-SS5 - 3.05-3.23 m - Nov 18, 2015

Parameter	Result	MOECC
PHC (F_2)	395	98

PHC (F_1, F_3, F_4) /BTEX results comply with MOECC Standards

BH3-AU1 - 0-0.61 m - June 5, 2014
PHC (F_1-F_4)/BTEX results comply with MOECC Standards

BH3-AU1 - 0-0.61 m - June 5, 2014
PAH results comply with MOECC Standards

BH14-15-SS4 - 2.29 m - 2.90 m - Nov 18, 2015

Parameter	Result	MOECC
PHC (F_2)	186	98

PHC (F_1, F_3, F_4) /BTEX results comply with MOECC Standards

BH14-15-AU1 - 0 - 0.61 m - Nov 18, 2015
SAR/EC results comply with MOECC Standards

BH12-15-AU1 - 0 - 0.61 m - Nov 16, 2015
SAR/EC results comply with MOECC Standards

BH12-15-SS2 - 0.76-1.37 m - Nov 16, 2015

Parameter	Result	MOECC
Acenaphthylene	0.56	0.15
Anthracene	2.54	0.67
Benzo[a]anthracene	1.08	0.5
Benzo[a]pyrene	1.43	0.3
Benzo[b]fluoranthene	3.39	0.78
Benzo[k]fluoranthene	1.53	0.78
Dibenzo[a,h]anthracene	0.29	0.1
Fluoranthene	9.56	0.69
Indeno[1,2,3-cd]pyrene	1.29	0.38
Methylnaphthalene (1&2)	4.38	0.99
Naphthalene	1.26	0.6
Phenanthrene	7.53	6.2

Remaining PAH results comply with MOECC Standards

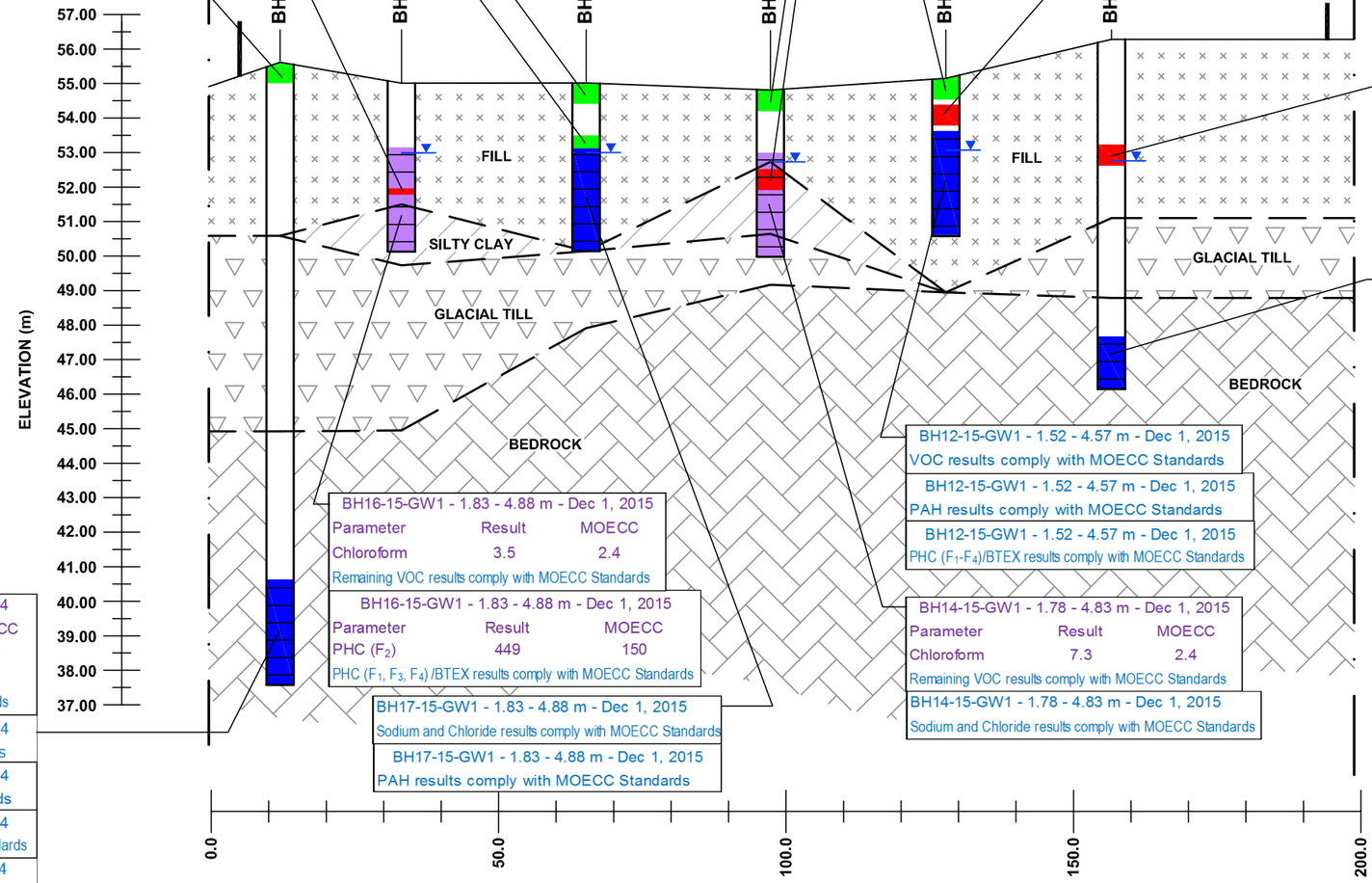
BH10-15-SS5 - 3.05 - 3.66 m - Nov 13, 2015

Parameter	Result	MOECC
Benzo[a]pyrene	0.51	0.3
Fluoranthene	0.78	0.69
Indeno[1,2,3-cd]pyrene	0.45	0.38

Remaining PAH results comply with MOECC Standards

BH10-15-GW1 - 8.61-10.13 m - Dec 1, 2015
VOC results comply with MOECC Standards

BH10-15-GW1 - 8.61-10.13 m - Dec 1, 2015
PAH results comply with MOECC Standards



BH12-15-GW1 - 1.52 - 4.57 m - Dec 1, 2015
VOC results comply with MOECC Standards

BH12-15-GW1 - 1.52 - 4.57 m - Dec 1, 2015
PAH results comply with MOECC Standards

BH12-15-GW1 - 1.52 - 4.57 m - Dec 1, 2015
PHC (F_1-F_4)/BTEX results comply with MOECC Standards

BH16-15-GW1 - 1.83 - 4.88 m - Dec 1, 2015

Parameter	Result	MOECC
Chloroform	3.5	2.4

Remaining VOC results comply with MOECC Standards

BH16-15-GW1 - 1.83 - 4.88 m - Dec 1, 2015

Parameter	Result	MOECC
PHC (F_2)	449	150

PHC (F_1, F_3, F_4) /BTEX results comply with MOECC Standards

BH14-15-GW1 - 1.78 - 4.83 m - Dec 1, 2015

Parameter	Result	MOECC
Chloroform	7.3	2.4

Remaining VOC results comply with MOECC Standards

BH17-15-GW1 - 1.83 - 4.88 m - Dec 1, 2015
Sodium and Chloride results comply with MOECC Standards

BH17-15-GW1 - 1.83 - 4.88 m - Dec 1, 2015
PAH results comply with MOECC Standards

BH14-15-GW1 - 1.78 - 4.83 m - Dec 1, 2015
Sodium and Chloride results comply with MOECC Standards

BH3-GW1-14.99-18.04 m - June 16, 2014

Parameter	Result	MOECC
Chloroform	4	2.4
1,1,2-Trichloroethane	4.9	4.7

Remaining VOC results comply with MOECC Standards

BH3-GW1-14.99-18.04 m - June 16, 2014
PAH results comply with MOECC Standards

BH3-GW1-14.99-18.04 m - June 16, 2014
Metal results comply with MOECC Standards

BH3-GW1-14.99-18.04 m - June 16, 2014
PHC (F_1-F_4)/BTEX results comply with MOECC Standards

BH3-GW2-14.99-18.04 m - July 31, 2014
VOC results comply with MOECC Standards

Legend

Sample ID-Sample Interval-Sample Date
Soil results comply with MOECC Table 3 Standards

Sample ID-Sample Interval-Sample Date

Parameter	Result (ug/g)	MOECC Standard (ug/g)
Anthracene	0.82	0.67

Soil result listed exceeds MOECC Table 3 Standard

Sample ID-Sample Interval-Sample Date

Parameter	Result (ug/L)	MOECC Standard (ug/L)
Chloroform	27.1	2.4

Groundwater result listed exceeds MOECC Table 3 Standard

Sample ID-Sample Interval-Sample Date
Groundwater results comply with MOECC Table 3 Standards

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TRINITY DEVELOPMENT GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A'

Drawn by:	Checked by:	Date:
CPB	LK	1/2016

Scale: AS SHOWN

Report No.: PE3302-2R

Drawing No.: **PE3302-20**

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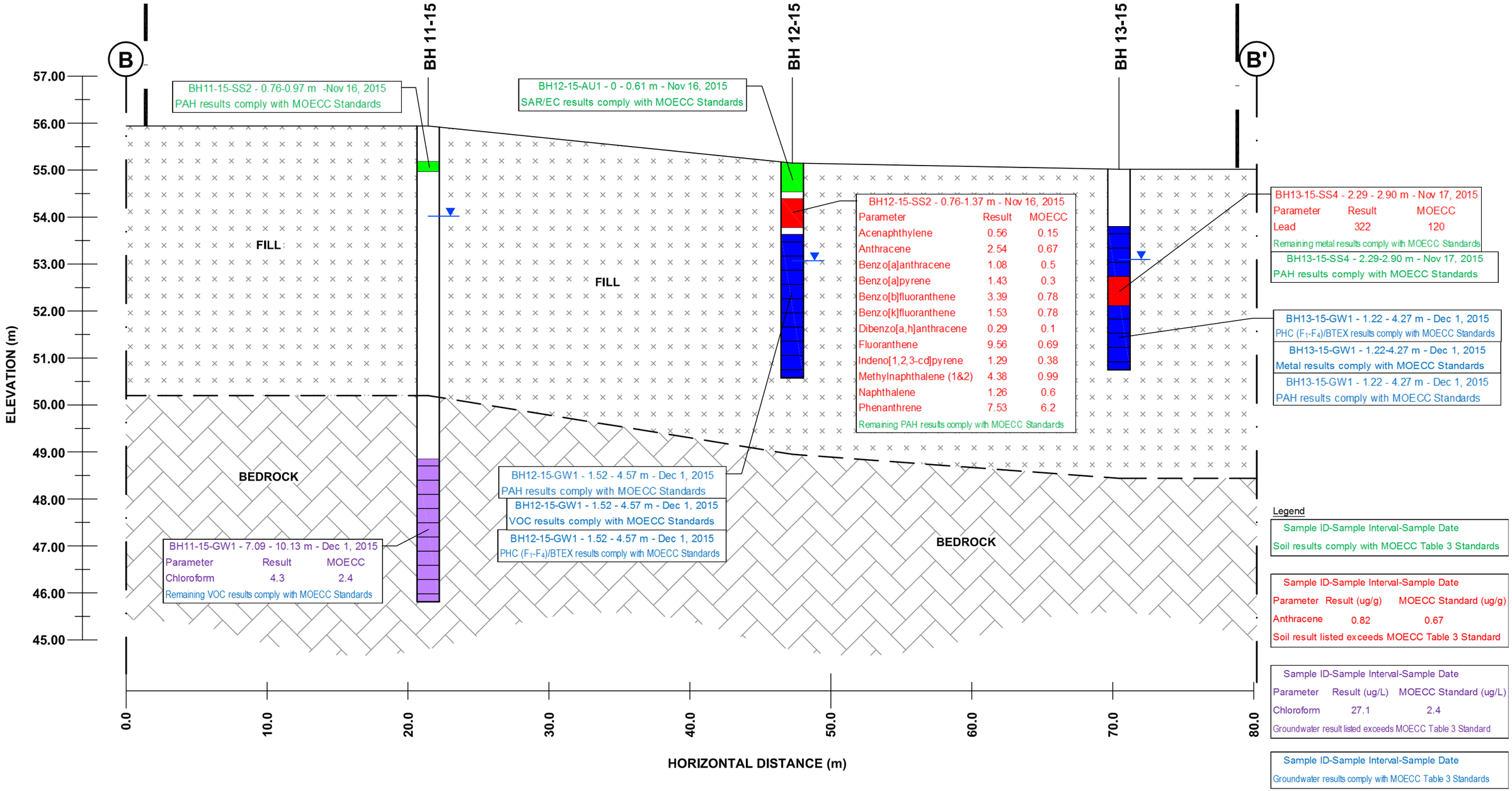

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NO.	REVISIONS	DATE	INITIAL

TRINITY DEVELOPMENT GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
900 ALBERT STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B'

Drawn by:	Checked by:	Date:
CPB	LK	1/2016
Scale: AS SHOWN		Drawing No.: PE3302-21
Report No.: PE3302-2R		

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