PATERSON GROUP

Phase II – Environmental Site Assessment

Tunney's Pasture (Block 8)

Ottawa, Ontario

Prepared for Arcadis IBI Group

Report: PE6038-2
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EXECUTIVE SUMMARY

Assessment

Paterson Group was retained by Arcadis IBI Group to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for Block 8 of the Tunney's Pasture government office complex, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site (Phase II Property).

The subsurface investigation for this assessment was conducted on November 23, 2023 and consisted of drilling six (6) boreholes (BH21-23 to BH26-23) across the Phase II Property. It should be noted that this field investigation was carried out as part of a larger investigation conducted for multiple sites at the Tunney's Pasture complex. The boreholes were advanced to depths ranging from approximately 6.04 m to 6.22 m below the existing ground surface and terminated within the bedrock unit. Upon completion, all six boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table.

In general, the subsurface soil profile encountered at the borehole locations consists of either a thin pavement structure (asphaltic concrete over granular fill) or topsoil, underlain by fill material (gravel with crushed stone and some silty sand), followed by a second layer of fill material (silty sand with varying amounts of gravel, clay cobbles, boulders and crushed stone). A subsurface layer of asphaltic concrete was encountered in BH23-23 beneath the first layer of fill material. A layer of glacial till (silty sand to sandy silt with gravel, cobbles and boulders) was encountered in BH25-23 beneath the fill material. Bedrock was encountered in all six boreholes during the field drilling program at depths ranging from approximately 0.74 m to 1.58 m below ground surface. During the field sampling program, the groundwater was measured at depths ranging from approximately 3.12 m to 4.17 m below the existing ground surface.

A total of seven soil samples (including one duplicate) were submitted for laboratory analysis of BTEX, VOCs, PHCs (F_1-F_4), metals, Hg^+, CrVI, PAHs, EC and/or SAR parameters. Based on the analytical test results, the concentration of heavier fractions of petroleum hydrocarbons (PHC F_3 and PHCs $F_{4\ gravimetric}$) and polycyclic aromatic hydrocarbons detected in Sample BH21-23-AU1 exceed the selected MECP Table 7 Coarse-Grained Residential Soil Standards. Elevated naphthalene and/or phenanthrene parameters were identified above the CCME Coarse-Grained Commercial Soil Standards in the fill material at boreholes BH21-23, BH22-23, BH23-23 and BH24-23. All remaining parameter concentrations detected in the soil samples analyzed are in compliance with the selected standards.

Exceedances of MECP Table 7 Coarse-Grained Residential Soil Standards are likely a result of asphalt inclusions in the sample. However, for excess soil management purposes, further assessment of this strata should be completed.

It should be noted that the electrical conductivity and sodium adsorption ratio detected in the fill material at BH23-23 and BH24-23 are also in excess of the MECP Table 7 Coarse-Grained Residential Soil Standards. These exceedances are suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, do not represent a contaminant issue. However, for off-site management of excess soil, any proposed reuse site must be notified of these exceedances.

A total of seven groundwater samples (including one duplicate) were submitted for laboratory analysis of BTEX, VOCs, PHC, Metals, and/or PAH parameters. All groundwater samples were found to comply with the MECP Table 7 Coarse-Grained Residential Soil Standards, with the exception of selenium identified in BH23-23. No concentrations of selenium were identified in the soil samples across the Phase II Property and therefore it is considered possible that these parameters are naturally elevated, or they are elevated due to the presence of sediment noted in the groundwater at the time of sampling.

All groundwater samples were found to exceed the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites, for aluminum, cadmium, selenium, zinc and/or various PAH parameters, with the exception of BH21-23 which complied with the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites.

Recommendations

Soil

Further soil analysis will be required, in part for delineation purposes, but primarily for the management of excess soil, in accordance with Ontario Regulation 406/19. Potential impacts of PAHs and PHCs in the vicinity of BH21-23 should be assessed at that time.

If excess soil cannot be managed on-site, or for a beneficial use at a local reuse facility, then soil may require off-site disposal at a licensed waste disposal facility.

It is our understanding that the Phase II Property may be redeveloped in the future. As such, the contaminated soil could be fully delineated and remediated in conjunction with site redevelopment. This contaminated soil will require disposal at a licensed waste disposal facility. Prior to off-site disposal of impacted soil at a licensed waste disposal facility, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

Monitoring Wells

It is recommended that re-sampling of the well at BH23-23 be completed to assess the presence of selenium above MECP standards.

It is recommended that the monitoring wells be maintained for future sampling purposes. The monitoring wells will be registered with the MECP under Ontario Regulation 903 (Ontario Water Resources Act). At such a time that the monitoring wells are no longer required, they must be decommissioned in accordance with O.Reg. 903.

1.0 INTRODUCTION

At the request of Arcadis IBI Group, Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for Block 8 of the Tunney's Pasture government office complex, in the City of Ottawa, Ontario (the Phase II Property).

The purpose of this Phase II ESA has been to address the areas of potential environmental concern (APECs) identified on the Phase II Property as a result the findings of the Phase I ESA.

1.1 Site Description

Address:	Part of 120 Parkdale Avenue (50 Chardon Driveway), Block 8, Tunney's Pasture, Ottawa, Ontario.
Location:	The Phase II Property is situated between Eglantine Driveway to the north, Sorrel Driveway to the south, and Chardon Driveway to the west, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan, as well as Drawing PE6038-1 – Site Plan, appended to this report.
Latitude and Longitude:	45° 24' 20" N, 75° 44' 14" W.

Site Description:

Configuration:	Rectangular.
Area:	8,900 m^2 (approximately).
Zoning:	MC – Mixed-Use Centre Zone.
Current Use:	The southwest portion of the Phase II Property is occupied by a two-storey central heating and cooling plant. The northeast portion of the Phase II Property is occupied by a one-storey fuel storage facility.
Services:	The Phase II Property is located within a municipally serviced area.

1.2 Property Ownership

The Phase II Property is currently owned by the Government of Canada. Paterson was retained to complete this Phase II ESA by Ms. Catriona Moggach of Arcadis IBI Group, whose office is located at 333 Preston Street, Unit #500, Ottawa, Ontario, and can be contacted via telephone at 613-225-1311.

In 2021, Public Service and Procurement Canada (PSPC) partnered with Canada Lands Company (CLC) under a collaboration project to leverage the strengths of each organization to deliver the long-term vision of Tunney's Pasture that includes the site's transition from a federal employment centre into a mixed-use, sustainable, transit-oriented community. CLC is a self-financing federal Crown corporation specializing in real estate and development with a mandate to transform former Government of Canada properties and reintegrates them into local communities while ensuring their long-term goals. Since the launch of this collaboration project, CLC has been committed to working with the community to define amendments to the TPMP and proposed upgrades to the existing roadway and servicing infrastructure that support both federal priorities and future development.

1.3 Applicable Site Condition Standard

The site condition standards for the Phase II Property were obtained from Table 7 of the document entitled, *"Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act"*, prepared by the Ministry of the Environment, Conservation and Parks (MECP), and dated April 15, 2011. The selected MECP standards are based on the following considerations:

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

Grain-size analysis was not conducted as part of this assessment, and as such, the coarse-grained soil standards were selected as a conservative approach.

It should be noted that in addition to the provincial MECP standards, the federal Canadian Council of Ministers of the Environment (CCME) commercial standards were also selected for additional consideration.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property currently consists of a central heating and cooling plant servicing the entire Tunney's Pasture government complex, a fuel storage facility, paved asphaltic concrete parking areas, with some mature trees and landscaped areas in the remaining areas.

The site topography is relatively flat, while the regional topography appears to slope down towards the northwest, in the general direction the Ottawa River. The Phase II Property is considered to be at grade with respect to the surrounding properties.

Water drainage on the Phase II Property occurs primarily via surface run-off towards catch basins present within the parking lot and on the adjacent streets, as well as via infiltration within the landscaped areas.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted during the interim of November 23 to November 24, 2023 and consisted of drilling six boreholes (BH21-23 to BH26-23) across the Phase II Property. It should be noted that this field investigation was carried out as part of a larger investigation conducted for multiple sites at the Tunney's Pasture complex.

The boreholes were advanced to depths ranging from approximately 6.04 m to 6.22 m below the existing ground surface and terminated within the bedrock unit. Bedrock was encountered in all six boreholes during the field drilling program at depths ranging from approximately 0.74 m to 1.58 m below ground surface.

Upon completion, all six boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table. During the field sampling program, the groundwater was measured at depths ranging from approximately 3.12 m to 4.17 m below the existing ground surface.

3.2 Media Investigated

During the course of this subsurface investigation, soil and groundwater samples were obtained from the Phase II Property and submitted for laboratory analysis.

The rationale for sampling and analyzing these media is based on the contaminants of potential concern identified in the Phase I ESA.

The contaminants of potential concern for the soil and/or groundwater on the Phase II Property include the following:

- ❒ Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- ❒ Volatile Organic Compounds (VOCs);
- ❒ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including Arsenic, Antimony, and Selenium);
- ❒ Mercury (Hg^+);
- ❒ Hexavalent Chromium (CrVI);
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase II Property.

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

Based on the available mapping information, the bedrock beneath the Phase II Property generally consists of interbedded limestone and dolomite of the Gull River Formation. The surficial geology consists of Paleozoic bedrock, with an overburden ranging from approximately 0 m to 1 m in thickness.

Groundwater is anticipated to be encountered within the bedrock and flow in a northerly direction towards the Ottawa River.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are present on the Phase II Property or within the Phase I Study Area.

The nearest named water body with respect to the Phase II Property is the Ottawa River, located approximately 650 m to the north.

Drinking Water Wells

Based on the availability of municipal services, no potable drinking water wells are anticipated to remain in use within the Phase I Study Area.

Existing Buildings and Structures

The central heating and cooling plant is a two-storey building with a half basement level below the east half of the building. Built in the 1950's, the central heating and cool plant building is constructed with a concrete foundation and is finished on the exterior with brick and concrete, in addition to a flat tar-and-gravel style roof. The building currently heats itself from its natural gas-fired boiler system.

Built in the 1994, the central heating and cooling plant building is constructed with a concrete foundation and is finished on the exterior with brick and concrete, in addition to a flat tar-and-gravel style roof. The building currently heats itself from its natural gas-fired boiler system.

Current and Future Property Use

The southwest portion of the Phase II Property is occupied by a two-storey heating and cooling plant. The northeast portion of the Phase II Property is occupied by a one-storey fuel storage facility.

It is our understanding that the Phase II Property may be redeveloped for residential purposes in the future. Due to a change in land use to a more sensitive type (commercial/industrial to residential), a record of site condition (RSC) will need to be filed with the MECP.

Neighbouring Land Use

The surrounding lands within the Phase I Study Area consist largely of commercial and government properties. Current land use is depicted on Drawing PE6038-2 – Surrounding Land Use Plan, in the Figures section of this report.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report, ten potentially contaminating activities (PCAs), resulting in ten areas of potential environmental concern (APECs), were identified on the Phase II Property. These APECs include:

- Item 28: Gasoline and Associated Products Storage in Fixed Tanks; associated with the presence of the former on-site USTs and former/existing on-site ASTs (APEC 1 to APEC 6 and APEC10)

- ❒ Item 30: Importation of Fill Material of Unknown Quality; associated with the potential presence of poor quality fill material used for grading purposes, located throughout the Phase II Property (APEC 7)

- ❒ Item N/A: Application of Road Salt for De-icing Purposes During Snow and Ice Conditions; associated with the use of road salt throughout the asphalt-covered parking areas of the Phase II Property (APEC 8).

- ❒ Item 8: Chemical Manufacturing, Processing and Bulk Storage; associated with the presence of a former varsol UST on the property adjacent to the east of the Phase II Property (with the UST located approximately 20 m east of the Phase II Property).

One other off-site PCA was identified within the Phase I Study Area but was deemed not to be of any environmental concern to the Phase II Property based on the separation distance and inferred cross-gradient orientation with respect to the known groundwater flow to the north.

Contaminants of Potential Concern

The contaminants of potential concern (CPCs) associated with the aforementioned APECs are considered to be:

- ❒ Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- ❒ Volatile Organic Compounds (VOCs);
- ❒ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including Arsenic, Antimony, and Selenium);
- ❒ Mercury (Hg^+);
- ❒ Hexavalent Chromium (CrVI);
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase II Property.

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA is considered to be sufficient to conclude that there are PCAs resulting in APECs associated with the Phase II Property.

The presence of any PCAs was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from the Sampling and Analysis Plan

No deviations from the Sampling and Analysis were made during the course of this Phase II ESA, with the exception of BH22-23 requiring to be moved slightly to the northeast due to limited access to the initially planned location.

3.5 Physical Impediments

Minor physical impediments were encountered as part of the drilling program. These included primarily buried utilities which results in boreholes being relocated by small amounts to allow for safe clearances of the utilities. The relocation of the boreholes is not expected to impact the outcome of the investigation.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted during the interim of November 23 to November 24, 2023 and consisted of drilling six boreholes (BH21-23 to BH26-23) across the Phase II Property. It should be noted that this field investigation was carried out as part of a larger investigation conducted for multiple sites at the Tunney's Pasture complex.

The boreholes were advanced to depths ranging from approximately 6.04 m to 6.22 m below the existing ground surface and terminated within the bedrock unit. Bedrock was encountered in all six boreholes during the field drilling program at depths ranging from approximately 0.74 m to 1.58 m below ground surface.

Upon completion, all six boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table. During the field sampling program, the groundwater was measured at depths ranging from approximately 3.12 m to 4.17 m below the existing ground surface.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a truck-mounted drill rig provided by Capital Cutting and Coring of Ottawa, Ontario. The locations of the boreholes are illustrated on Drawing PE6038-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

Soil sampling protocols were followed using the MECP document entitled, *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996.

The samples were recovered using a stainless-steel split spoon, while wearing protective gloves (changed after each sample), and immediately placed into plastic bags. If significant contamination was encountered, the samples were instead placed into glass jars. Sampling equipment was routinely washed in soapy water and rinsed with methylhydrate after each split spoon to prevent any cross contamination of the samples. The samples were also stored in coolers to reduce analyte volatilization during transportation.

A total of 11 soil samples were obtained from the boreholes by means of auger and split spoon sampling. The depths at which auger, split spoon, and rock core samples were obtained from the boreholes are shown as "**AU**", "**SS**", and "**RC**" respectively, on the Soil Profile and Test Data Sheets, appended to this report.

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as soil vapour screening with a Photo Ionization Detector.

The recovered soil samples were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey, ensuring consistency of readings between samples. To measure the soil vapours, the analyser probe was inserted into the nominal headspace above the sample. The sample was then agitated and manipulated gently by hand as the measurement was taken. The peak reading registered within the first 15 seconds was recorded as the vapour measurement. The parts per million (ppm) scale was used to measure concentrations of organic vapours.

The maximum vapour reading was 7.2 ppm in the soil samples obtained. These results were not considered to be indicative of potential significant contamination from volatile contaminants.

The results of the vapour survey are presented on the Soil Profile and Test Data Sheets, appended to this report.

4.4 Groundwater Monitoring Well Installation

Six groundwater monitoring wells were installed on the Phase II Property as part of this assessment. These monitoring wells were constructed using 32 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen with a bentonite seal placed above to minimize cross-contamination.

The ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

A summary of the monitoring well construction details are listed below in Table 1 as well as on the Soil Profile and Test Data Sheets provided in Appendix 1.

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH21-23	62.19	6.04	2.99 – 6.04	2.69 – 6.04	0.00 – 2.69	Flushmount
BH22-23	62.24	6.20	3.15 – 6.20	2.85 – 6.20	0.00 – 2.85	Flushmount
BH23-23	62.63	6.20	3.15 – 6.20	2.85 – 6.20	0.00 – 2.85	Flushmount
BH24-23	62.71	6.22	3.17 – 6.22	2.87 – 6.22	0.00 – 2.87	Flushmount
BH25-23	62.54	6.12	3.07 – 6.12	2.82 – 6.12	0.00 – 2.82	Stick-Up
BH26-23	62.72	6.20	3.15 – 6.20	2.85 – 6.20	0.00 – 2.85	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater monitoring and sampling was conducted on-site on November 29, 2023. At this time, water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field included temperature, pH and electrical conductivity.

Field parameters were measured after each well volume purged. Wells were purged prior to sampling until at least three well volumes had been removed or the field parameters were relatively stable. Stabilized field parameter values are summarized in Table 2.

Table 2
Measurement of Water Quality Parameters

Well ID	Temperature (˚C)	Conductivity (µS)	pH (Units)

BH22-23	10.4	>4,000	7.98
BH25-23	12.5	3675	7.64
BH26-23	11.3	1871	8.20

Remaining wells samples did not produce enough purge water to sample for temperature, pH and electrical conductivity.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled, *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996.

Standing water was purged from each monitoring well prior to the recovery of the groundwater samples using dedicated sampling equipment. The samples were then stored in coolers to reduce possible analyte volatilization during their transportation. Further details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan, appended to this report.

4.7 Analytical Testing

The following soil and groundwater samples were submitted for laboratory analysis:

Table 3
Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed							Rationale
		BTEX	VOCs	PHCs (F_1-F_4)	Metals[1]	PAHs	EC	SAR	
BH21-23-AU1	Fill Material 0.08 – 0.46 m	X		X	X	X	X	X	To assess for potential soil impacts resulting from the presence of an existing on-site diesel AST, fill material of unknown quality and the use of road salt for de-icing purposes, and for excess soil qualification purposes.
BH22-23-SS2	Fill Material 0.76 – 1.37 m		X	X	X	X			To assess for potential soil impacts resulting from the presence of former on-site bunker oil USTs, the existing on-site fuel storage facility, fill material of unknown quality and for excess soil qualification purposes.

Table 3
Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed							Rationale
		BTEX	VOCs	PHCs (F_1-F_4)	Metals[1]	PAHs	EC	SAR	
BH23-23-AU1	Fill Material 0.08 m – 0.53 m	X		X	X	X	X	X	To assess for potential soil impacts resulting from the existing on-site underground line from the fuel storage facility to the central heating and cooling plant, the existing on-site fuel storage facility, fill material of unknown quality and the use of road salt for de-icing purposes, and for excess soil qualification purposes.
BH24-23-AU1	Fill Material 0.08 – 0.46 m	X		X	X	X	X	X	To assess for potential soil impacts resulting from the presence of a former on-site fuel oil AST, fill material of unknown quality and the use of road salt for de-icing purposes, and for excess soil qualification purposes.
BH25-23-SS2	Glacial Till 0.76 – 1.37 m	X		X	X	X			To assess for potential soil impacts resulting from the existing on-site fuel storage facility and fill material of unknown quality and for excess soil qualification purposes.
BH26-23-SS2	Fill Material 0.76 – 1.37 m	X		X	X	X			To assess for potential soil impacts resulting from the presence of former on-site fuel oil ASTs and fill material of unknown quality and for excess soil qualification purposes.
DUP[2]	Fill Material 0.08 – 0.46 m	X		X	X	X	X	X	For laboratory QA/QC purposes.

1 – Includes Mercury and Hexavalent Chromium
2 – Duplicate sample of BH21-23-AU1

Table 4
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	VOCs	PHCs (F_1-F_4)	Metals[1]	PAHs	
BH21-23-GW1	Bedrock 2.99 m – 6.04 m	X		X	X	X	To assess for potential groundwater impacts resulting from the presence of an existing on-site diesel AST.

Table 4
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	VOCs	PHCs (F_1-F_4)	Metals[1]	PAHs	
BH22-23-GW1	Bedrock 3.15 m – 6.20 m	X	X	X	X	X	To assess for potential groundwater impacts resulting from the presence of the existing on-site fuel storage facility, former on-site bunker oil USTs, the former off-site varsol UST and former off-site diesel ASTs.
BH23-23-GW1	Bedrock 3.15 m – 6.20 m	X		X	X	X	To assess for potential groundwater impacts resulting from the existing on-site underground line from the fuel storage facility to the central heating and cooling plant and the existing on-site fuel storage facility.
BH24-23-GW1	Bedrock 3.17 m – 6.22 m	X		X	X	X	To assess for potential groundwater impacts resulting from the presence of a former on-site fuel oil AST.
BH25-23-GW1	Bedrock 3.07 m – 6.12 m	X		X	X	X	To assess for potential groundwater impacts resulting from the existing on-site fuel storage facility.
BH26-23-GW1	Bedrock 3.15 m – 6.20 m	X		X	X	X	To assess for potential groundwater impacts resulting from the presence of former on-site fuel oil ASTs.
DUP[2]	Bedrock 3.15 m – 6.20 m		X	X			For laboratory QA/QC purposes.

1 – Includes Mercury and Hexavalent Chromium
2 – Duplicate sample of BH22-23-GW1

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) and is accredited and certified by the SCC/CALA for specific tests registered with the association.

4.8 Residue Management

All soil cuttings were removed from the site following the field program, while all purge water and equipment cleaning fluids were retained on-site.

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

A summary of the quality assurance and quality control (QA/QC) measures, undertaken as part of this assessment, is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

In general, the subsurface soil profile encountered at the borehole locations consists of either a thin pavement structure (asphaltic concrete over granular fill) or topsoil, underlain by fill material (gravel with crushed stone and some silty sand), followed by a second layer of fill material (silty sand with varying amounts of gravel, clay cobbles, boulders and crushed stone). A subsurface layer of asphaltic concrete was encountered in BH23-23 beneath the first layer of fill material. A layer of glacial till (silty sand to sandy silt with gravel, cobbles and boulders) was encountered in BH25-23 beneath the fill material. Bedrock was encountered in all six boreholes during the field drilling program at depths ranging from approximately 0.74 m to 1.58 m below ground surface.

Site geology details are provided in the Soil Profile and Test Data Sheets in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter on November 29, 2023 and January 25, 2024 (only BH23-23 and BH24-23). The groundwater levels are summarized below in Table 5.

Table 5
Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH21-23	62.19	3.12	59.07	November 29, 2023
BH22-23	62.24	3.75	58.49	
BH23-23	62.63	3.84	58.79	
BH24-23	62.71	3.20	59.51	
BH25-23	62.54	3.47	59.07	

BH26-23	62.72	4.17	58.55	
BH23-23	62.63	4.12	58.51	January 25, 2024
BH24-23	62.71	3.30	59.41	

The groundwater at the Phase II Property was encountered within the bedrock at depths ranging from approximately 3.12 m to 4.17 m below the existing ground surface.

No unusual visual observations were identified within the recovered groundwater samples.

Using the groundwater elevations recorded during the November 28, 2023 sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE6038-3 – Test Hole Location Plan in the appendix, the groundwater flow on the Phase II Property was calculated to be in a northerly direction. A horizontal hydraulic gradient of approximately 0.006 m/m was also calculated as part of this assessment. It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine/Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. As a result, the coarse-grained soil standards were chosen as a conservative approach.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0.4 ppm to 7.2 ppm, indicating that there is a negligible potential for the presence of volatile substances. Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

A total of seven soil samples (including one duplicate) were submitted for laboratory analysis of BTEX, VOCs, PHCs (F_1-F_4), metals, Hg^+, CrVI, PAHs, EC and/or SAR parameters. The results of the analytical testing are presented below in Tables 6 to 10, as well as on the laboratory Certificates of Analysis included in Appendix 1.

Table 6
Analytical Test Results – Soil
BTEX & PHCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 23, 2023				MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1		
		Sample Depth (m bgs)					
		0.07 – 0.46 m	0.76 – 1.37 m	0.07 – 0.53 m	0.07 – 0.46 m		
Benzene	0.002	nd	nd	0.003	nd	0.21	0.03
Ethylbenzene	0.002	nd	nd	nd	nd	2	0.082
Toluene	0.002	nd	nd	nd	nd	2.3	0.37
Xylenes	0.002	nd	nd	nd	nd	3.1	11
PHCs F_1	7	nd	nd	nd	nd	55	240
PHCs F_2	4	nd	nd	nd	nd	98	260
PHCs F_3	8	**341**	24	nd	nd	300	1,700
PHCs F_4	6	2,190	32	400	366	2,800	3,300
PHCs F_4 (gravimetric)	50	2,780	nt	1,420	692	2,800	N/A

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

Table 6 Continued
Analytical Test Results – Soil
BTEX & PHCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 23, 2023			MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		BH25-23-SS2	BH26-23-SS2	DUP[1]		
		Sample Depth (m bgs)				
		0.76 – 1.37 m	0.76 – 1.37 m	0.07 – 0.46 m		
Benzene	0.002	nd	nd	nd	0.21	0.03
Ethylbenzene	0.002	nd	nd	nd	2	0.082
Toluene	0.002	nd	nd	nd	2.3	0.37
Xylenes	0.002	nd	nd	nd	3.1	11
PHCs F_1	7	nd	nd	nd	55	240
PHCs F_2	4	nd	nd	nd	98	260
PHCs F_3	8	29	23	80	300	1,700
PHCs F_4	6	21	18	976	2,800	3,300
PHCs F_4 (gravimetric)	50	nt	nt	**3,060**	2,800	N/A

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards
- 1 – Duplicate of sample BH21-23-AU1

The concentration of PHC F3 detected in sample BH21-23-AU1 and the concentration of PHCs $F_{4\ gravimetric}$ detected in the duplicate sample of BH21-23-AU1 (DUP) are in excess of the selected MECP Table 7 Coarse-Grained Residential Soil Standards. All remaining BTEX and PHC parameter concentrations detected in the soil samples analyzed comply with the selected MECP Table 7 Coarse-Grained Residential Soil Standards and the CCME Coarse-Grained Commercial Soil Standards.

Table 7
Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)	MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		November 23, 2023		
		BH21-23-AU1		
		Sample Depth (m bgs)		
		0.07 – 0.46 m		
Acetone	0.100	nd	16	N/A
Benzene	0.002	nd	0.21	0.03
Bromodichloromethane	0.005	nd	13	N/A
Bromoform	0.005	nd	0.27	N/A
Bromomethane	0.005	nd	0.05	N/A
Carbon Tetrachloride	0.002	nd	0.05	50
Chlorobenzene	0.002	nd	2.4	10
Chloroethane	0.050	nd	N/A	50
Chloroform	0.002	nd	0.05	50
Chloromethane	0.050	nd	N/A	50
Dibromochloromethane	0.002	nd	9.4	N/A
Ethylene dibromide	0.005	nd	0.05	N/A
1,2-Dichlorobenzene	0.002	nd	3.4	10
1,3-Dichlorobenzene	0.002	nd	4.8	10
1,4-Dichlorobenzene	0.002	nd	0.083	10
1,1-Dichloroethane	0.002	nd	3.5	50
1,2-Dichloroethane	0.002	nd	0.05	50
1,1-Dichloroethylene	0.002	nd	0.05	50
Dichlorodifluoromethane	0.002	nd	16	N/A
cis-1,2-Dichloroethylene	0.002	nd	3.4	50
trans-1,2-Dichloroethylene	0.002	nd	0.084	50
1,2-Dichloroethylene, total	0.003	nd	N/A	N/A
1,2-Dichloropropane	0.002	nd	0.05	50
cis-1,3-Dichloropropylene	0.002	nd	N/A	50
trans-1,3-Dichloropropylene	0.002	nd	N/A	50
1,3-Dichloropropene, total	0.003	nd	0.05	N/A
Ethylbenzene	0.002	nd	2	0.082
Hexane	0.002	nd	2.8	6.5
Methyl Ethyl Ketone	0.050	nd	16	N/A
Methyl Butyl Ketone	0.010	nd	N/A	N/A
Methyl Isobutyl Ketone	0.050	nd	1.7	N/A
Methyl tert-butyl ether	0.010	nd	0.75	N/A
Methylene Chloride	0.005	nd	0.1	50

Table 7
Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)	MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		November 23, 2023		
		BH21-23-AU1		
		Sample Depth (m bgs)		
		0.07 – 0.46 m		
Styrene	0.005	nd	0.7	50
1,1,1,2-Tetrachloroethane	0.002	nd	0.058	50
1,1,2,2-Tetrachloroethane	0.002	nd	0.05	50
Tetrachloroethylene	0.002	nd	0.28	0.5
Toluene	0.002	nd	2.3	0.37
1,2,4-Trichlorobenzene	0.002	nd	0.36	10
1,1,1-Trichloroethane	0.002	nd	0.38	50
1,1,2-Trichloroethane	0.002	nd	0.05	50
Trichloroethylene	0.002	nd	0.061	0.01
Trichlorofluoromethane	0.005	nd	4	N/A
1,3,5-Trimethylbenzene	0.005	nd	N/A	N/A
Vinyl Chloride	0.005	nd	0.02	N/A
m/p-Xylene	0.005	nd	N/A	N/A
o-Xylene	0.002	nd	N/A	N/A
Xylenes, total	0.005	nd	3.1	11

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

No VOC parameters were detected in the soil sample analyzed at any concentrations above the laboratory method detection limits. The results are in compliance with the selected MECP Table 7 Coarse-Grained Residential Soil Standards and the CCME Coarse-Grained Commercial Soil Standards.

Table 8
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		November 23, 2023					
		BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1		
		Sample Depth (m bgs)					
		0.07 – 0.46 m	0.76 – 1.37 m	0.07 – 0.53 m	0.07 – 0.46 m		
Antimony	1.0	nd	nd	nd	nd	7.5	40
Arsenic	1.0	2.2	3.5	2.8	1.1	18	12
Barium	1.0	120	385	257	43.3	390	2,000
Beryllium	0.5	nd	0.6	nd	nd	4	8
Boron	1.0	7.9	17.7	9.5	2.7	120	N/A
Cadmium	0.5	nd	nd	nd	nd	1.2	22
Chromium	5.0	12.1	20.9	8.7	7.0	160	87
Chromium (VI)	0.2	nd	nd	nd	nd	8	1.4
Cobalt	5.0	nd	6.3	nd	nd	22	300
Copper	5.0	12.4	15.4	7.0	8.5	140	91
Lead	1.0	7.0	13.7	8.9	2.0	120	260
Mercury	0.1	nd	nd	nd	nd	0.27	24
Molybdenum	1.0	1.3	nd	nd	nd	6.9	40
Nickel	5.0	10.6	15.8	9.8	5.8	100	89
Selenium	1.0	nd	nd	nd	nd	2.4	2.9
Silver	0.3	nd	nd	nd	nd	20	40
Thallium	1.0	nd	nd	nd	nd	1	1
Tin	5.0	nd	nd	nd	nd	300	300
Uranium	1.0	nd	nd	nd	nd	33	33
Vanadium	10.0	22.0	23.5	15.2	16.6	130	130
Zinc	20.0	nd	30.1	nd	nd	410	410

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

Table 8 Continued
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		November 23, 2023				
		BH25-23-SS2	BH26-23-SS2	DUP[1]		
		Sample Depth (m bgs)				
		0.76 – 1.37 m	0.76 – 1.37 m	0.07 – 0.46 m		
Antimony	1.0	nd	nd	nd	7.5	40
Arsenic	1.0	2.8	1.5	1.9	18	12
Barium	1.0	64.9	61.8	110	390	2,000
Beryllium	0.5	nd	nd	nd	4	8
Boron	1.0	12.3	3.8	6.9	120	N/A
Cadmium	0.5	nd	nd	nd	1.2	22
Chromium	5.0	12.7	10.4	11.4	160	87
Chromium (VI)	0.2	nd	nd	nd	8	1.4
Cobalt	5.0	5.2	nd	nd	22	300
Copper	5.0	8.0	9.4	13.9	140	91
Lead	1.0	6.0	4.3	5.5	120	260
Mercury	0.1	nd	nd	nd	0.27	24
Molybdenum	1.0	nd	nd	nd	6.9	40
Nickel	5.0	12.1	6.8	9.7	100	89
Selenium	1.0	nd	nd	nd	2.4	2.9
Silver	0.3	nd	nd	1.7	20	40
Thallium	1.0	nd	nd	nd	1	1
Tin	5.0	nd	nd	nd	300	300
Uranium	1.0	nd	nd	nd	33	33
Vanadium	10.0	10.7	18.3	21.5	130	130
Zinc	20.0	nd	nd	nd	410	410

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards
- 1 – Duplicate of sample BH21-23-AU1

All detected metal parameter concentrations in the soil samples analyzed are in compliance with the selected MECP Table 7 Coarse-Grained Residential Soil Standards and the CCME Coarse-Grained Commercial Soil Standards.

Table 9
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		November 23, 2023					
		BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1		
		Sample Depth (m bgs)					
		0.07 – 0.46 m	0.76 – 1.37 m	0.07 – 0.53 m	0.07 – 0.46 m		
Acenaphthene	0.02	0.06	nd	nd	nd	7.9	0.28
Acenaphthylene	0.02	nd	nd	nd	nd	0.15	320
Anthracene	0.02	0.18	nd	0.02	0.04	0.67	32
Benzo[a]anthracene	0.02	0.36	0.06	0.04	0.14	0.5	10
Benzo[a]pyrene	0.02	0.24	0.04	0.03	0.13	0.3	72
Benzo[b]fluoranthene	0.02	0.25	0.07	0.04	0.16	0.78	10
Benzo[g,h,i]perylene	0.02	0.14	0.03	0.04	0.08	6.6	N/A
Benzo[k]fluoranthene	0.02	0.17	0.04	0.02	0.10	0.78	10
1,1-Biphenyl	0.02	nd	nd	nd	nd	0.31	N/A
Chrysene	0.02	0.33	0.07	0.04	0.11	7	N/A
Dibenzo[a,h]anthracene	0.02	0.04	nd	nd	0.02	0.1	10
Fluoranthene	0.02	**0.82**	0.14	0.10	0.32	0.69	180
Fluorene	0.02	0.06	nd	nd	nd	62	0.25
Indeno [1,2,3-cd] pyrene	0.02	0.12	0.03	nd	0.07	0.38	10
1-Methylnaphthalene	0.02	nd	nd	nd	nd	0.99	N/A
2-Methylnaphthalene	0.02	nd	nd	nd	nd	0.99	N/A
Methylnaphthalene (1&2)	0.04	nd	nd	nd	nd	0.99	N/A
Naphthalene	0.01	0.01	nd	0.01	nd	0.6	0.013
Phenanthrene	0.02	0.57	0.07	0.08	0.14	6.2	0.046
Pyrene	0.02	0.66	0.11	0.08	0.27	78	100
Quinoline	0.10	nd	nd	nd	nd	N/A	N/A

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

Table 9 Continued
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 7 Coarse-Grained Residential Soil Standards (µg/g)	CCME Coarse-Grained Commercial Standards (µg/g)
		November 23, 2023				
		BH25-23-SS2	BH26-23-SS2	DUP[1]		
		Sample Depth (m bgs)				
		0.76 – 1.37 m	0.76 – 1.37 m	0.07 – 0.46 m		
Acenaphthene	0.02	nd	nd	0.13	7.9	0.28
Acenaphthylene	0.02	nd	nd	nd	0.15	320
Anthracene	0.02	nd	nd	0.38	0.67	32
Benzo[a]anthracene	0.02	nd	nd	**0.73**	0.5	10
Benzo[a]pyrene	0.02	nd	nd	**0.47**	0.3	72
Benzo[b]fluoranthene	0.02	nd	nd	0.52	0.78	10
Benzo[g,h,i]perylene	0.02	nd	nd	0.28	6.6	N/A
Benzo[k]fluoranthene	0.02	nd	nd	0.34	0.78	10
1,1-Biphenyl	0.02	nd	nd	nd	0.31	N/A
Chrysene	0.02	nd	nd	0.65	7	N/A
Dibenzo[a,h]anthracene	0.02	nd	nd	0.04	0.1	10
Fluoranthene	0.02	nd	0.04	**1.78**	0.69	180
Fluorene	0.02	nd	nd	0.12	62	0.25
Indeno [1,2,3-cd] pyrene	0.02	nd	nd	0.25	0.38	10
1-Methylnaphthalene	0.02	nd	nd	nd	0.99	N/A
2-Methylnaphthalene	0.02	nd	nd	nd	0.99	N/A
Methylnaphthalene (1&2)	0.04	nd	nd	nd	0.99	N/A
Naphthalene	0.01	nd	nd	0.02	0.6	0.013
Phenanthrene	0.02	nd	nd	1.21	6.2	0.046
Pyrene	0.02	nd	0.03	1.47	78	100
Quinoline	0.10	nd	nd	nd	N/A	N/A

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards
- 1 – Duplicate of sample BH21-23-AU1

The concentration of fluoranthene detected in soil sample BH21-23-AU1 and various PAH parameters detected in the duplicate of soil sample BH21-23-AU1 (DUP) exceed the MECP Table 7 Coarse-Grained Residential Soil Standards. The concentration of phenanthrene detected in soil samples BH21-23-AU1, BH22-23-SS2, BH23-23-AU1, BH24-23-AU1 and the concentration of both phenanthrene and naphthalene in the duplicate sample (DUP) BH21-23-AU1 exceed the CCME Coarse-Grained Commercial Soil Standards. Remaining PAHs parameter concentrations detected in the soil samples analyzed comply with the selected MECP Table 7 Coarse-Grained Residential Soil Standards and the CCME Coarse-Grained Commercial Soil Standards.

Table 10
Analytical Test Results – Soil
Inorganic Parameters

Parameter	MDL (units)	Soil Samples (µg/g)				MECP Table 7 Coarse-Grained Residential Soil Standards (units)	CCME Coarse-Grained Commercial Standards (units)
		November 23, 2023					
		BH21-23-AU1	BH23-23-AU1	BH24-23-AU1	DUP[1]		
		Sample Depth (m bgs)					
		0.07 – 0.46 m	0.07 – 0.53 m	0.07 – 0.46 m	0.07 – 0.46 m		
SAR	0.01 Units	3.49	**7.03**	**5.64**	3.52	5	12
EC	5 µS/cm	604	**997**	**885**	577	700	4,000

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards
- 1 – Duplicate of sample BH21-23-AU1

The EC and SAR concentrations measured in the soil sample BH21-23-AU1 and the associated duplicate sample comply with the selected MECP Table 7 Coarse-Grained Residential Soil Standards and the CCME Coarse-Grained Commercial Soil Standards. The EC and SAR levels measured in soil samples BH23-23-AU1 and BH24-23-AU1 exceed the selected MECP Table 7 Coarse-Grained Residential Soil Standards, though they comply with the CCME Coarse-Grained Commercial Soil Standards. These exceedances are suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, do not represent a contaminant issue.

Table 11
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Benzene	0.003	BH22-23-SS2	0.76 – 1.37 m
PHCs F_3	**341**	BH21-23-AU1	0.07 – 0.46 m
PHCs F_4	2,190	BH21-23-AU1	0.07 – 0.46 m
PHCs F_4 (gravimetric)	**3,060**	DUP (BH21-23-AU1)	0.07 – 0.46 m
Arsenic	3.5	BH22-23-SS2	0.76 – 1.37 m
Barium	385	BH22-23-SS2	0.76 – 1.37 m
Beryllium	0.6	BH22-23-SS2	0.76 – 1.37 m
Boron	17.7	BH22-23-SS2	0.76 – 1.37 m
Chromium	20.9	BH22-23-SS2	0.76 – 1.37 m
Cobalt	6.3	BH22-23-SS2	0.76 – 1.37 m
Copper	15.4	BH22-23-SS2	0.76 – 1.37 m
Lead	13.7	BH22-23-SS2	0.76 – 1.37 m
Molybdenum	1.3	BH21-23-AU1	0.07 – 0.46 m
Nickel	15.8	BH22-23-SS2	0.76 – 1.37 m
Silver	1.7	DUP (BH21-23-AU1)	0.07 – 0.46 m
Vanadium	23.5	BH22-23-SS2	0.76 – 1.37 m
Zinc	30.1	BH22-23-SS2	0.76 – 1.37 m
Acenaphthene	0.13	DUP (BH21-23-AU1)	0.07 – 0.46 m
Anthracene	0.38	DUP (BH21-23-AU1)	0.07 – 0.46 m
Benzo[a]anthracene	**0.73**	DUP (BH21-23-AU1)	0.07 – 0.46 m
Benzo[a]pyrene	**0.47**	DUP (BH21-23-AU1)	0.07 – 0.46 m
Benzo[b]fluoranthene	0.52	DUP (BH21-23-AU1)	0.07 – 0.46 m
Benzo[g,h,i]perylene	0.28	DUP (BH21-23-AU1)	0.07 – 0.46 m
Benzo[k]fluoranthene	0.34	DUP (BH21-23-AU1)	0.07 – 0.46 m
Chrysene	0.65	DUP (BH21-23-AU1)	0.07 – 0.46 m
Dibenzo[a,h]anthracene	0.04	DUP (BH21-23-AU1)	0.07 – 0.46 m
Fluoranthene	**1.78**	DUP (BH21-23-AU1)	0.07 – 0.46 m
Fluorene	0.12	DUP (BH21-23-AU1)	0.07 – 0.46 m
Indeno [1,2,3-cd] pyrene	0.25	DUP (BH21-23-AU1)	0.07 – 0.46 m
Naphthalene	0.02	DUP (BH21-23-AU1)	0.07 – 0.46 m
Phenanthrene	1.21	DUP (BH21-23-AU1)	0.07 – 0.46 m
Pyrene	1.47	DUP (BH21-23-AU1)	0.07 – 0.46 m
Electrical Conductivity	**997**	BH23-23-AU1	0.07 – 0.53 m
Sodium Adsorption Ratio	**7.03**	BH23-23-AU1	0.07 – 0.53 m

Notes:
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

All other parameter concentrations analyzed were below the laboratory detection limits.

5.6 Groundwater Quality

Seven groundwater samples (including one duplicate) were submitted for laboratory analysis of BTEX, VOCs, PHC, Metals, and/or PAH parameters. The results of the analytical testing are presented below in Table 12 to Table 15, as well as on the laboratory Certificates of Analysis included in Appendix 1.

Table 12
Analytical Test Results – Groundwater
BTEX & PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023					
		BH21-23-GW1	BH22-23-GW1	BH25-23-GW1	BH26-23-GW1		
		Sample Depth (m bgs)					
		2.99 – 6.04 m	3.15 – 6.20 m	3.15 – 6.20 m	3.17 – 6.22 m		
Benzene	0.5	nd	nd	nd	nd	0.5	88
Ethylbenzene	0.5	nd	nd	nd	nd	54	3,200
Toluene	0.5	nd	nd	nd	nd	320	83
Xylenes	0.5	nd	nd	nd	nd	72	3,900
PHCs F_1	25	nd	nd	nd	nd	420	810
PHCs F_2	100	nd	nd	nd	nd	150	1,300
PHCs F_3	100	nd	nd	nd	nd	500	N/A
PHCs F_4	100	nd	nd	nd	nd	500	N/A

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

Table 12 Continued
Analytical Test Results – Groundwater
BTEX & PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023	January 25, 2024			
		DUP-1-GW[1]	BH23-23-GW1	BH24-23-GW1		
		Sample Depth (m bgs)				
		3.15 – 6.20 m	3.15 – 6.20 m	3.17 – 6.22 m		
Benzene	0.5	nd	nd	nd	0.5	88
Ethylbenzene	0.5	nd	nd	nd	54	3,200
Toluene	0.5	nd	nd	nd	320	83
Xylenes	0.5	nd	nd	nd	72	3,900
PHCs F_1	25	nd	nd	nd	420	810
PHCs F_2	100	nd	nd	nd	150	1,300
PHCs F_3	100	nd	nd	nd	500	N/A
PHCs F_4	100	nd	nd	nd	500	N/A

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards
- 1 – Duplicate of sample BH22-23-GW1

No BTEX or PHC parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 7 Non-Potable Groundwater Standards as well as the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites.

Table 13
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023			
		BH22-23-GW1	DUP-1-GW[1]		
		Sample Depth (m bgs)			
		3.15 – 6.20 m	3.15 – 6.20 m		
Acetone	5.0	nd	nd	100,000	13,000
Benzene	0.5	nd	nd	0.5	88
Bromodichloromethane	0.5	nd	nd	67,000	8,500
Bromoform	0.5	nd	nd	5	380
Bromomethane	0.5	nd	nd	0.89	56
Carbon Tetrachloride	0.2	nd	nd	0.2	0.56
Chlorobenzene	0.5	nd	nd	140	1.3
Chloroethane	1.0	nd	nd	N/A	N/A
Chloroform	0.5	nd	nd	2	1.8
Chloromethane	3.0	nd	nd	N/A	N/A
Dibromochloromethane	0.5	nd	nd	65,000	100
Dichlorodifluoromethane	1.0	nd	nd	3,500	N/A
Ethylene dibromide	0.2	nd	nd	0.2	0.25
1,2-Dichlorobenzene	0.5	nd	nd	150	0.7
1,3-Dichlorobenzene	0.5	nd	nd	7,600	42
1,4-Dichlorobenzene	0.5	nd	nd	0.5	26
1,1-Dichloroethane	0.5	nd	nd	11	320
1,2-Dichloroethane	0.5	nd	nd	0.5	5
1,1-Dichloroethylene	0.5	nd	nd	0.5	39
cis-1,2-Dichloroethylene	0.5	nd	nd	1.6	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	1.6	1.6
1,2-Dichloroethylene, total	0.5	nd	nd	N/A	N/A
1,2-Dichloropropane	0.5	nd	nd	0.58	16
cis-1,3-Dichloropropylene	0.5	nd	nd	N/A	N/A
trans-1,3-Dichloropropylene	0.5	nd	nd	N/A	N/A
1,3-Dichloropropene, total	0.5	nd	nd	0.5	5.2
Ethylbenzene	0.5	nd	nd	54	3,200
Hexane	1.0	nd	nd	5	N/A
Methyl Ethyl Ketone	5.0	nd	nd	21,000	150,000
Methyl Butyl Ketone	10.0	nd	nd	N/A	N/A
Methyl Isobutyl Ketone	5.0	nd	nd	5,200	58,000
Methyl tert-butyl ether	2.0	nd	nd	15	4,300
Methylene Chloride	5.0	nd	nd	26	50
Styrene	0.5	nd	nd	43	72
1,1,1,2-Tetrachloroethane	0.5	nd	nd	1.1	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	0.5	3.2
Tetrachloroethylene	0.5	nd	nd	0.5	110
Toluene	0.5	nd	nd	320	83
1,1,1-Trichloroethane	0.5	nd	nd	23	640
1,1,2-Trichloroethane	0.5	nd	nd	0.5	4.7

Table 13
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023			
		BH22-23-GW1	DUP-1-GW[1]		
		Sample Depth (m bgs)			
		3.15 – 6.20 m	3.15 – 6.20 m		
Trichloroethylene	0.5	nd	nd	0.5	20
Trichlorofluoromethane	1.0	nd	nd	2,000	N/A
1,3,5-Trimethylbenzene	0.5	nd	nd	N/A	N/A
Vinyl Chloride	0.5	nd	nd	0.5	1.1
m/p-Xylene	0.5	nd	nd	N/A	N/A
o-Xylene	0.5	nd	nd	N/A	N/A
Xylenes, total	0.5	nd	nd	72	3,900

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards
- 1 – Duplicate of sample BH22-23-GW1

No VOC parameter concentrations were detected above the laboratory method detection limits in any of the samples analyzed. The results are in compliance with the MECP Table 7 Non-Potable Groundwater Standards as well as the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites.

Table 14
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023				
		BH21-23-GW1	BH22-23-GW1	BH25-23-GW1		
		Sample Depth (m bgs)				
		2.99 – 6.04 m	3.15 – 6.20 m	3.15 – 6.20 m		
Aluminum	1	4	9	5	N/A	5
Antimony	0.5	nd	nd	nd	16,000	2,000
Arsenic	1	nd	nd	nd	1,500	5
Barium	1	180	65	125	23,000	500
Beryllium	0.5	nd	nd	nd	53	5.3
Boron	10	77	81	41	36,000	500
Cadmium	0.01	nd	nd	0.02	2.1	0.017
Calcium	100	562,000	450,000	193,000	N/A	N/A
Chromium	1	nd	nd	nd	640	8.9
Chromium (VI)	1	nd	nd	nd	110	N/A
Cobalt	0.5	1.9	0.6	0.6	52	N/A
Copper	0.5	1.7	1.7	6.4	69	50
Iron	100	nd	nd	nd	N/A	300
Lead	0.1	nd	nd	0.1	20	1
Magnesium	200	61,300	91,000	27,500	N/A	N/A
Manganese	5	88	17	20	N/A	200
Mercury	0.01	nd	nd	nd	0.27	N/A
Molybdenum	0.5	2.6	10.6	2.9	7,300	73
Nickel	1	5	3	2	390	25
Selenium	1	nd	nd	nd	50	1
Silver	0.1	nd	nd	nd	1.2	0.1
Thallium	0.1	nd	0.1	nd	400	0.8
Titanium	5	nd	nd	nd	N/A	100
Uranium	0.1	2.6	2.1	3.5	330	10
Vanadium	0.5	2.0	0.7	0.8	200	100
Zinc	5	6	11	15	890	10

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

Table 14 Continued
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023	January 25, 2024			
		BH26-23-GW1	BH23-23-GW1	BH24-23-GW1		
		Sample Depth (m bgs)				
		3.17 – 6.22 m	3.15 – 6.20 m	3.17 – 6.22 m		
Aluminum	1	12	nd	nd	N/A	5
Antimony	0.5	0.7	nd	nd	16,000	2,000
Arsenic	1	nd	nd	nd	1,500	5
Barium	1	203	275	208	23,000	500
Beryllium	0.5	nd	nd	nd	53	5.3
Boron	10	125	121	nd	36,000	500
Cadmium	0.01	0.01	nd	nd	2.1	0.017
Calcium	100	470,000	560,000	399,000	N/A	N/A
Chromium	1	nd	nd	nd	640	8.9
Chromium (VI)	1	nd	1	nd	110	N/A
Cobalt	0.5	nd	nd	nd	52	N/A
Copper	0.5	3.6	nd	5.5	69	50
Iron	100	nd	nd	nd	N/A	300
Lead	0.1	nd	nd	nd	20	1
Magnesium	200	38,900	48,800	25,500	N/A	N/A
Manganese	5	8	nd	nd	N/A	200
Mercury	0.01	12.9	5.3	8.5	0.27	N/A
Molybdenum	0.5	nd	nd	8.5	7,300	73
Nickel	1	nd	nd	nd	390	25
Selenium	1	nd	**8,930**	nd	50	1
Silver	0.1	0.2	nd	nd	1.2	0.1
Thallium	0.1	nd	nd	nd	400	0.8
Titanium	5	0.8	nd	nd	N/A	100
Uranium	0.1	4.3	2.0	3.3	330	10
Vanadium	0.5	nd	nd	nd	200	100
Zinc	5	12	nd	nd	890	10

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

All detected metal parameter concentrations in the groundwater samples analyzed are in compliance with the selected MECP Table 7 Non-Potable Groundwater Standards, with the exception of selenium in sample BH23-23-GW1.

It should be noted that the concentration of aluminum, cadmium and/or zinc detected in samples BH22-23-GW1, BH25-23-GW1 and BH26-23-GW1 and the concentration of selenium in sample BH23-23-G1 are in excess of the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites.

Table 15
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023				
		BH21-23-GW1	BH22-23-GW1	BH25-23-GW1		
		Sample Depth (m bgs)				
		2.99 – 6.04 m	3.15 – 6.20 m	3.15 – 6.20 m		
Acenaphthene	0.05	nd	nd	nd	17	5.8
Acenaphthylene	0.05	nd	nd	nd	1	46
Acridine	0.10	nd	nd	nd	N/A	0.05
Anthracene	0.01	nd	0.03	nd	1	0.012
Benzo[a]anthracene	0.01	nd	nd	nd	1.8	0.018
Benzo[a]pyrene	0.01	nd	nd	nd	0.81	0.015
Benzo[b]fluoranthene	0.05	nd	nd	nd	0.75	N/A
Benzo[g,h,i]perylene	0.05	nd	nd	nd	0.2	0.17
Benzo[k]fluoranthene	0.05	nd	nd	nd	0.4	0.48
1,1-Biphenyl	0.05	nd	nd	nd	1,000	N/A
Chrysene	0.05	nd	nd	nd	0.7	0.1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	0.4	0.26
Fluoranthene	0.01	nd	0.06	nd	44	0.04
Fluorene	0.05	nd	nd	nd	290	3
Indeno [1,2,3-cd] pyrene	0.05	nd	nd	nd	0.2	0.21
1-Methylnaphthalene	0.05	nd	nd	nd	1,500	1,500
2-Methylnaphthalene	0.05	nd	nd	nd	1,500	1,500
Methylnaphthalene (1&2)	0.10	nd	nd	nd	1,500	180
Naphthalene	0.05	nd	nd	nd	7	1.1
Phenanthrene	0.05	nd	nd	nd	380	0.4
Pyrene	0.01	nd	0.05	nd	5.7	0.025
Quinoline	0.10	nd	nd	nd	N/A	3.4

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

Table 15 Continued
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 7 Non-Potable Groundwater Standards (µg/L)	CCME Tier 1 FIGWQG Commercial Standards (µg/L)
		November 29, 2023	January 25, 2024			
		BH26-23-GW1	BH23-23-GW1	BH24-23-GW1		
		Sample Depth (m bgs)				
		3.17 – 6.22 m	3.15 – 6.20 m	3.17 – 6.22 m		
Acenaphthene	0.05	nd	nd	nd	17	5.8
Acenaphthylene	0.05	nd	nd	nd	1	46
Acridine	0.10	nd	nd	nd	N/A	0.05
Anthracene	0.01	nd	nd	0.01	1	0.012
Benzo[a]anthracene	0.01	nd	nd	nd	1.8	0.018
Benzo[a]pyrene	0.01	nd	nd	0.05	0.81	0.015
Benzo[b]fluoranthene	0.05	nd	nd	0.08	0.75	N/A
Benzo[g,h,i]perylene	0.05	nd	nd	nd	0.2	0.17
Benzo[k]fluoranthene	0.05	nd	nd	nd	0.4	0.48
1,1-Biphenyl	0.05	nd	nd	nd	1,000	N/A
Chrysene	0.05	nd	nd	0.06	0.7	0.1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	0.4	0.26
Fluoranthene	0.01	nd	nd	0.11	44	0.04
Fluorene	0.05	nd	nd	nd	290	3
Indeno [1,2,3-cd] pyrene	0.05	nd	nd	nd	0.2	0.21
1-Methylnaphthalene	0.05	nd	nd	nd	1,500	1,500
2-Methylnaphthalene	0.05	nd	nd	nd	1,500	1,500
Methylnaphthalene (1&2)	0.10	nd	nd	nd	1,500	180
Naphthalene	0.05	nd	nd	nd	7	1.1
Phenanthrene	0.05	nd	nd	0.06	380	0.4
Pyrene	0.01	nd	nd	0.09	5.7	0.025
Quinoline	0.10	nd	nd	nd	N/A	3.4

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- nt – not tested for this parameter
- N/A – not applicable (no standard for this parameter)
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

All detected PAH parameter concentrations in the groundwater samples analyzed are in compliance with the selected MECP Table 7 Non-Potable Groundwater Standards.

It should be noted that the concentrations of some PAH parameters detected in sample BH22-23-GW1 and BH24-23-GW1 are in excess of the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites.

Table 16
Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Aluminum	12	BH26-23-GW1	3.15 – 6.20 m
Antimony	0.7	BH26-23-GW1	3.15 – 6.20 m
Barium	275	BH23-23-GW1	3.15 – 6.20 m
Boron	125	BH26-23-GW1	3.15 – 6.20 m
Cadmium	0.02	BH25-23-GW1	3.07 – 6.12 m
Calcium	562,000	BH21-23-GW1	2.99 – 6.04 m
Chromium VI	1	BH23-23-GW1	3.15 – 6.20 m
Cobalt	1.9	BH21-23-GW1	2.99 – 6.04 m
Copper	6.4	BH25-23-GW1	3.07 – 6.12 m
Lead	0.1	BH25-23-GW1	3.07 – 6.12 m
Magnesium	91,000	BH22-23-GW1	3.15 – 6.20 m
Manganese	88	BH21-23-GW1	2.99 – 6.04 m
Molybdenum	12.9	BH26-23-GW1	3.15 – 6.20 m
Nickel	5	BH21-23-GW1	2.99 – 6.04 m
Selenium	**8.930**	BH23-23-GW1	3.15 – 6.20 m
Thallium	0.2	BH26-23-GW1	3.15 – 6.20 m
Uranium	3.5	BH25-23-GW1	3.07 – 6.12 m
Vanadium	4.3	BH26-23-GW1	3.15 – 6.20 m
Zinc	15	BH25-23-GW1	3.07 – 6.12 m
Anthracene	0.03	BH22-23-GW1	3.15 – 6.20 m
Benzo[a]pyrene	0.05	BH24-24-GW1	3.17 – 6.22 m
Benzo[b]fluoranthene	0.08	BH24-24-GW1	3.17 – 6.22 m
Chrysene	0.06	BH24-24-GW1	3.17 – 6.22 m
Fluoranthene	0.11	BH24-24-GW1	3.17 – 6.22 m
Phenanthrene	0.07	BH22-23-GW1	3.15 – 6.20 m
Pyrene	0.09	BH24-24-GW1	3.17 – 6.22 m

Notes:
- Underlined – value exceeds selected CCME standards
- **Bold and Underlined** – value exceeds selected MECP standards

All other parameter concentrations analyzed were below the laboratory detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of this Phase II ESA were handled in accordance with the analytical protocols 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 the Environmental Protection Act, the certificates of analysis have been received for each sample submitted for laboratory analysis and have been appended to this report.

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from sample BH21-23-AU1 and submitted for laboratory analysis of metal parameters. The relative percent difference (RPD) calculations for the original and duplicate samples are provided below in Table 17.

Table 17
QA/QC Calculations – Soil

Parameter	MDL (µg/g)	BH21-23-AU1	DUP	RPD (%)	QA/QC Result (Target: <20% RPD)
Arsenic	1.0	2.2	1.9	14.6	Meets Target
Barium	1.0	120	110	8.7	Meets Target
Boron	5.0	7.9	6.9	13.5	Meets Target
Chromium	5.0	12.1	11.4	6.0	Meets Target
Copper	5.0	12.4	13.9	11.4	Meets Target
Lead	1.0	7.0	5.5	24.0	Does Not Meet Target
Nickel	5.0	10.6	9.7	8.9	Meets Target
Vanadium	10.0	22.0	21.5	2.3	Meets Target
PHCs F_3	8	341	80	123	Does Not Meet Target
PHCs F_4	6	2,190	976	76.7	Does Not Meet Target
PHCs F_4 (gravimetric)	6	2,780	3,060	9.6	Meets Target
Acenaphthene	0.02	0.06	0.13	73.7	Does Not Meet Target
Anthracene	0.02	0.18	0.38	71.4	Does Not Meet Target
Benzo[a]anthracene	0.02	0.36	0.73	67.9	Does Not Meet Target
Benzo[a]pyrene	0.02	0.24	0.47	64.8	Does Not Meet Target
Benzo[b]fluoranthene	0.02	0.25	0.52	70.1	Does Not Meet Target
Benzo[g,h,i]perylene	0.02	0.14	0.28	66.7	Does Not Meet Target
Benzo[k]fluoranthene	0.02	0.17	0.34	66.7	Does Not Meet Target
Chrysene	0.02	0.33	0.65	65.3	Does Not Meet Target
Dibenzo[a,h]anthracene	0.02	0.04	0.04	0	Meets Target
Fluoranthene	0.02	0.82	1.78	73.8	Does Not Meet Target
Fluorene	0.02	0.06	0.12	66.7	Does Not Meet Target
Indeno [1,2,3-cd] pyrene	0.02	0.12	0.25	70.3	Does Not Meet Target
Naphthalene	0.01	0.01	0.02	66.7	Does Not Meet Target
Phenanthrene	0.02	0.57	1.21	71.9	Does Not Meet Target
Pyrene	0.02	0.66	1.47	76.1	Does Not Meet Target

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

Typically, RPD values below 20% are considered to be of satisfactory quality. The relative percent difference (RPD) results calculated for several soil parameters fell outside of the acceptable range of 20%, and thus do not meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

It should be noted that sample BH21-23-AU1 was collected immediately beneath the asphaltic concrete layer. Given the parameters detected, it is highly likely that the sample contained inclusions of asphaltic fragments. Given the variability of the fill material, the RPD values are not considered to represent erroneous data.

Similarly, a duplicate groundwater sample was obtained from sample BH22-23-GW1 and submitted for laboratory analysis of VOC and PHC parameters. No parameter concentrations were detected in either the original or the duplicate samples above the laboratory method detection limits, and as such, they are considered to meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

Based on the results of the QA/QC analysis, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O. Reg. 153/04 amended by the Environmental Protection Act. For the purposes of the proposed uses of this Phase II Property, the Phase II Conceptual Site Model was prepared with consideration for O.Reg. 153/04 only. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As described in Section 7.1 of the Phase I ESA report, the following PCAs, as defined by Table 2 of O. Reg. 153/04, are considered to result in APECs on the Phase II Property:

Table 17
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of APEC on Phase I Property	Potentially Contaminating Activity (Table 2 – O. Reg. 153/04)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 Former On-Site Bunker Oil Underground Storage Tanks	East-central portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	On-Site	PHCs (F_1-F_4) BTEX PAHs	Soil and Groundwater
APEC 2 Existing On-Site Underground Line from Fuel Storage Facility to Central Heating and Cooling Plant	East-central portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	On-Site	PHCs (F_1-F_4) BTEX PAHs	Soil and Groundwater
APEC 3 Existing On-Site Fuel Storage Facility (and associated vent and fill pipes)	Northeast portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	On-Site	PHCs (F_1-F_4) BTEX PAHs	Soil and Groundwater

Table 17
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of APEC on Phase I Property	Potentially Contaminating Activity (Table 2 – O. Reg. 153/04)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 4 Existing On-Site Diesel Aboveground Storage Tank	Southeast portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	On-Site	PHCs (F_1-F_4) BTEX PAHs	Soil and Groundwater
APEC 5 Former On-Site Fuel Oil Aboveground Storage Tank	West-central portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	On-Site	PHCs (F_1-F_4) BTEX PAHs	Soil and Groundwater
APEC 6 Former On-Site Fuel Oil Aboveground Storage Tanks (and associated vent and fill pipes)	South portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	On-Site	PHCs (F_1-F_4) BTEX PAHs	Soil and Groundwater
APEC 7 Fill Material of Unknown Quality	Entirety of Phase II Property	*"Item 30: Importation of Fill Material of Unknown Quality"*	On-Site	PHCs (F_1-F_4) BTEX Metals PAH	Soil
APEC 8 Application of Road Salt	Within parking areas of Phase II Property	*"Item N/A: Application of Road Salt for De-Icing Purposes During Snow and Ice Conditions"*	On-Site	EC SAR	Soil
APEC 9 Former Off-Site Varsol Underground Storage Tank	East-central portion of Phase II Property	*"Item 8: Chemical Manufacturing, Processing and Bulk Storage Tanks"*	Off-Site	PHCs (F_1-F_4) VOCs	Groundwater
APEC 10 Former Off-Site Diesel Aboveground Storage Tanks	East-central portion of Phase II Property	*"Item 28: Gasoline and Associated products Storage in Fixed Tanks"*	Off-Site	PHCs (F_1-F_4) BTEX PAHs	Groundwater

Contaminants of Potential Concern (CPCs)

The contaminants of potential concern (CPCs) associated with the aforementioned APECs are considered to be:

- ❒ Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- ❒ Volatile Organic Compounds (VOCs);
- ❒ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including Arsenic, Antimony, and Selenium);
- ❒ Mercury (Hg^+);
- ❒ Hexavalent Chromium (CrVI);
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase II Property.

Subsurface Structures and Utilities

Underground service locates were completed prior to the subsurface investigation. Underground utilities identified beneath the Phase II Property include sewer and water lines, buried electrical conduits as well as a buried fuel line between the fuel storage facility and the central heating and cooling plant.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ❒ Pavement Structure (asphaltic concrete underlain by engineered fill); extending to a maximum depth of approximately 0.43 m below ground surface. A subsurface layer of asphaltic concrete underlain by engineered fill was encountered at a depth of approximately 0.23 m below ground surface and extending to 0.74 m below ground surface (BH23-23 only);

- ❒ Topsoil; extending to a maximum depth of approximately 0.36 m below ground surface (BH25-23 and BH26-23 only);

- ❒ Fill Material (brown silty sand with varying amounts of gravel, cobbles, boulders and crushed stone); extending to a maximum depth of approximately 1.58 m below ground surface;

- ❒ Fill Material (brown silty clay, trace sand, gravel, organics, occasional cobbles and boulders); encountered at a depth of approximately 0.91 m below ground surface and extending to a depth of approximately 1.58 m below ground surface (BH26-23 only);
- ❒ Glacial Till; encountered at a depth of approximately 0.69 m below ground surface and extending to a depth of approximately 1.27 m below ground surface (BH25-23 only);
- ❒ Limestone Bedrock; encountered at depths ranging from approximately 0.74 m to 1.58 m below ground surface.

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

Hydrogeological Characteristics

The groundwater at the Phase II Property was encountered within the bedrock at depths ranging from approximately 3.12 m to 4.17 m below the existing ground surface.

Based on the measured groundwater levels, the groundwater was calculated to flow in a northerly direction.

Approximate Depth to Bedrock

Bedrock was encountered in all six boreholes during the field drilling program at depths ranging from approximately 0.74 m to 1.58 m below ground surface.

Approximate Depth to Water Table

The depth to the water table is approximately 3.12 m to 4.17 m below the existing ground surface.

Sections 41 and 43.1 of Ontario Regulation 153/04

Section 41 of the Regulation does not apply to the Phase II Property, as the Phase II Property is not within 30 m of an environmentally sensitive area.

Section 43.1 of the Regulation does apply to the Phase II Property in that the Phase II Property is considered a Shallow Soil Property.

Existing Buildings and Structures

The central heating and cooling plant is a two-storey building with a half basement level below the east half of the building. Built in the 1950's, the central heating and cool plant building is constructed with a concrete foundation and is finished on the exterior with brick and concrete, in addition to a flat tar-and-gravel style roof. The building currently heats itself from its natural gas-fired boiler system.

Built in the 1994, the central heating and cooling plant building is constructed with a concrete foundation and is finished on the exterior with brick and concrete, in addition to a flat tar-and-gravel style roof. The building currently heats itself from its natural gas-fired boiler system.

Environmental Condition

Areas Where Contaminants are Present

A Total Petroleum Hydrocarbon (TPH) exceedance of the Ontario Ministry of Environment and Energy (now MECP) standards was identified in the west face of the 1995 remediation beneath the existing underground pipe tunnel connection between the two on-site buildings. This soil was unable to be removed as it was deemed to have a potential affect on the structural integrity of the tunnel. Additionally, the potential of this residual zone of soil contamination causing an environmental risk was considered to be minimal.

Based on the findings of this assessment, the fill material encountered beneath the surficial layer of asphalt at BH21-23, located within the vehicle parking lot/access road in the eastern portion of the Phase II Property, is contaminated with PHCs and PAHs. Given that the sample was collected immediately below the asphaltic paving structure, it is likely that these exceedances are a result of asphalt inclusions in the sample.

It should be noted that the electrical conductivity and sodium adsorption ratio detected in the fill material at BH23-23 and BH24-23 are also in excess of the MECP Table 7 Coarse-Grained Residential Soil Standards. These exceedances are suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, do not represent a contaminant issue.

All groundwater samples were found to comply with the MECP Table 7 Coarse-Grained Residential Standards, with the exception of selenium identified in BH23-23.

Types of Contaminants

Based on the analytical test results, the concentration of heavier fractions of petroleum hydrocarbons (PHC F_3 and PHC $F_{4\ gravimetric}$) and various PAH parameters detected in the fill material in BH21-23 exceed the selected MECP Table 7 Coarse-Grained Residential Soil Standards. Based on the very shallow sample depth, it is suspected that these exceedances may be a result of asphalt inclusions in the sample, from the paving structure. TPH contaminants are considered to be covered by PHC parameters for the purposes of O.Reg. 153/04.

Contaminated Media

Based on the findings of the 1995 remediation report for the Phase II Property, soil impacted with TPH is present beneath the existing underground pipe tunnel connection between the two on-site buildings. The potential of this residual zone of soil contamination causing an environmental risk was considered to be minimal.

Based on the findings of this assessment, the fill material present in the vicinity of BH21-23 is considered to be contaminated above MECP Table 7 Coarse-Grained Residential Soil Standards with PHC F_3 and PHC F_{4G} and three PAH parameters.

Elevated naphthalene and/or phenanthrene parameters were identified above the CCME standards in the fill material at boreholes BH21-23, BH22-23, BH23-23 and BH24-23.

Groundwater impacted with selenium was identified in BH23-23 above MECP Table 7 Coarse-Grained Residential Standards. No concentrations of selenium were identified in the soil samples across the Phase II Property and therefore it is considered possible that these parameters are naturally elevated, or they are elevated due to the presence of sediment.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the 1995 remediation report for the Phase II Property, soil impacted with TPH is present beneath the existing underground pipe tunnel connection between the two on-site buildings. The potential of this residual zone of soil contamination causing an environmental risk was considered to be minimal.

The fill material present beneath the surficial asphalt at BH21-23 is impacted above provincial MECP standards with heavier fractions of petroleum hydrocarbons (PHC F_3 and PHC $F_{4\ gravimetric}$) and polycyclic aromatic hydrocarbons. Given the shallow soil conditions, this sample may have been influenced by the presence of asphalt inclusions in the sample.

Distribution and Migration of Contaminants

Based on the findings of the 1995 remediation report for the Phase II Property, soil impacted with TPH is present beneath the existing underground pipe tunnel connection between the two on-site buildings. All other samples submitted for analysis were in compliance with the Ontario Ministry of Environment and Energy standards. Soil with elevated TPH concentrations is considered to be localized to the area beneath the existing underground pipe tunnel connection and the potential of this residual zone of soil contamination causing an environmental risk was considered to be minimal.

Distribution of PHC impacts above MECP Table 7 Coarse-Grained Residential Soil Standards is considered to be limited to BH21-23. Based on the low mobility of heavy petroleum hydrocarbons, as well as the clean groundwater results obtained from this borehole, these contaminants are not suspected to have migrated into the water table.

Discharge of Contaminants

The previously identified TPH impact is considered to resultant of the former on-site USTs. Given the USTs have since been removed from this area of the Phase II Property, there is no concern for the discharge of contaminants to reoccur in this area.

PHC F4 gravimetric concentration in soil at BH21-23 is suspected to be present due to sample collection directly under the asphalt paving structure, and asphalt inclusions, since the standard PHC F4 concentration was found to comply with both selected project standards.

Climatic and Meteorological Conditions

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

Based on the groundwater results obtained during this investigation, no downward migration of contaminants is suspected to have occurred.

Potential for Vapour Intrusion

Given that the Phase II Property will be redeveloped in the near future, all contaminated soil will be removed from the site. As a result, there is no potential for any current or future vapour intrusion on the Phase II Property.

6.0 CONCLUSIONS

Assessment

Paterson Group was retained by Arcadis IBI Group to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for Block 8 of the Tunney's Pasture government office complex, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site (Phase II Property).

The subsurface investigation for this assessment was conducted on November 23, 2023 and consisted of drilling six (6) boreholes (BH21-23 to BH26-23) across the Phase II Property. It should be noted that this field investigation was carried out as part of a larger investigation conducted for multiple sites at the Tunney's Pasture complex. The boreholes were advanced to depths ranging from approximately 6.04 m to 6.22 m below the existing ground surface and terminated within the bedrock unit. Upon completion, all six boreholes were instrumented with groundwater monitoring wells in order to access the groundwater table.

In general, the subsurface soil profile encountered at the borehole locations consists of either a thin pavement structure (asphaltic concrete over granular fill) or topsoil, underlain by fill material (gravel with crushed stone and some silty sand), followed by a second layer of fill material (silty sand with varying amounts of gravel, clay cobbles, boulders and crushed stone). A subsurface layer of asphaltic concrete was encountered in BH23-23 beneath the first layer of fill material. A layer of glacial till (silty sand to sandy silt with gravel, cobbles and boulders) was encountered in BH25-23 beneath the fill material. Bedrock was encountered in all six boreholes during the field drilling program at depths ranging from approximately 0.74 m to 1.58 m below ground surface. During the field sampling program, the groundwater was measured at depths ranging from approximately 3.12 m to 4.17 m below the existing ground surface.

A total of seven soil samples (including one duplicate) were submitted for laboratory analysis of BTEX, VOCs, PHCs (F_1-F_4), metals, Hg^+, CrVI, PAHs, EC and/or SAR parameters. Based on the analytical test results, the concentration of heavier fractions of petroleum hydrocarbons (PHC F_3 and PHCs $F_{4\ gravimetric}$) and polycyclic aromatic hydrocarbons detected in Sample BH21-23-AU1 exceed the selected MECP Table 7 Coarse-Grained Residential Soil Standards. Elevated naphthalene and/or phenanthrene parameters were identified above the CCME Coarse-Grained Commercial Soil Standards in the fill material at boreholes BH21-23, BH22-23, BH23-23 and BH24-23. All remaining parameter concentrations detected in the soil samples analyzed are in compliance with the selected standards.

Exceedances of MECP Table 7 Coarse-Grained Residential Soil Standards are likely a result of asphalt inclusions in the sample. However, for excess soil management purposes, further assessment of this strata should be completed.

It should be noted that the electrical conductivity and sodium adsorption ratio detected in the fill material at BH23-23 and BH24-23 are also in excess of the MECP Table 7 Coarse-Grained Residential Soil Standards. These exceedances are suspected to be the result of the use of road salt on the Phase II Property during snow and ice conditions and thus, as per Section 49.1 of O. Reg 153/04, do not represent a contaminant issue. However, for off-site management of excess soil, any proposed reuse site must be notified of these exceedances.

A total of seven groundwater samples (including one duplicate) were submitted for laboratory analysis of BTEX, VOCs, PHC, Metals, and/or PAH parameters. All groundwater samples were found to comply with the MECP Table 7 Coarse-Grained Residential Soil Standards, with the exception of selenium identified in BH23-23. No concentrations of selenium were identified in the soil samples across the Phase II Property and therefore it is considered possible that these parameters are naturally elevated, or they are elevated due to the presence of sediment noted in the groundwater at the time of sampling.

All groundwater samples were found to exceed the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites, for aluminum, cadmium, selenium, zinc and/or various PAH parameters, with the exception of BH21-23 which complied with the CCME Tier 1 Federal Interim Groundwater Water Quality Guidelines for Commercial Sites.

Recommendations

Soil

Further soil analysis will be required, in part for delineation purposes, but primarily for the management of excess soil, in accordance with Ontario Regulation 406/19. Potential impacts of PAHs and PHCs in the vicinity of BH21-23 and the TPH exceedance identified during the 1995 remediation beneath the existing underground connection between the two on-site buildings should be assessed at that time.

If excess soil cannot be managed on-site, or for a beneficial use at a local reuse facility, then soil may require off-site disposal at a licensed waste disposal facility.

It is our understanding that the Phase II Property may be redeveloped in the future. As such, the contaminated soil could be fully delineated and remediated in conjunction with site redevelopment. This contaminated soil will require disposal at a licensed waste disposal facility. Prior to off-site disposal of impacted soil at a licensed waste disposal facility, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

Monitoring Wells

It is recommended that re-sampling of the well at BH23-23 be completed to assess the presence of selenium above MECP standards.

It is recommended that the monitoring wells be maintained for future sampling purposes. The monitoring wells will be registered with the MECP under Ontario Regulation 903 (Ontario Water Resources Act). At such a time that the monitoring wells are no longer required, they must be decommissioned in accordance with O.Reg. 903.

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, and 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 Phase II Property 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 Arcadis IBI Group and the Government of Canada. Permission and notification from the above noted parties and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Jeremy Camposarcone, B.Eng.

Adrian Menyhart, P.Eng., QP$_{ESA}$

Report Distribution:

- Arcadis IBI Group
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE6038-1 – SITE PLAN

DRAWING PE6038-2 – SURROUNDING LAND USE PLAN

DRAWING PE6038-3 – TEST HOLE LOCATION PLAN

DRAWING PE6038-4 – ANALYTICAL TESTING PLAN – SOIL (PHCs)

DRAWING PE6038-4A – CROSS SECTION A-A' – SOIL (PHCs)

DRAWING PE6038-4B – CROSS SECTION B-B' – SOIL (PHCs)

DRAWING PE6038-5 – ANALYTICAL TESTING PLAN – SOIL (PAHs)

DRAWING PE6038-5A – CROSS SECTION A-A' – SOIL (PAHs)

DRAWING PE6038-5B – CROSS SECTION B-B' – SOIL (PAHs)

DRAWING PE6038-6 – ANALYTICAL TESTING PLAN – SOIL (Metals)

DRAWING PE6038-6A – CROSS SECTION A-A' – SOIL (Metals)

DRAWING PE6038-6B – CROSS SECTION B-B' – SOIL (Metals)

DRAWING PE6038-7 – ANALYTICAL TESTING PLAN – SOIL (EC and SAR)

DRAWING PE6038-7A – CROSS SECTION A-A' – SOIL (EC and SAR)

DRAWING PE6038-7B – CROSS SECTION B-B' – SOIL
(EC and SAR)

DRAWING PE6038-8 – ANALYTICAL TESTING PLAN – SOIL
(BTEX and VOCs)

DRAWING PE6038-8A – CROSS SECTION A-A' – SOIL
(BTEX and VOCs)

DRAWING PE6038-8B – CROSS SECTION B-B' – SOIL
(BTEX and VOCs)

DRAWING PE6038-9 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE6038-9A – CROSS SECTION A-A' – GROUNDWATER

DRAWING PE6038-9B – CROSS SECTION B-B' – GROUNDWATER

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

SOIL & GROUNDWATER MANAGEMENT PLAN

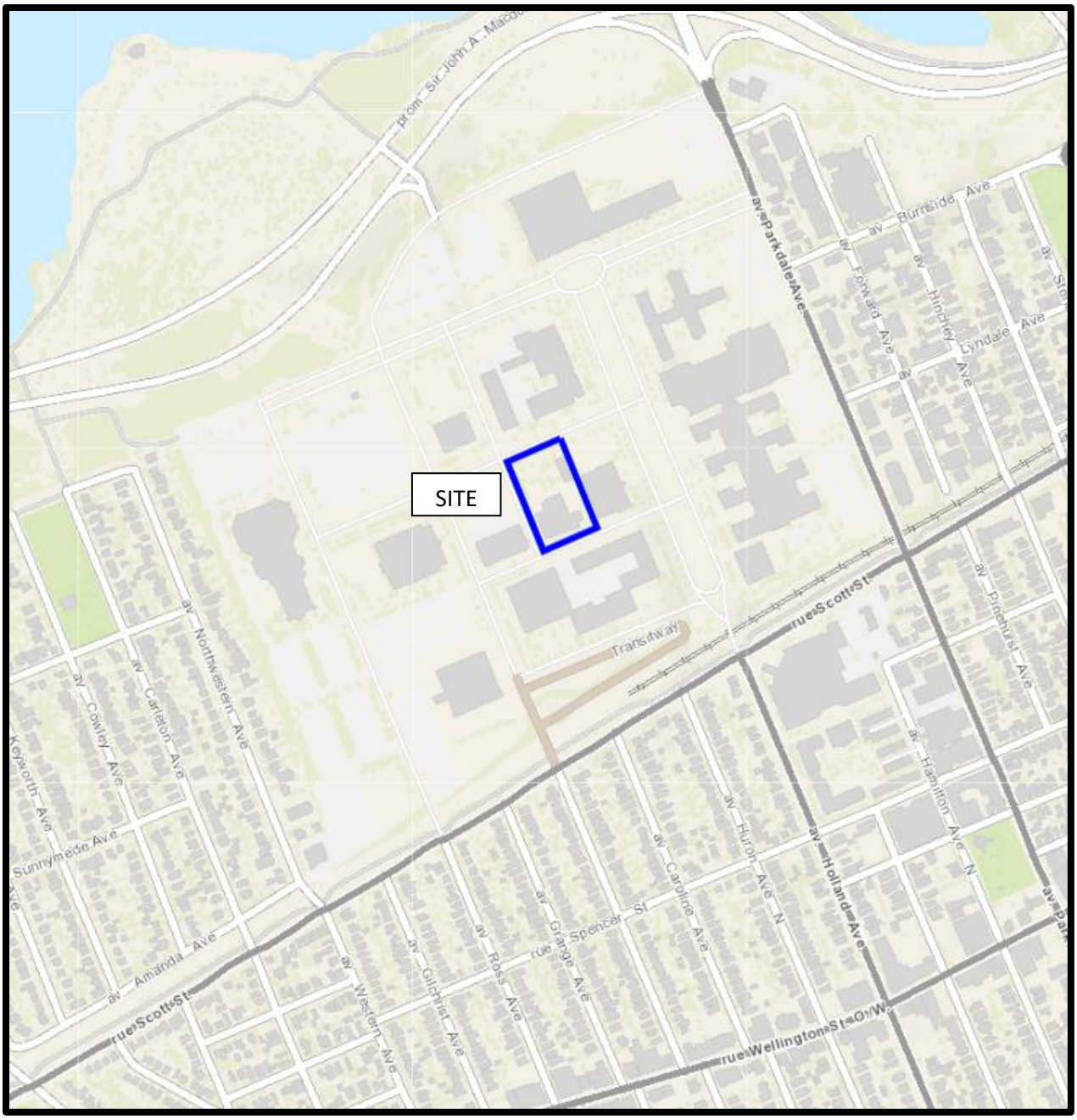
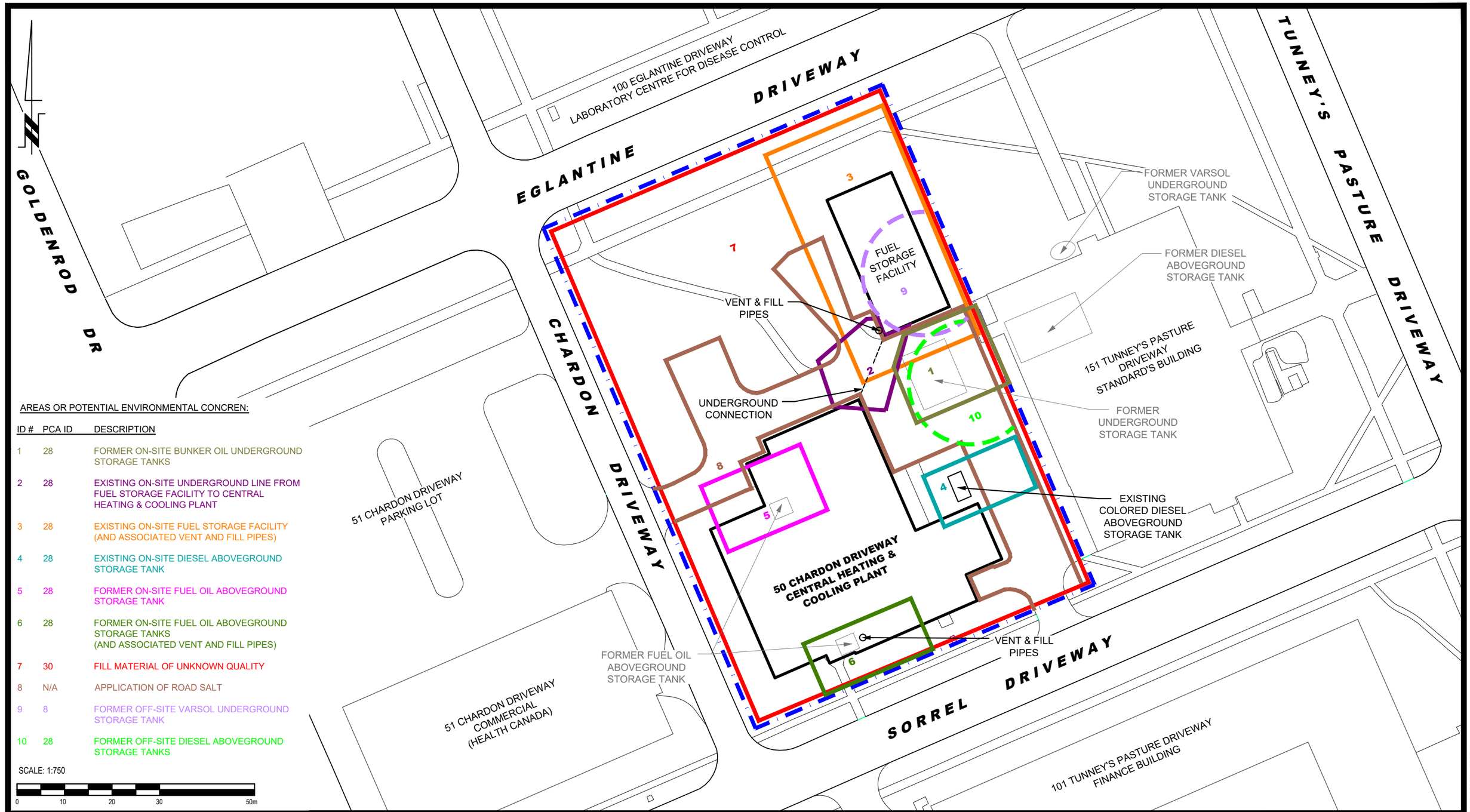


FIGURE 1

KEY PLAN



AREAS OR POTENTIAL ENVIRONMENTAL CONCREN:

ID #	PCA ID	DESCRIPTION
1	28	FORMER ON-SITE BUNKER OIL UNDERGROUND STORAGE TANKS
2	28	EXISTING ON-SITE UNDERGROUND LINE FROM FUEL STORAGE FACILITY TO CENTRAL HEATING & COOLING PLANT
3	28	EXISTING ON-SITE FUEL STORAGE FACILITY (AND ASSOCIATED VENT AND FILL PIPES)
4	28	EXISTING ON-SITE DIESEL ABOVEGROUND STORAGE TANK
5	28	FORMER ON-SITE FUEL OIL ABOVEGROUND STORAGE TANK
6	28	FORMER ON-SITE FUEL OIL ABOVEGROUND STORAGE TANKS (AND ASSOCIATED VENT AND FILL PIPES)
7	30	FILL MATERIAL OF UNKNOWN QUALITY
8	N/A	APPLICATION OF ROAD SALT
9	8	FORMER OFF-SITE VARSOL UNDERGROUND STORAGE TANK
10	28	FORMER OFF-SITE DIESEL ABOVEGROUND STORAGE TANKS

SCALE: 1:750

0 10 20 30 50m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE - BLOCK 8

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:750	Date: 06/2023
Drawn by: YA	Report No.: PE6038-1
Checked by: JC	Dwg. No.: PE6038-1
Approved by: AM	Revision No.:

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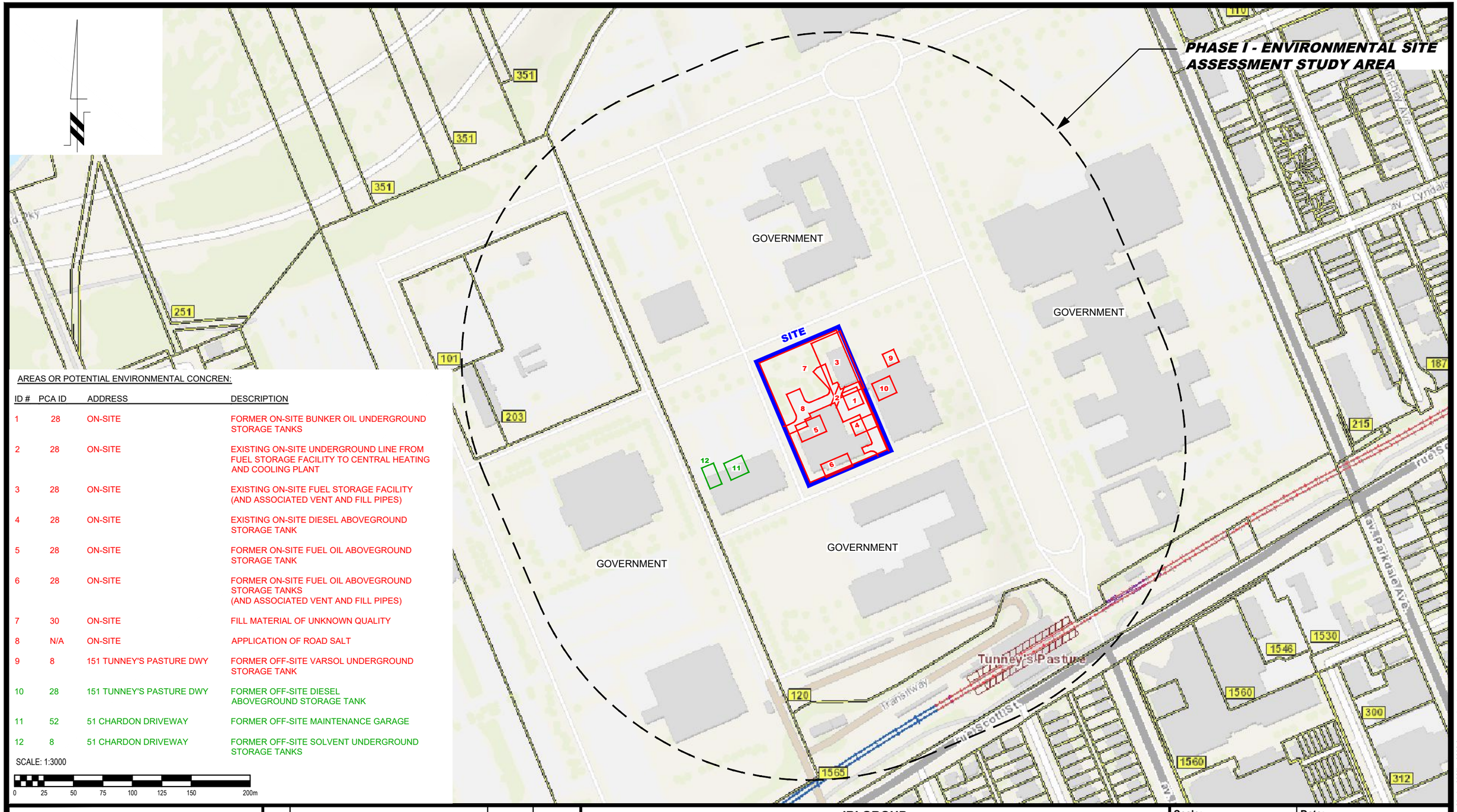

AREAS OR POTENTIAL ENVIRONMENTAL CONCREN:

ID #	PCA ID	ADDRESS	DESCRIPTION
1	28	ON-SITE	FORMER ON-SITE BUNKER OIL UNDERGROUND STORAGE TANKS
2	28	ON-SITE	EXISTING ON-SITE UNDERGROUND LINE FROM FUEL STORAGE FACILITY TO CENTRAL HEATING AND COOLING PLANT
3	28	ON-SITE	EXISTING ON-SITE FUEL STORAGE FACILITY (AND ASSOCIATED VENT AND FILL PIPES)
4	28	ON-SITE	EXISTING ON-SITE DIESEL ABOVEGROUND STORAGE TANK
5	28	ON-SITE	FORMER ON-SITE FUEL OIL ABOVEGROUND STORAGE TANK
6	28	ON-SITE	FORMER ON-SITE FUEL OIL ABOVEGROUND STORAGE TANKS (AND ASSOCIATED VENT AND FILL PIPES)
7	30	ON-SITE	FILL MATERIAL OF UNKNOWN QUALITY
8	N/A	ON-SITE	APPLICATION OF ROAD SALT
9	8	151 TUNNEY'S PASTURE DWY	FORMER OFF-SITE VARSOL UNDERGROUND STORAGE TANK
10	28	151 TUNNEY'S PASTURE DWY	FORMER OFF-SITE DIESEL ABOVEGROUND STORAGE TANK
11	52	51 CHARDON DRIVEWAY	FORMER OFF-SITE MAINTENANCE GARAGE
12	8	51 CHARDON DRIVEWAY	FORMER OFF-SITE SOLVENT UNDERGROUND STORAGE TANKS

SCALE: 1:3000

0 25 50 75 100 125 150 200m

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PHASE I - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE - BLOCK 8

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:3000	Date: 06/2023
Drawn by: YA	Report No.: PE6038-1
Checked by: JC	Dwg. No.: PE6038-2
Approved by: AM	Revision No.:

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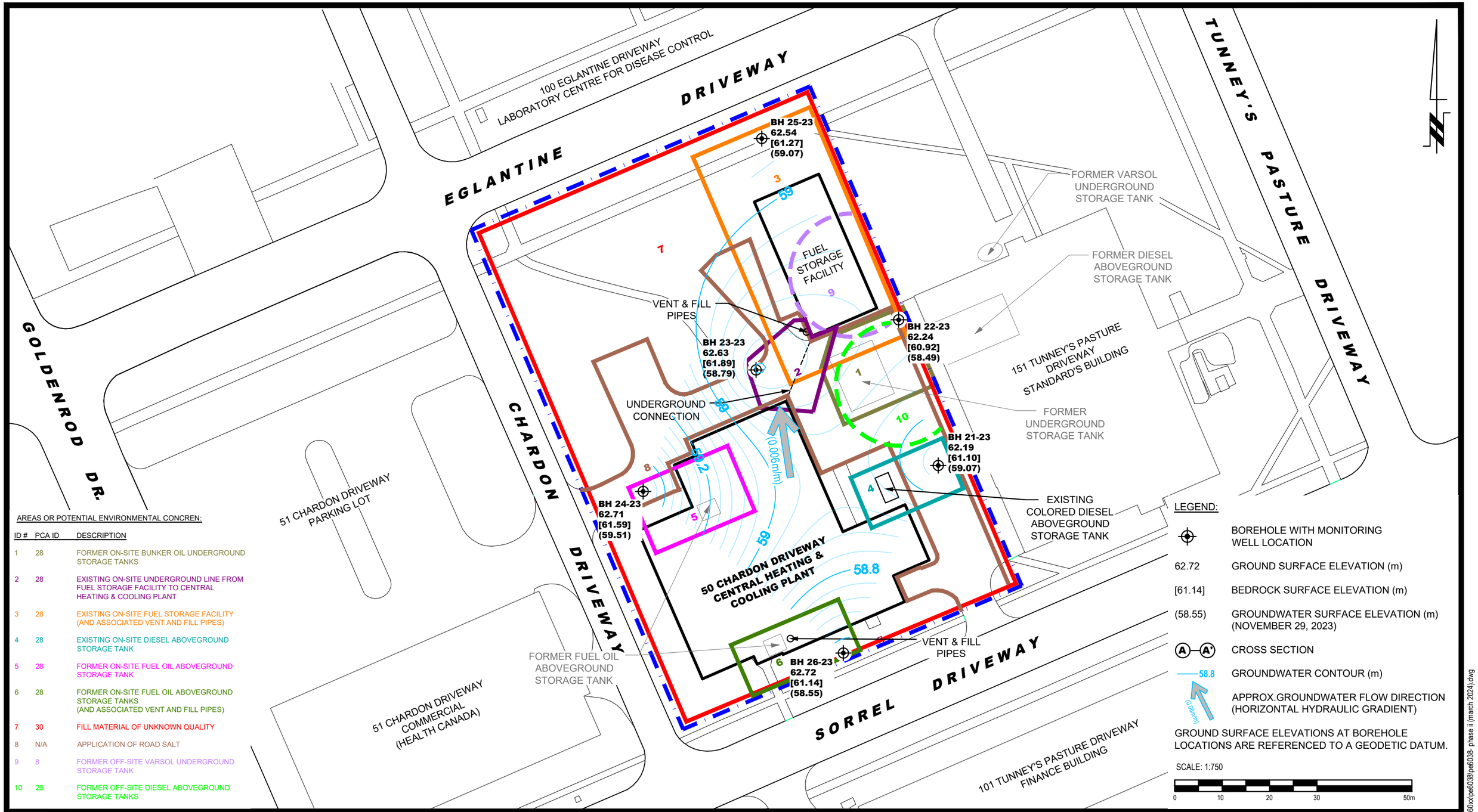

AREAS OR POTENTIAL ENVIRONMENTAL CONCREN:

ID #	PCA ID	DESCRIPTION
1	28	FORMER ON-SITE BUNKER OIL UNDERGROUND STORAGE TANKS
2	28	EXISTING ON-SITE UNDERGROUND LINE FROM FUEL STORAGE FACILITY TO CENTRAL HEATING & COOLING PLANT
3	28	EXISTING ON-SITE FUEL STORAGE FACILITY (AND ASSOCIATED VENT AND FILL PIPES)
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5	28	FORMER ON-SITE FUEL OIL ABOVEGROUND STORAGE TANK
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7	30	FILL MATERIAL OF UNKNOWN QUALITY
8	N/A	APPLICATION OF ROAD SALT
9	8	FORMER OFF-SITE VARSOL UNDERGROUND STORAGE TANK
10	28	FORMER OFF-SITE DIESEL ABOVEGROUND STORAGE TANKS

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- 62.72 — GROUND SURFACE ELEVATION (m)
- [61.14] — BEDROCK SURFACE ELEVATION (m)
- (58.55) — GROUNDWATER SURFACE ELEVATION (m) (NOVEMBER 29, 2023)
- A—A' — CROSS SECTION
- 58.8 — GROUNDWATER CONTOUR (m)
- (0.006m/m) — APPROX.GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

SCALE: 1:750

0 10 20 30 50m

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IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-3
Approved by: AM	Revision No.:

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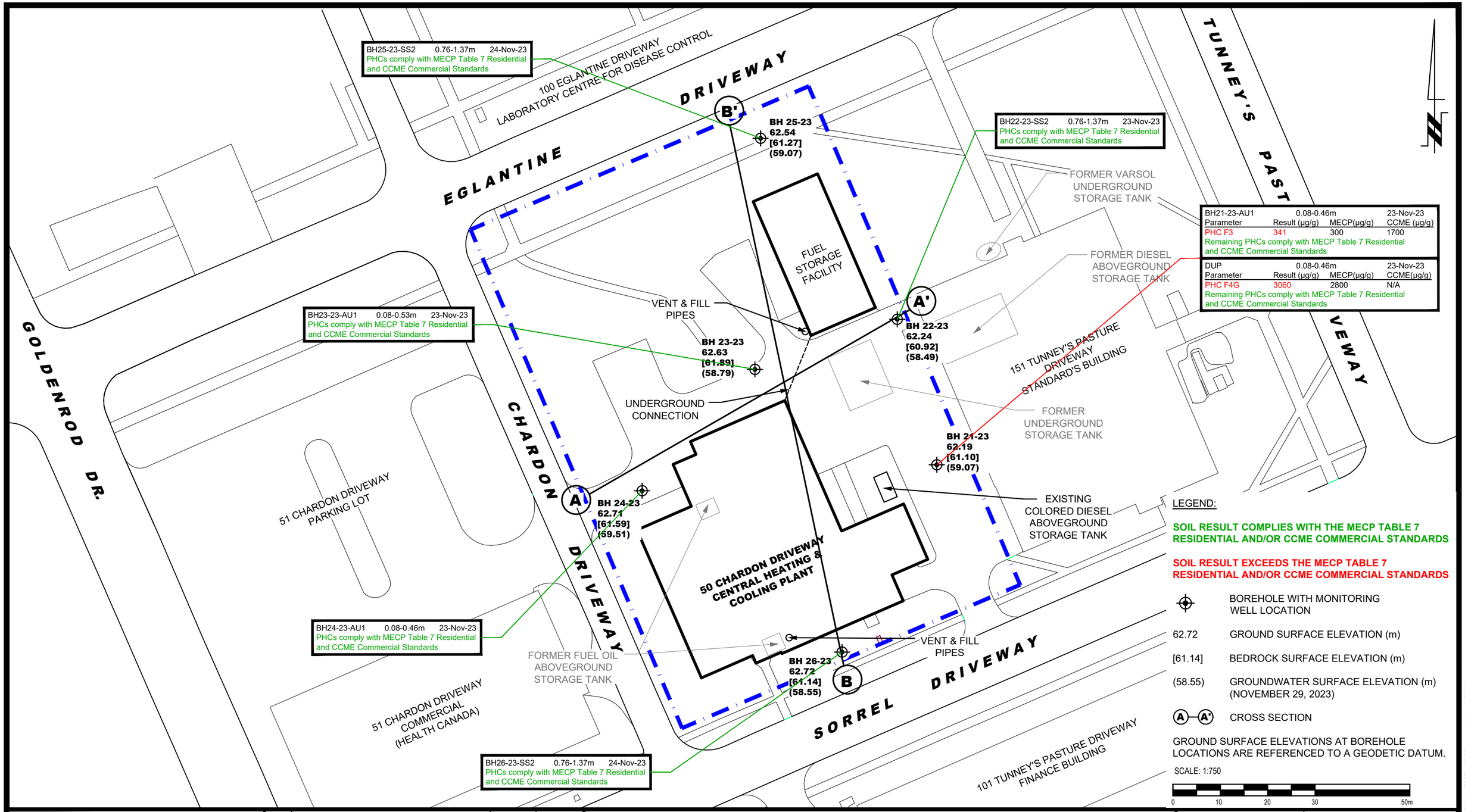

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - SOIL (PHCs)

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-4
Approved by: AM	Revision No.:

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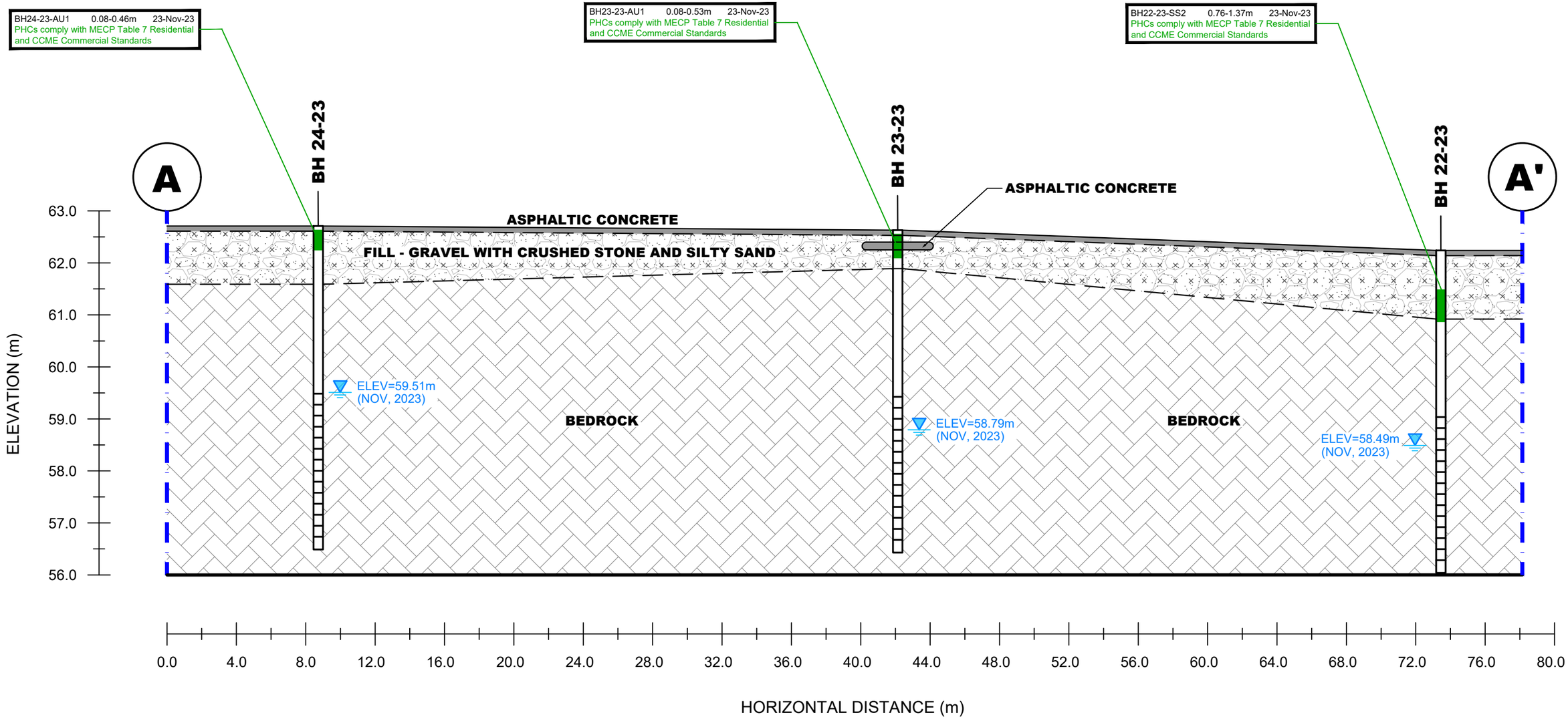
BH24-23-AU1 0.08-0.46m 23-Nov-23
PHCs comply with MECP Table 7 Residential and CCME Commercial Standards

BH23-23-AU1 0.08-0.53m 23-Nov-23
PHCs comply with MECP Table 7 Residential and CCME Commercial Standards

BH22-23-SS2 0.76-1.37m 23-Nov-23
PHCs comply with MECP Table 7 Residential and CCME Commercial Standards



SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL & CCME COMMERCIAL STANDARDS

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NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION A-A' - SOIL (PHCs)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-4A
Approved by: AM	Revision No.:

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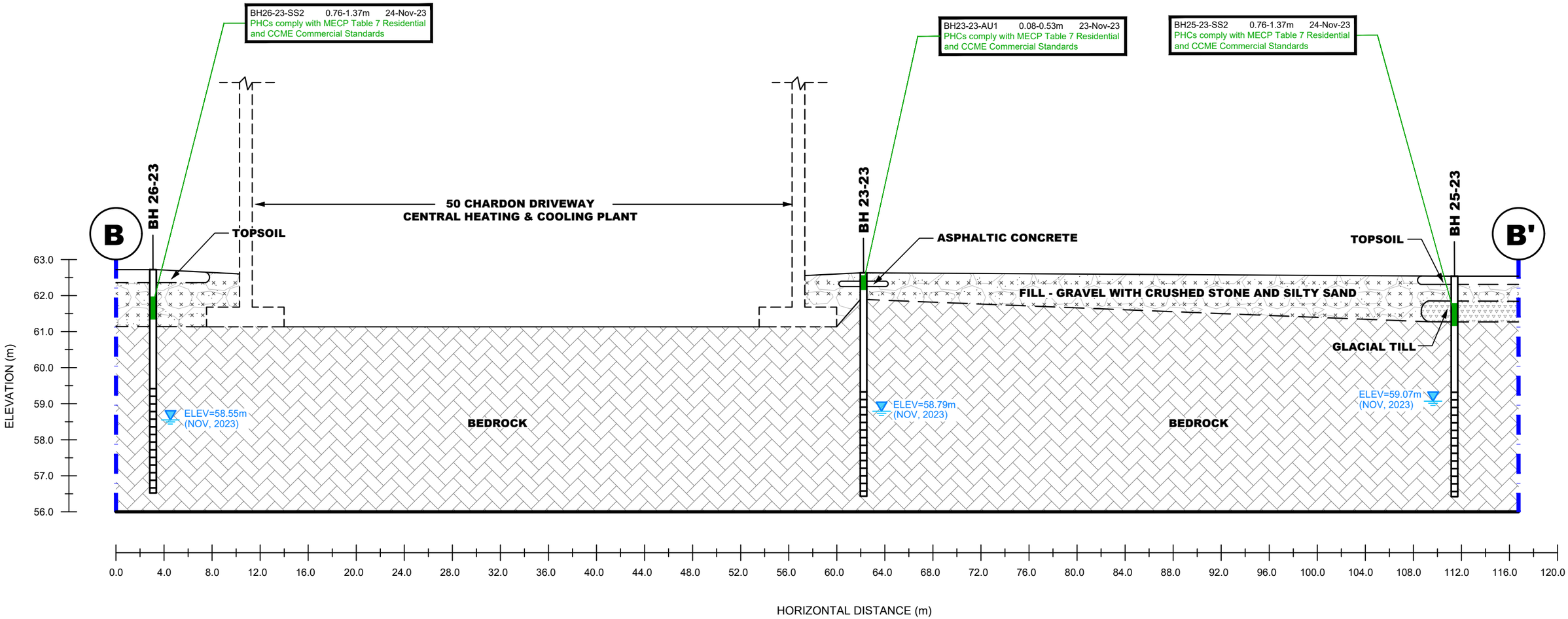

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-4B
Approved by: AM	Revision No.:

11x17

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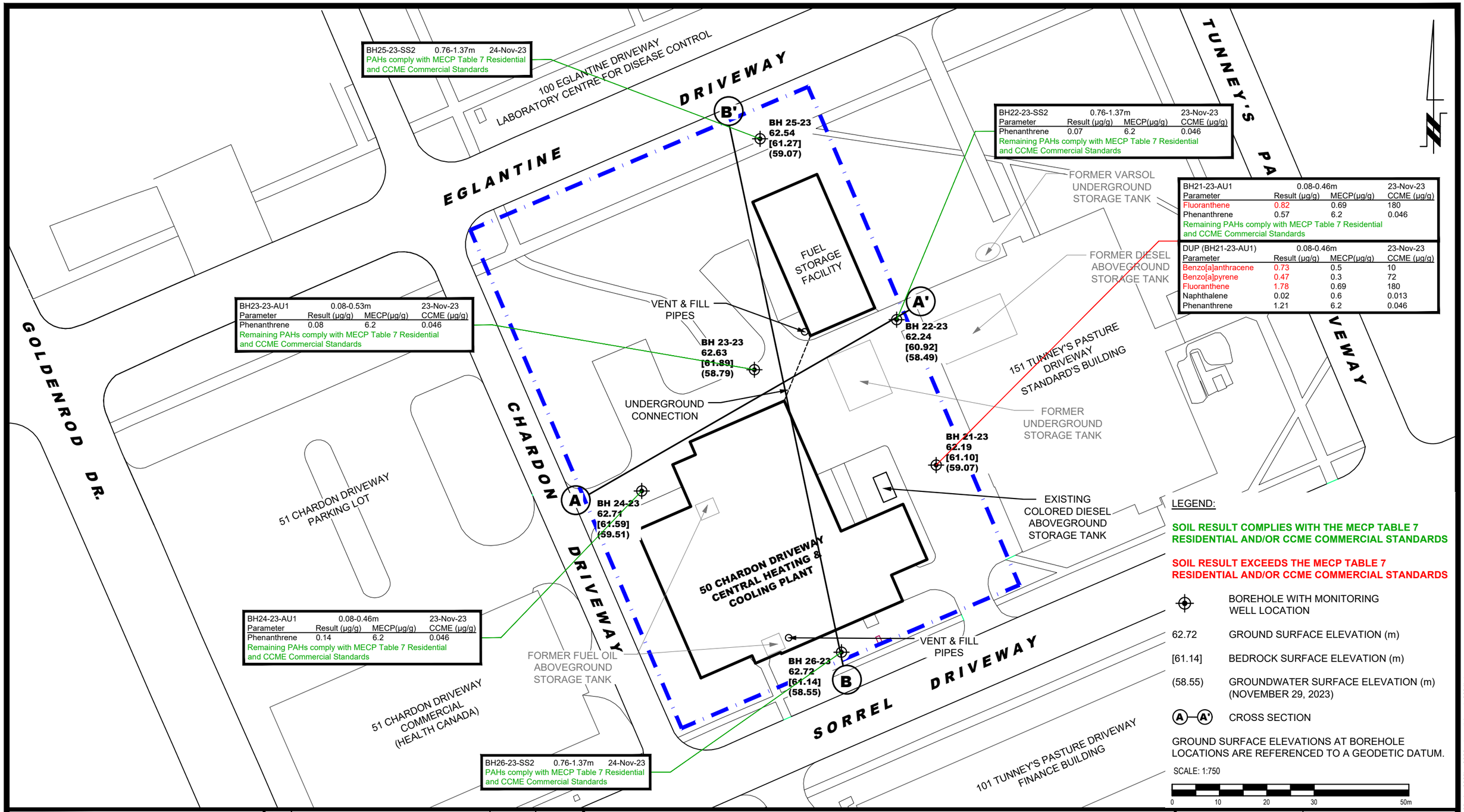

PATERSON GROUP
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NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - SOIL (PAHs)**

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-5
Approved by: AM	Revision No.:

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BH24-23-AU1	0.08-0.46m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
Phenanthrene	0.14	6.2	0.046

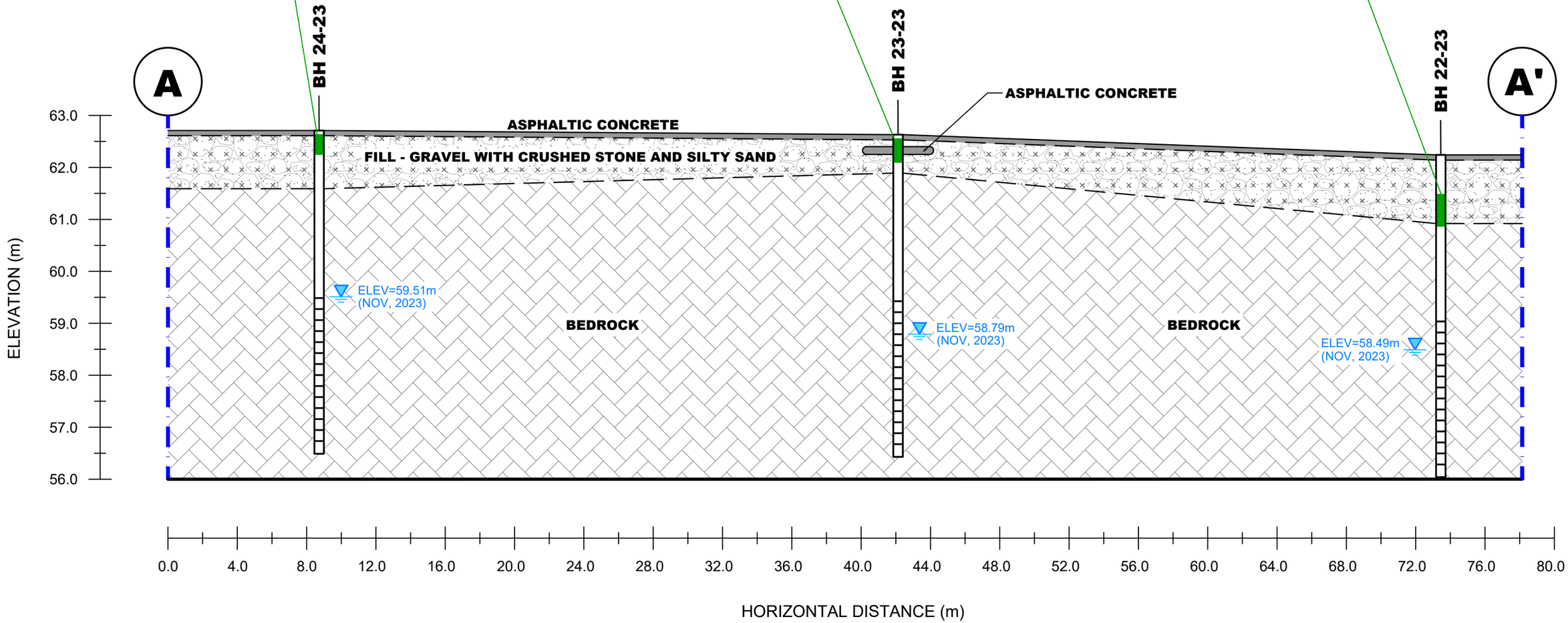
Remaining PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH23-23-AU1	0.08-0.53m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
Phenanthrene	0.08	6.2	0.046

Remaining PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH22-23-SS2	0.76-1.37m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
Phenanthrene	0.07	6.2	0.046

Remaining PAHs comply with MECP Table 7 Residential and CCME Commercial Standards



SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION A-A' - SOIL (PAHs)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-5A
Approved by: AM	Revision No.:

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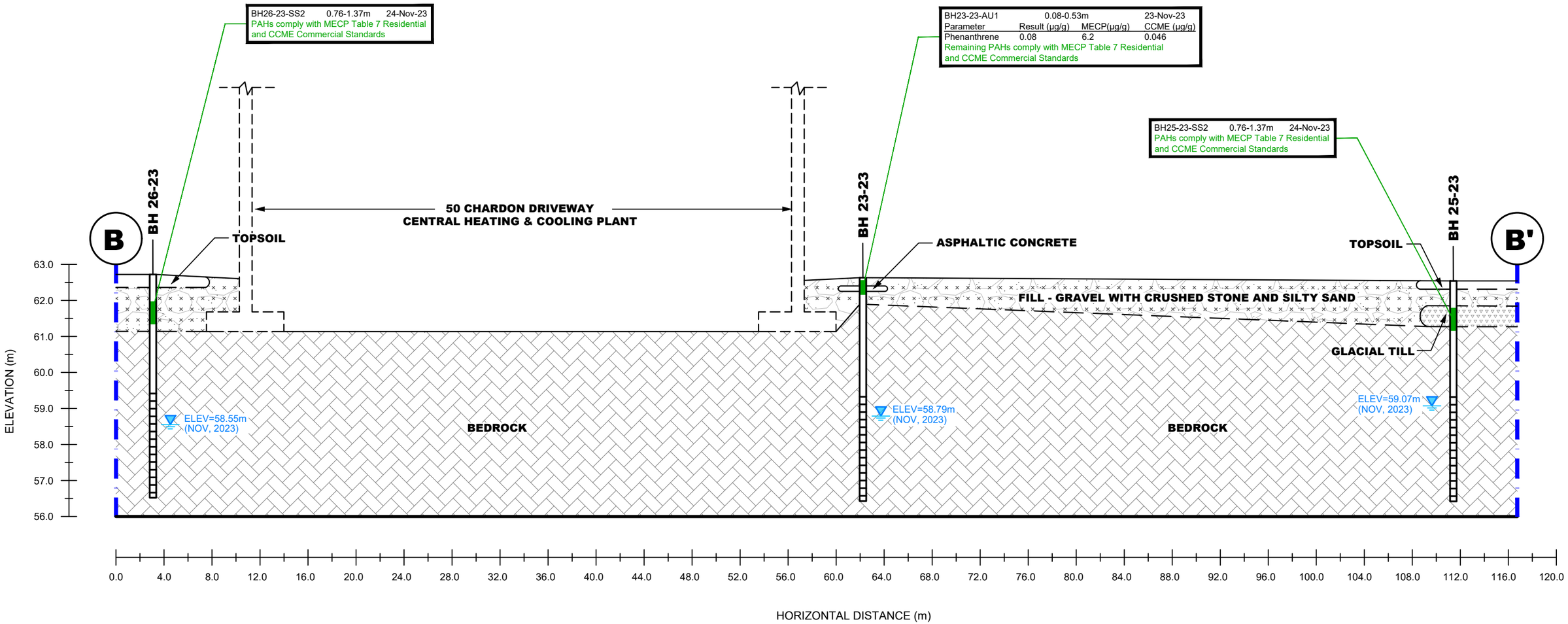

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-5B
Approved by: AM	Revision No.:

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BH25-23-SS2 0.76-1.37m 24-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH22-23-SS2 0.76-1.37m 23-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH21-23-AU1 0.08-0.46m 23-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

DUP (BH21-23-AU1) 0.08-0.46m 23-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH23-23-AU1 0.08-0.53m 23-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH24-23-AU1 0.08-0.46m 23-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH26-23-SS2 0.76-1.37m 24-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

100 EGLANTINE DRIVEWAY
LABORATORY CENTRE FOR DISEASE CONTROL
EGLANTINE DRIVEWAY
GOLDENROD DR.
CHARDON DRIVEWAY
TUNNEY'S PASTURE DRIVEWAY
SORREL DRIVEWAY
B'
A'
A
B
BH 25-23
62.54
[61.27]
(59.07)
BH 22-23
62.24
[60.92]
(58.49)
BH 21-23
62.19
[61.10]
(59.07)
BH 23-23
62.63
[61.89]
(58.79)
BH 24-23
62.71
[61.59]
(59.51)
BH 26-23
62.72
[61.14]
(58.55)
FUEL STORAGE FACILITY
VENT & FILL PIPES
UNDERGROUND CONNECTION
FORMER VARSOL UNDERGROUND STORAGE TANK
FORMER DIESEL ABOVEGROUND STORAGE TANK
FORMER UNDERGROUND STORAGE TANK
151 TUNNEY'S PASTURE DRIVEWAY
STANDARD'S BUILDING
EXISTING COLORED DIESEL ABOVEGROUND STORAGE TANK
50 CHARDON DRIVEWAY
CENTRAL HEATING & COOLING PLANT
51 CHARDON DRIVEWAY
PARKING LOT
FORMER FUEL OIL ABOVEGROUND STORAGE TANK
51 CHARDON DRIVEWAY
COMMERCIAL
(HEALTH CANADA)
101 TUNNEY'S PASTURE DRIVEWAY
FINANCE BUILDING

LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION
- 62.72 GROUND SURFACE ELEVATION (m)
- [61.14] BEDROCK SURFACE ELEVATION (m)
- (58.55) GROUNDWATER SURFACE ELEVATION (m) (NOVEMBER 29, 2023)
- A—A' CROSS SECTION

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

SCALE: 1:750

0 10 20 30 50m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - SOIL (METALS)**

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-6
Approved by: AM	Revision No.:

11x17

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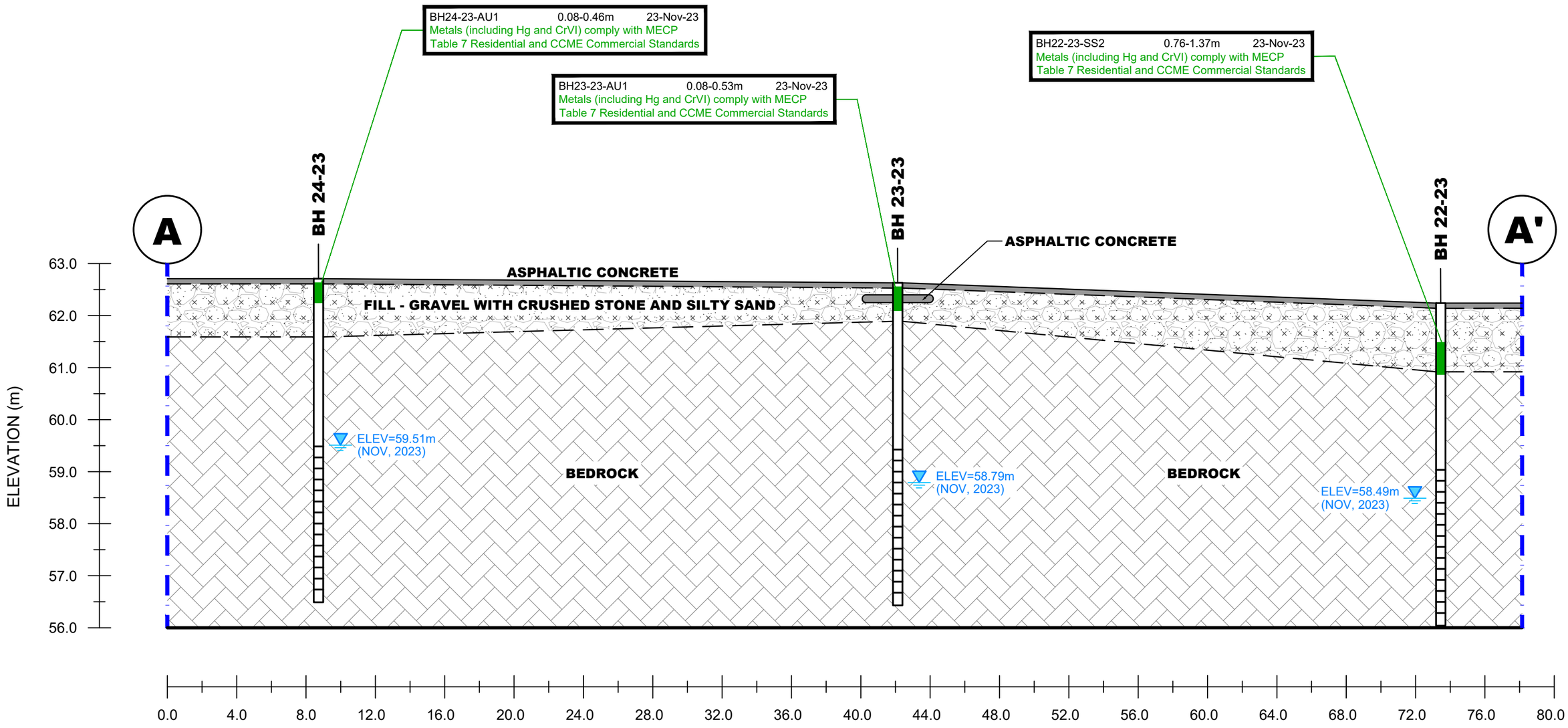

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION A-A' - SOIL (METALS)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-6A
Approved by: AM	Revision No.:

11x17

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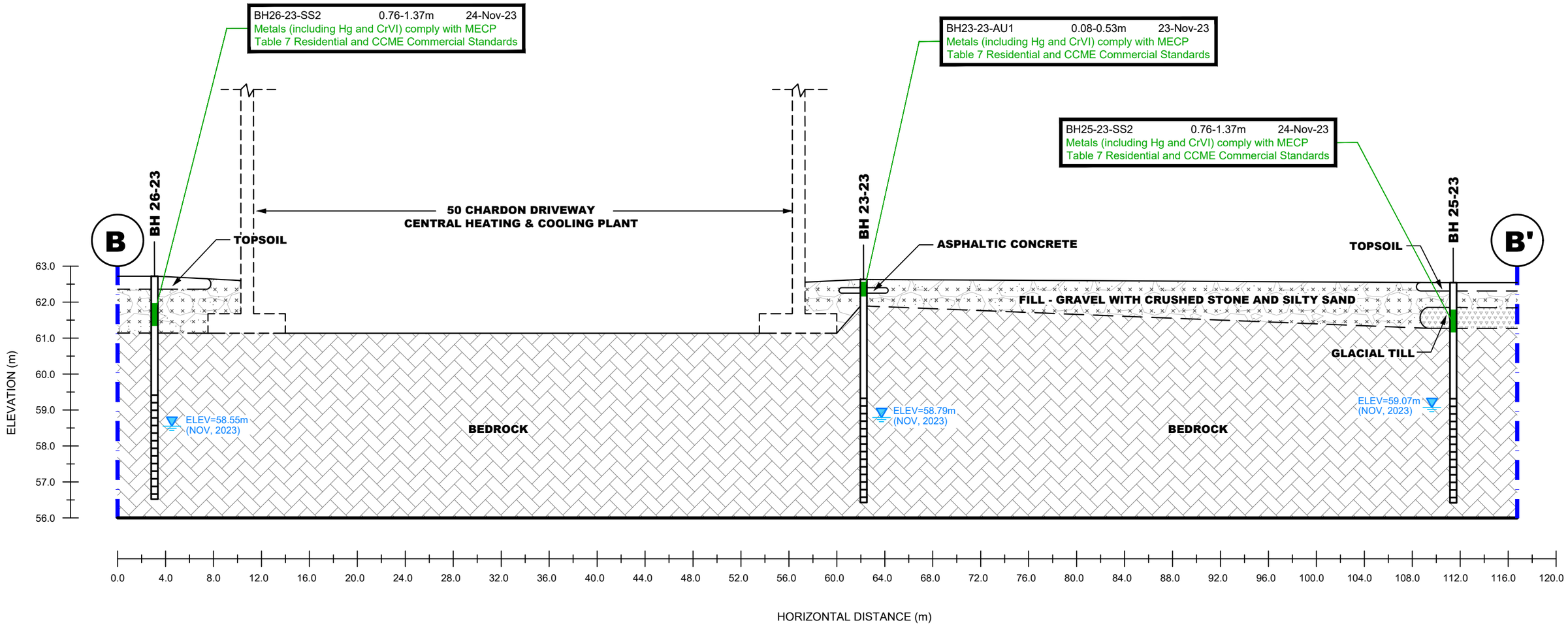
BH26-23-SS2 0.76-1.37m 24-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH23-23-AU1 0.08-0.53m 23-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards

BH25-23-SS2 0.76-1.37m 24-Nov-23
Metals (including Hg and CrVI) comply with MECP
Table 7 Residential and CCME Commercial Standards



SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
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NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-6B
Approved by: AM	Revision No.:

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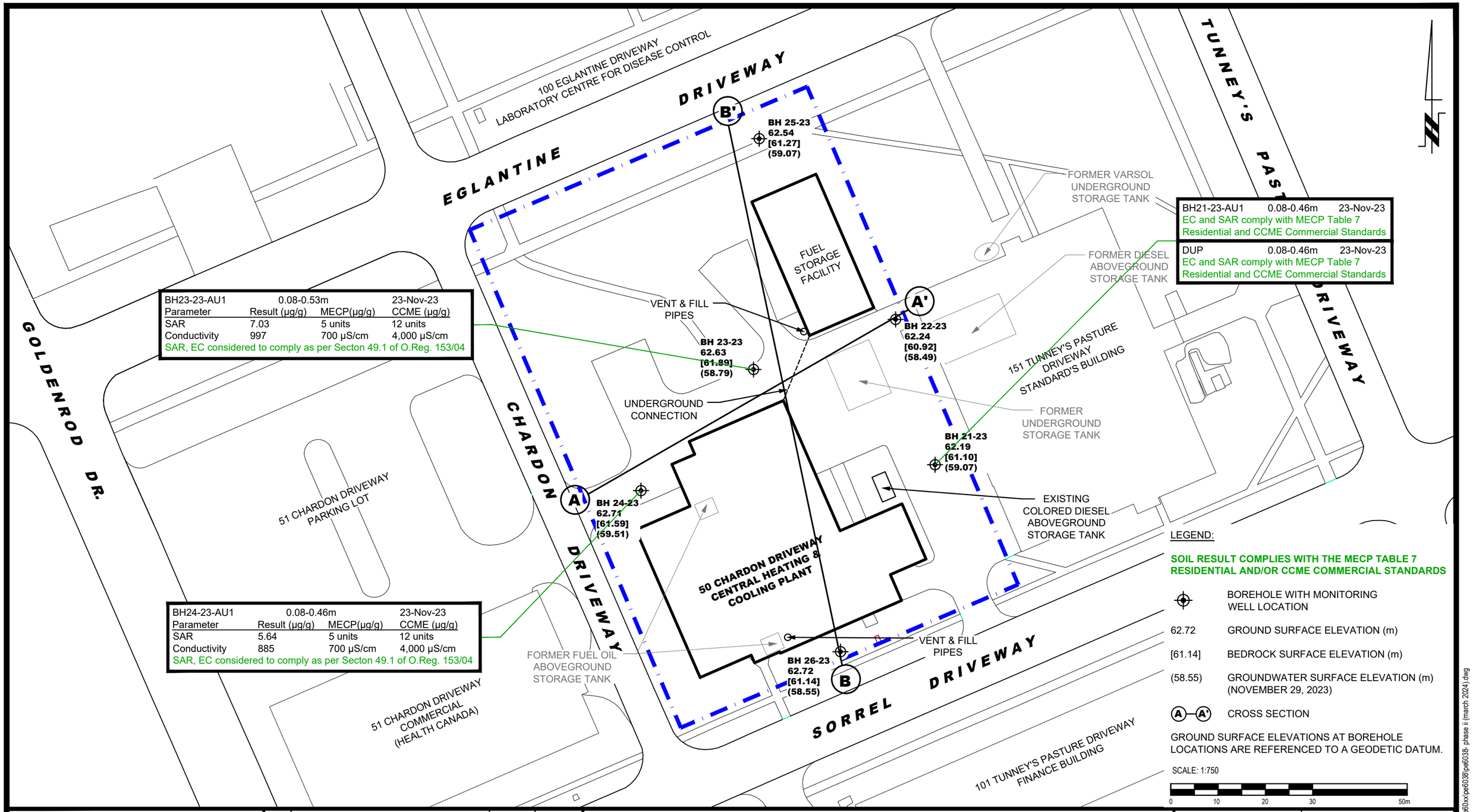

BH23-23-AU1	0.08-0.53m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
SAR	7.03	5 units	12 units
Conductivity	997	700 µS/cm	4,000 µS/cm

SAR, EC considered to comply as per Secton 49.1 of O.Reg. 153/04

BH24-23-AU1	0.08-0.46m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
SAR	5.64	5 units	12 units
Conductivity	885	700 µS/cm	4,000 µS/cm

SAR, EC considered to comply as per Secton 49.1 of O.Reg. 153/04

BH21-23-AU1	0.08-0.46m	23-Nov-23

EC and SAR comply with MECP Table 7 Residential and CCME Commercial Standards

DUP	0.08-0.46m	23-Nov-23

EC and SAR comply with MECP Table 7 Residential and CCME Commercial Standards

LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION
- 62.72 GROUND SURFACE ELEVATION (m)
- [61.14] BEDROCK SURFACE ELEVATION (m)
- (58.55) GROUNDWATER SURFACE ELEVATION (m) (NOVEMBER 29, 2023)
- A—A' CROSS SECTION

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

SCALE: 1:750

0 10 20 30 50m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - SOIL (EC & SAR)**

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-7
Approved by: AM	Revision No.:

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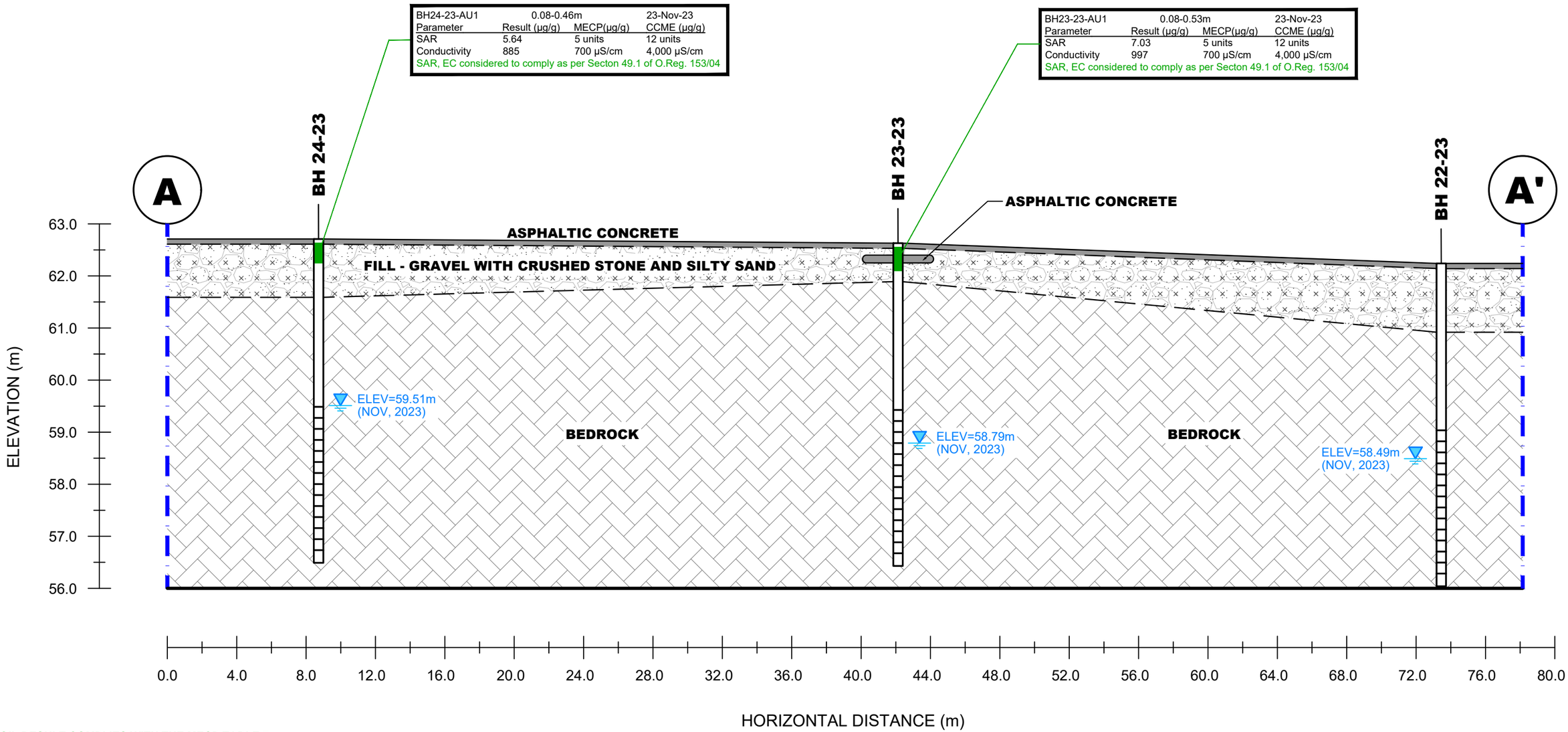
BH24-23-AU1	0.08-0.46m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
SAR	5.64	5 units	12 units
Conductivity	885	700 µS/cm	4,000 µS/cm

SAR, EC considered to comply as per Secton 49.1 of O.Reg. 153/04

BH23-23-AU1	0.08-0.53m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
SAR	7.03	5 units	12 units
Conductivity	997	700 µS/cm	4,000 µS/cm

SAR, EC considered to comply as per Secton 49.1 of O.Reg. 153/04



SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION A-A' - SOIL (EC & SAR)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-7A
Approved by: AM	Revision No.:

11x17

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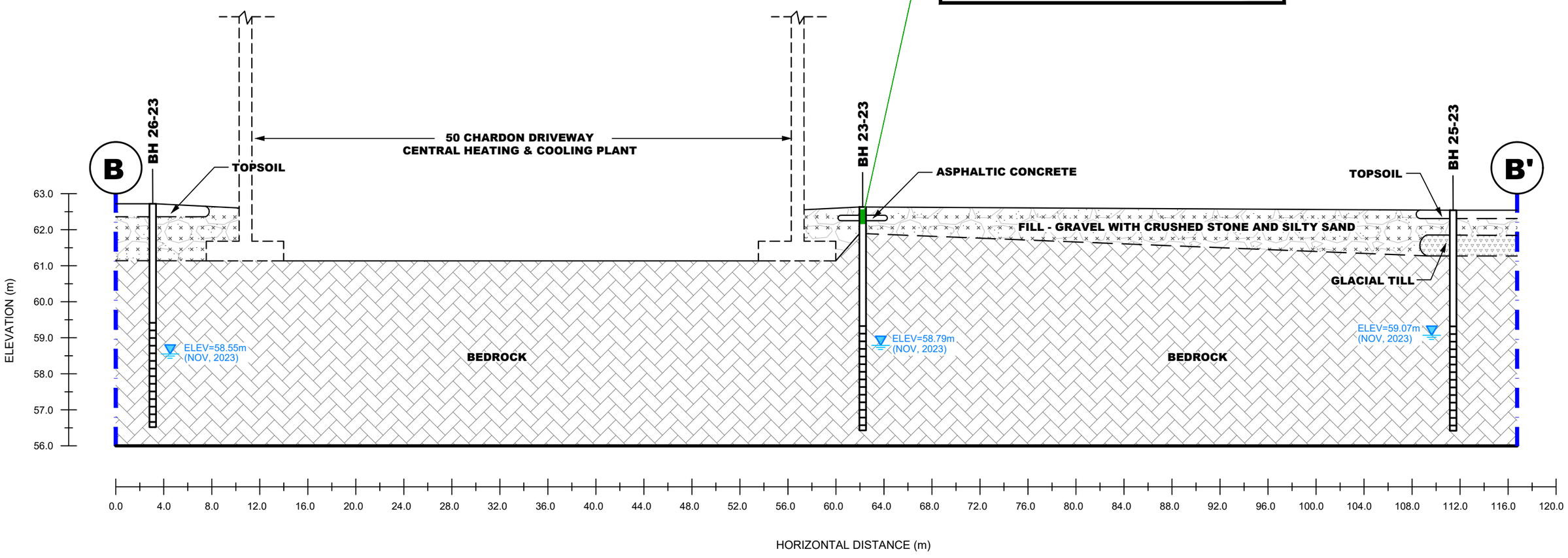
BH23-23-AU1	0.08-0.53m		23-Nov-23
Parameter	Result (µg/g)	MECP(µg/g)	CCME (µg/g)
SAR	7.03	5 units	12 units
Conductivity	997	700 µS/cm	4,000 µS/cm

SAR, EC considered to comply as per Secton 49.1 of O.Reg. 153/04



SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION B-B' - SOIL (EC & SAR)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-7B
Approved by: AM	Revision No.:

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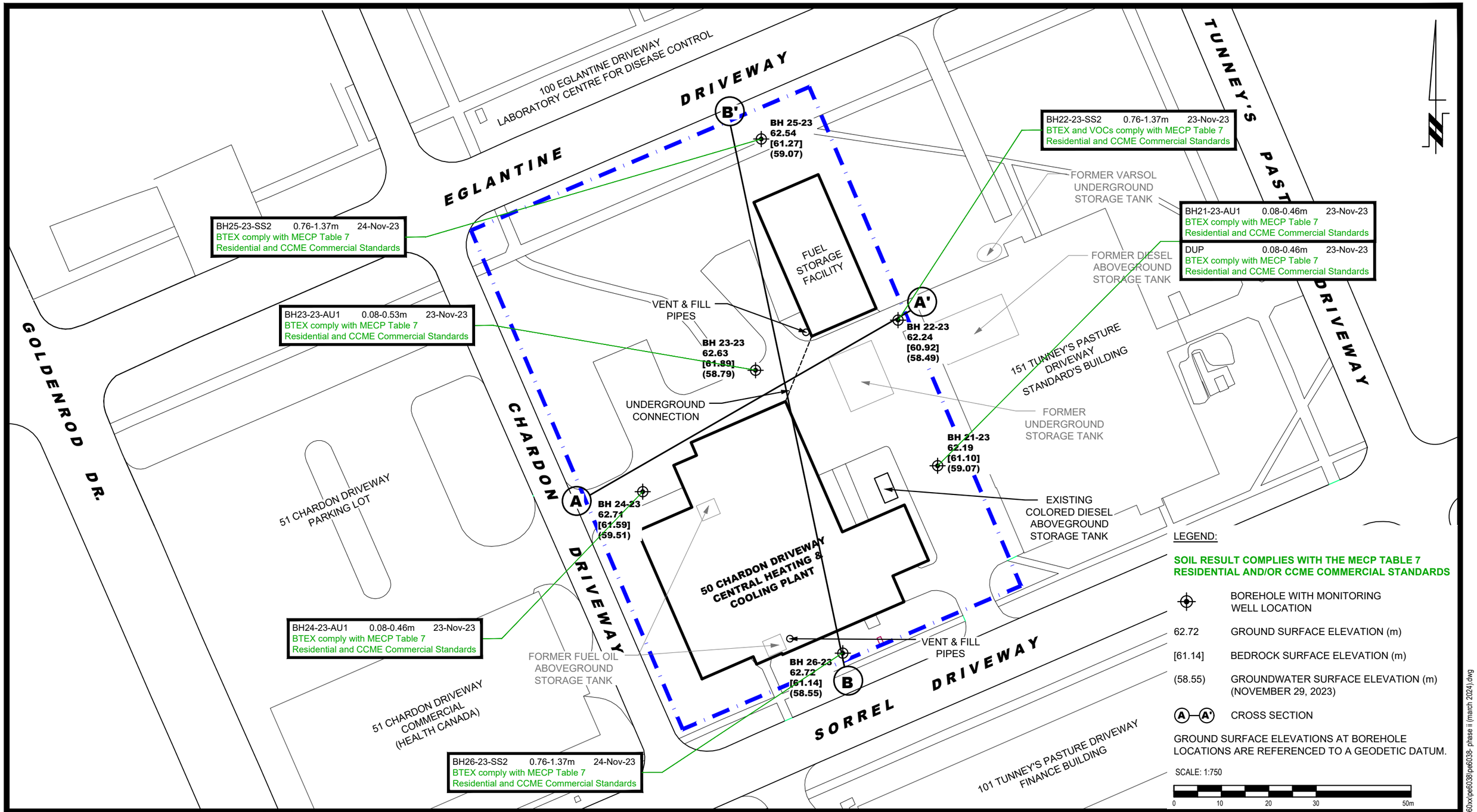

PATERSON GROUP
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OTTAWA, ON
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - SOIL (BTEX, VOCs)**

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-8
Approved by: AM	Revision No.:

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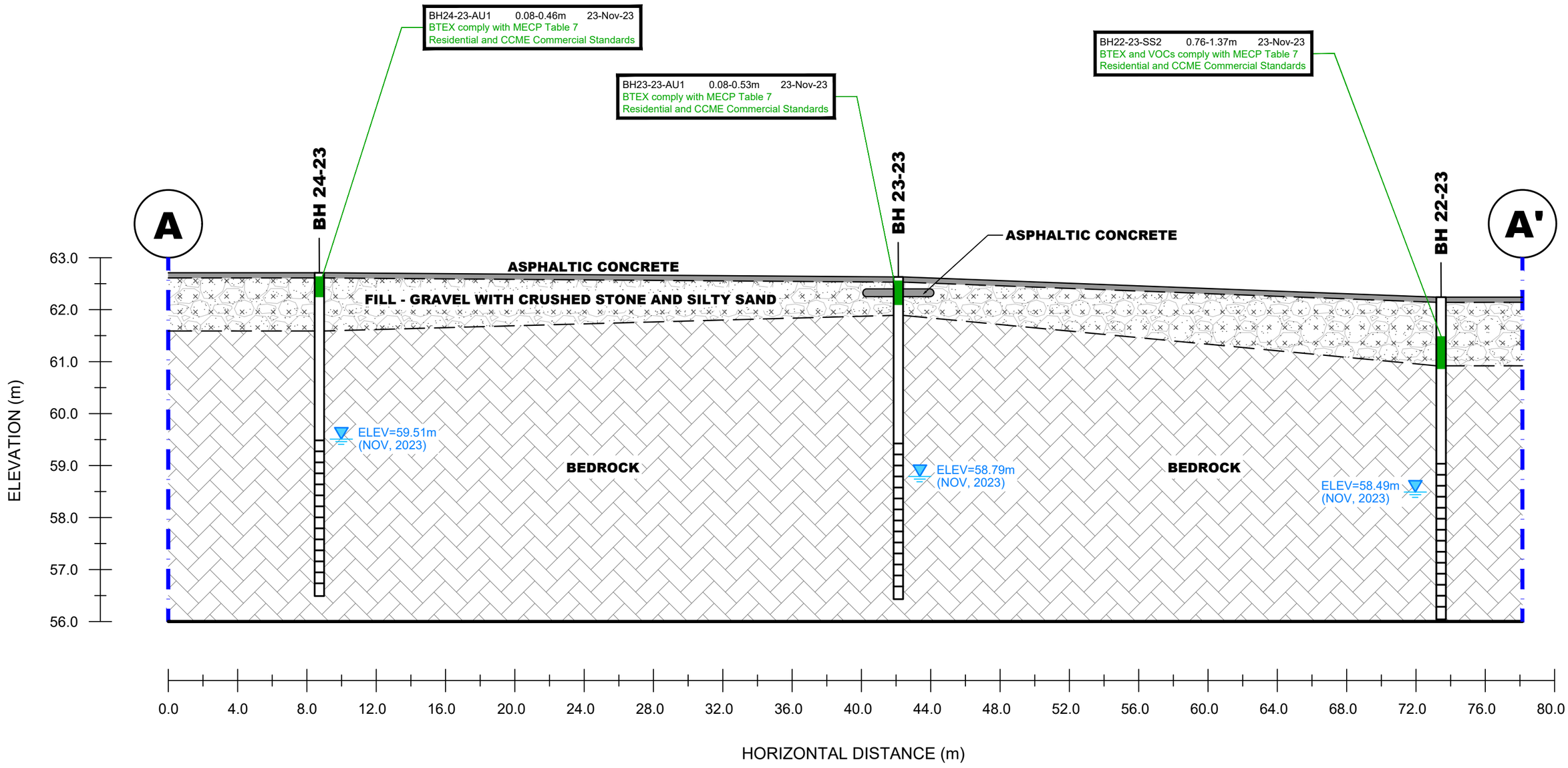

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION A-A' - SOIL (BTEX, VOCs)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-8A
Approved by: AM	Revision No.:

11x17

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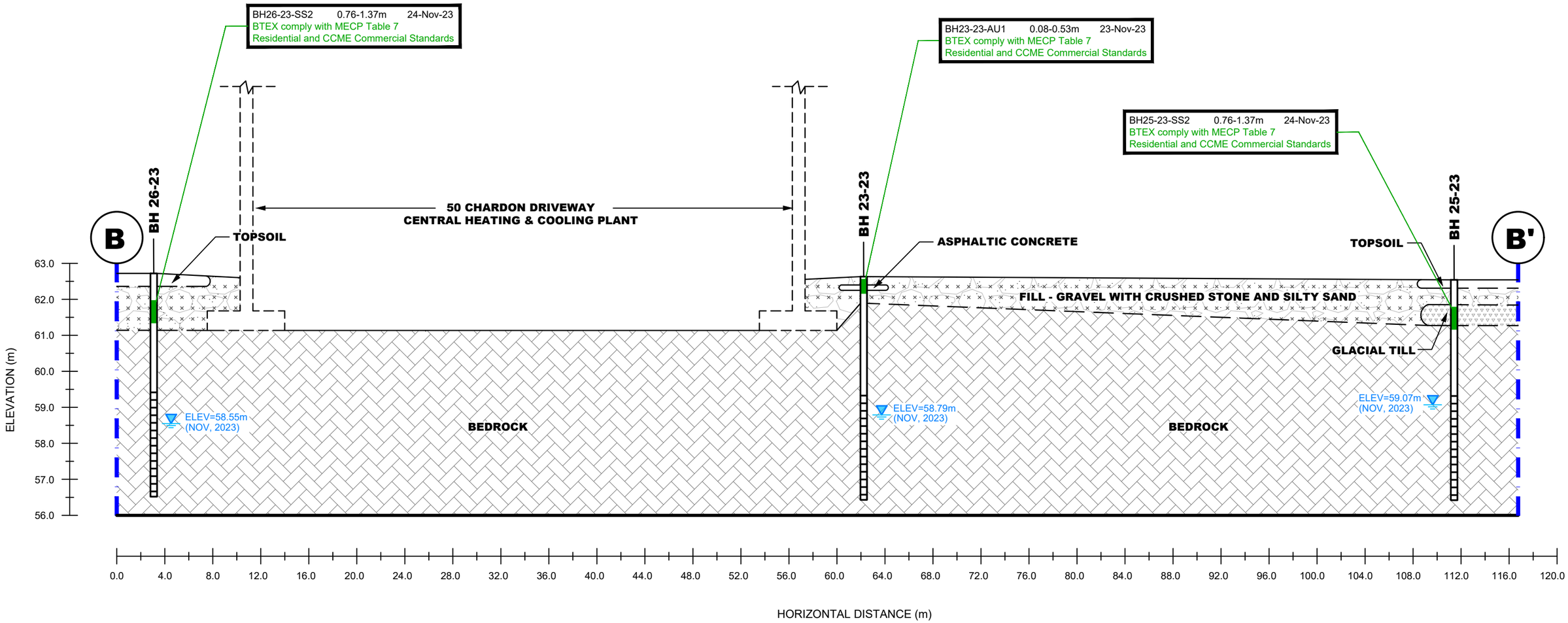

SOIL RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

PATERSON GROUP
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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-8B
Approved by: AM	Revision No.:

11x17

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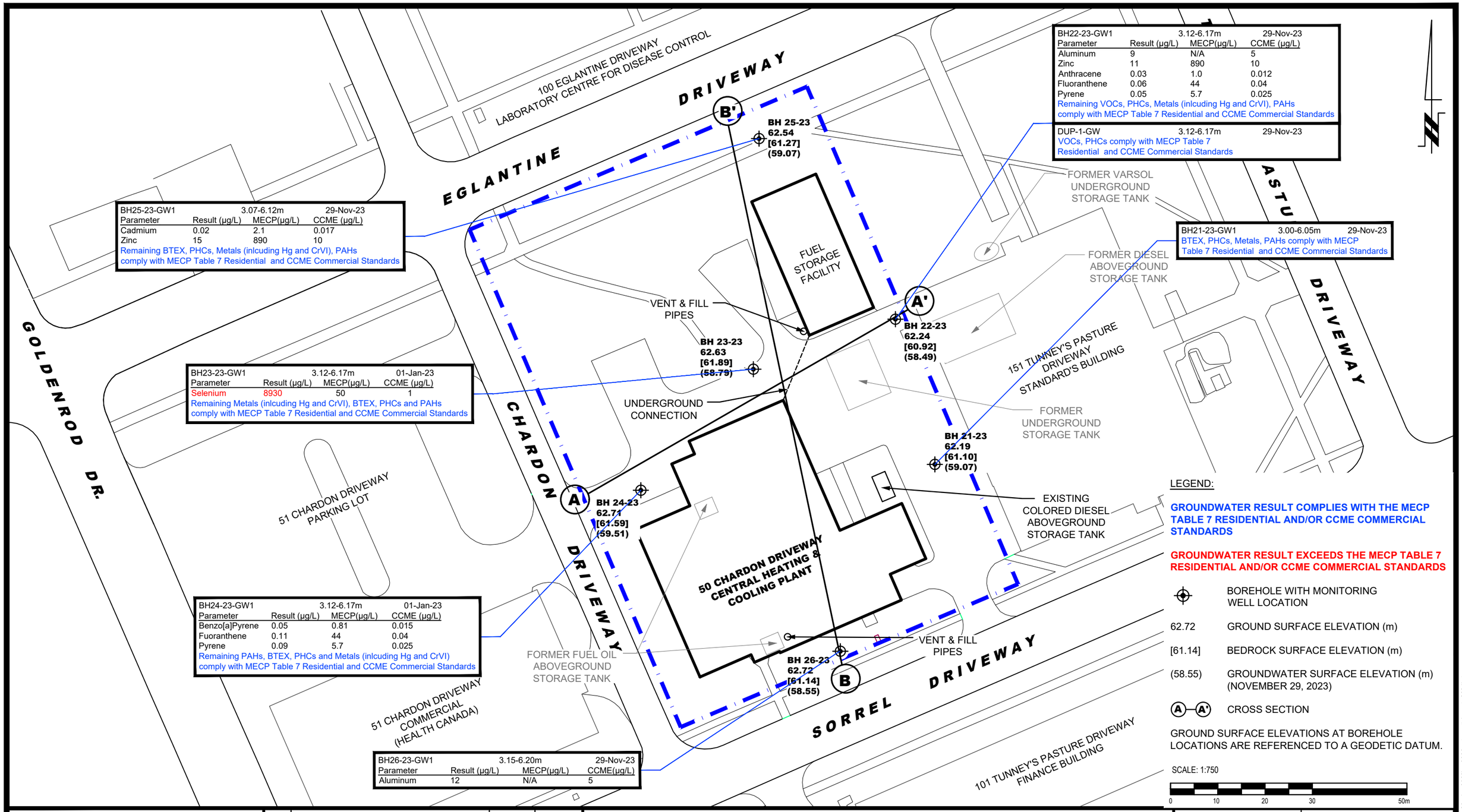

BH22-23-GW1		3.12-6.17m	29-Nov-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Aluminum	9	N/A	5
Zinc	11	890	10
Anthracene	0.03	1.0	0.012
Fluoranthene	0.06	44	0.04
Pyrene	0.05	5.7	0.025

Remaining VOCs, PHCs, Metals (inlcuding Hg and CrVI), PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

DUP-1-GW	3.12-6.17m	29-Nov-23

VOCs, PHCs comply with MECP Table 7 Residential and CCME Commercial Standards

BH25-23-GW1		3.07-6.12m	29-Nov-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Cadmium	0.02	2.1	0.017
Zinc	15	890	10

Remaining BTEX, PHCs, Metals (inlcuding Hg and CrVI), PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH21-23-GW1	3.00-6.05m	29-Nov-23

BTEX, PHCs, Metals, PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH23-23-GW1		3.12-6.17m	01-Jan-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Selenium	8930	50	1

Remaining Metals (inlcuding Hg and CrVI), BTEX, PHCs and PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH24-23-GW1		3.12-6.17m	01-Jan-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Benzo[a]Pyrene	0.05	0.81	0.015
Fuoranthene	0.11	44	0.04
Pyrene	0.09	5.7	0.025

Remaining PAHs, BTEX, PHCs and Metals (inlcuding Hg and CrVI) comply with MECP Table 7 Residential and CCME Commercial Standards

BH26-23-GW1	3.15-6.20m	29-Nov-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME(µg/L)
Aluminum	12	N/A	5

LEGEND:

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION
- 62.72 GROUND SURFACE ELEVATION (m)
- [61.14] BEDROCK SURFACE ELEVATION (m)
- (58.55) GROUNDWATER SURFACE ELEVATION (m) (NOVEMBER 29, 2023)
- A—A' CROSS SECTION

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

SCALE: 1:750

0 10 20 30 50m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - GROUNDWATER (BTEX, VOCs, PHCs, METALS, PAHs)**

Scale: 1:750	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-9
Approved by: AM	Revision No.:

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11x17

BH24-23-GW1		3.12-6.17m	01-Jan-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Benzo[a]Pyrene	0.05	0.81	0.015
Fuoranthene	0.11	44	0.04
Pyrene	0.09	5.7	0.025

Remaining PAHs, BTEX, PHCs and Metals (inlcuding Hg and CrVI) comply with MECP Table 7 Residential and CCME Commercial Standards

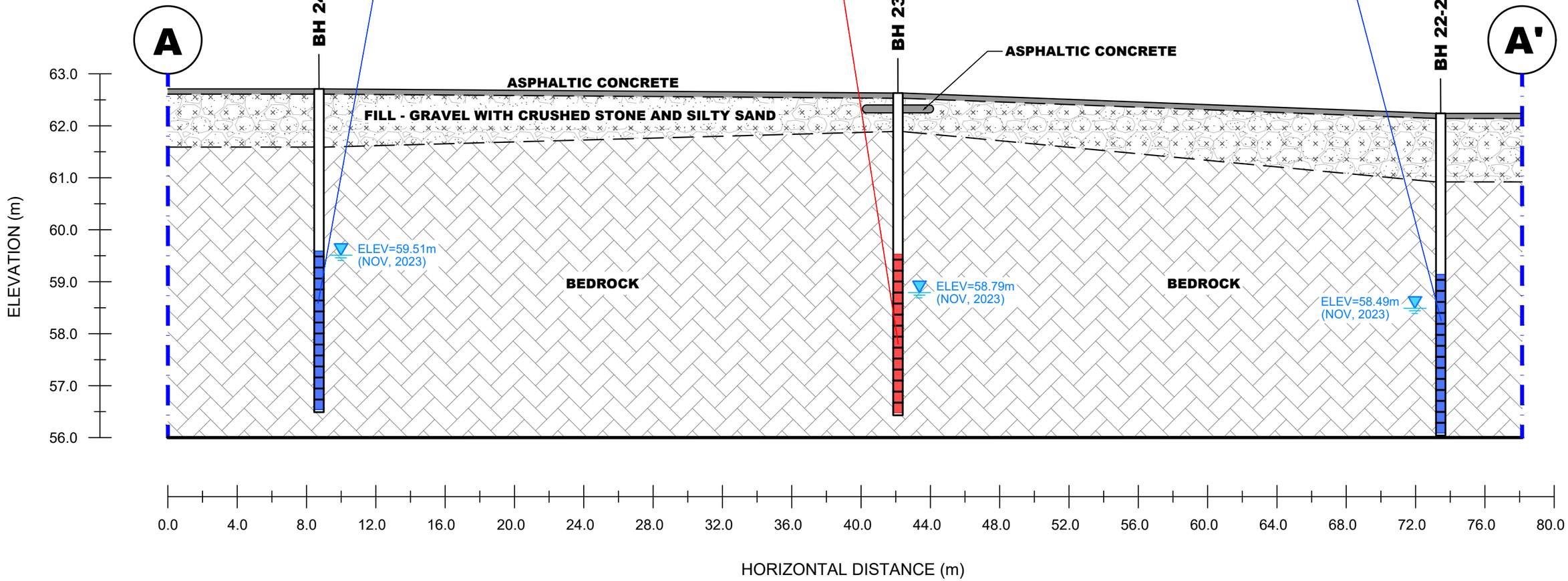
BH23-23-GW1		3.12-6.17m	01-Jan-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Selenium	8930	50	1

Remaining Metals (inlcuding Hg and CrVI), BTEX, PHCs and PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH22-23-GW1		3.12-6.17m	29-Nov-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Aluminum	9	N/A	5
Zinc	11	890	10
Anthracene	0.03	1.0	0.012
Fluoranthene	0.06	44	0.04
Pyrene	0.05	5.7	0.025

Remaining VOCs, PHCs, Metals (inlcuding Hg and CrVI), PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

DUP-1-GW 3.12-6.17m 29-Nov-23
VOCs, PHCs comply with MECP Table 7 Residential and CCME Commercial Standards



GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

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NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: CROSS SECTION A-A' - GROUNDWATER (BTEX, VOCs, PHCs, METALS, PAHs)

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-9A
Approved by: AM	Revision No.:

11x17

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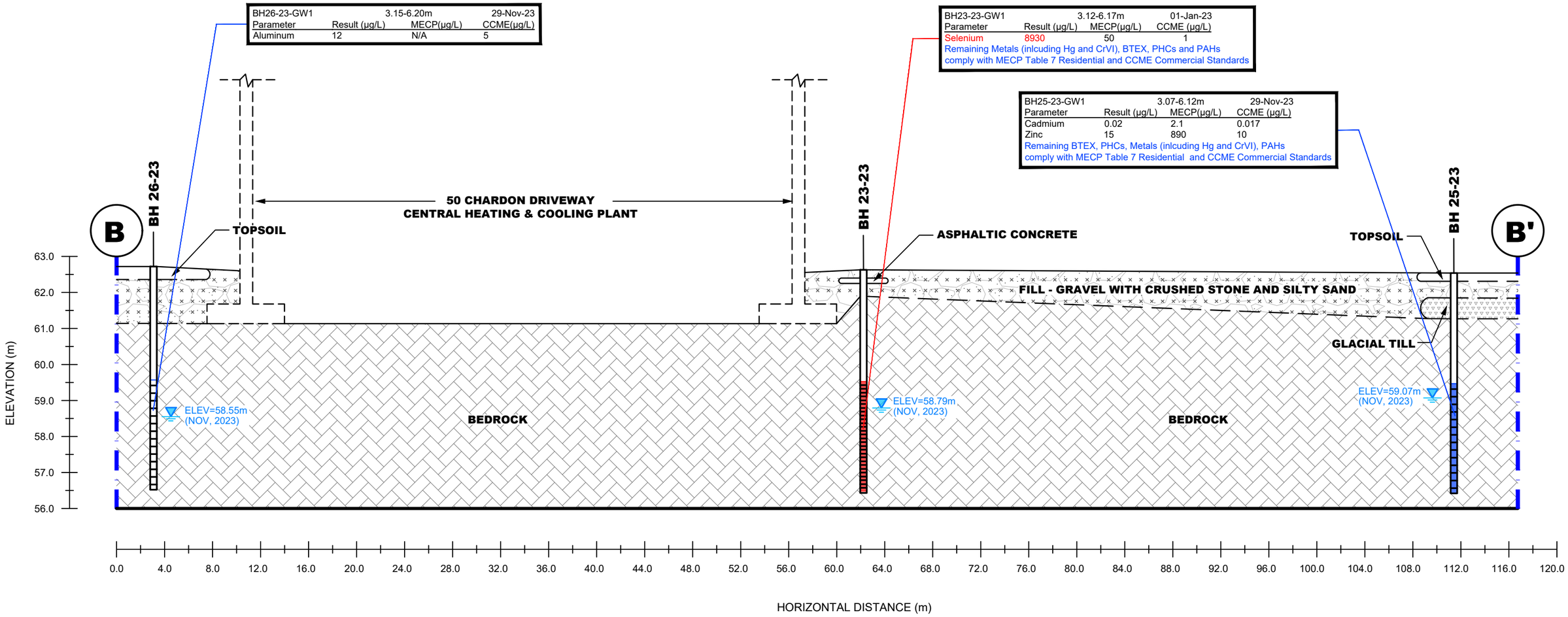
BH26-23-GW1	3.15-6.20m		29-Nov-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME(µg/L)
Aluminum	12	N/A	5

BH23-23-GW1	3.12-6.17m		01-Jan-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Selenium	8930	50	1

Remaining Metals (inlcuding Hg and CrVI), BTEX, PHCs and PAHs comply with MECP Table 7 Residential and CCME Commercial Standards

BH25-23-GW1	3.07-6.12m		29-Nov-23
Parameter	Result (µg/L)	MECP(µg/L)	CCME (µg/L)
Cadmium	0.02	2.1	0.017
Zinc	15	890	10

Remaining BTEX, PHCs, Metals (inlcuding Hg and CrVI), PAHs comply with MECP Table 7 Residential and CCME Commercial Standards



GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 7 RESIDENTIAL AND/OR CCME COMMERCIAL STANDARDS

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NO.	REVISIONS	DATE	INITIAL

IBI GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TUNNEY'S PASTURE (BLOCK 8)

OTTAWA, ONTARIO

Title: **CROSS SECTION B-B' - GROUNDWATER (BTEX, VOCs, PHCs, METALS, PAHs)**

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE6038-2
Checked by: JC	Dwg. No.: PE6038-9B
Approved by: AM	Revision No.:

11x17

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

SOIL & GROUNDWATER MANAGEMENT PLAN

Sampling & Analysis Plan

Tunney's Pasture (Block 8)

Ottawa, Ontario

Prepared for Arcadis IBI Group

Report: PE6038-SAP
Date: November 1, 2023

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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Arcadis IBI Group, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for Block 8 of the Tunney's Pasture government office complex, in the City of Ottawa, Ontario.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH21-23	Eastern portion of the Phase I Property; to assess for potential impacts resulting from the presence of an existing on-site diesel AST, fill material of unknown quality and the use of road salt for de-icing purposes, and for excess soil qualification purposes.	5-7 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH22-23	Eastern portion of the Phase I Property; to assess for potential impacts resulting from the presence of former on-site bunker oil USTs, the existing on-site fuel storage facility, fill material of unknown quality and for excess soil qualification purposes.	5-7 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH23-23	Central portion of the Phase I Property; to assess for potential impacts resulting from the existing on-site underground line from the fuel storage facility to the central heating and cooling plant, the existing on-site fuel storage facility, fill material of unknown quality and the use of road salt for de-icing purposes, and for excess soil qualification purposes.	5-7 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH24-23	Western portion of the Phase I Property; to assess for potential impacts resulting from the presence of a former on-site fuel oil AST, fill material of unknown quality and the use of road salt for de-icing purposes, and for excess soil qualification purposes.	5-7 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH25-23	Northeastern portion of the Phase I Property; to assess for potential impacts resulting from the existing on-site fuel storage facility and fill material of unknown quality and for excess soil qualification purposes.	5-7 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH26-23	Southern portion of the Phase I Property; to assess for potential impacts resulting from the presence of former on-site fuel oil ASTs and fill material of unknown quality and for excess soil qualification purposes.	5-7 m; to intercept the groundwater table for the purpose of installing a monitoring well.

Borehole locations are shown on Drawing PE6038-3 – Test Hole Location Plan, appended to the main report.

At each borehole, split-spoon samples of the overburden soils will be obtained at 0.76 m (2'6") intervals. All soil samples will be retained, and samples will be selected for submission following a preliminary screening analysis. Following the borehole drilling, groundwater monitoring wells will be installed in all three boreholes to allow for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

The analytical testing program for soil at the Phase I Property is based on the following general considerations:

- ❒ At least one sample from each borehole should be submitted, in order to delineate the horizontal extent of contamination across the site.

- ❒ At least one sample from each stratigraphic unit should be submitted, in order to delineate the vertical extent of contamination at the site.

- ❒ In boreholes where there is visual or olfactory evidence of contamination, or where organic vapour meter or photoionization detector readings indicate the presence of contamination, the 'worst-case' sample from each borehole should be submitted for comparison with MECP site condition standards.

- ❒ In boreholes with evidence of contamination as described above, a sample should be submitted from the stratigraphic unit below the 'worst-case' sample to determine whether the contaminant(s) have migrated downward.

- ❒ Parameters analyzed should be consistent with the Contaminants of Potential Concern identified in the Phase I ESA.

The analytical testing program for soil at the Phase I Property is based on the following general considerations:

- ❒ Groundwater monitoring wells should be installed in all boreholes with visual or olfactory evidence of soil contamination, in stratigraphic units where soil contamination was encountered, where those stratigraphic units are at or below the water table (i.e. a water sample can be obtained).

- ❒ Groundwater monitoring well screens should straddle the water table at sites where the contaminants of concern are suspected to be LNAPLs.

- ❒ At least one groundwater monitoring well should be installed in a stratigraphic unit below the suspected contamination, where said stratigraphic unit is water-bearing.

- ❒ Parameters analyzed should be consistent with the Contaminants of Concern identified in the Phase I ESA and with the contaminants identified in the soil samples.

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

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

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

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

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

Procedure

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

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

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

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

Tunney's Pasture Block 8, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364535.067 **NORTHING:** 5029792.031 **ELEVATION:** 62.19

PROJECT: Phase II - Environmental Site Assessment

BORINGS BY: Truck-Mount Power Auger

REMARKS:

DATE: November 23, 2023

FILE NO. PE6038

HOLE NO. BH21-23

SAMPLE DESCRIPTION	STRATA PLOT	Sample No.	SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm) 0 16.67 33.33 50	Gas Tech (ppm) 0 50 100 150 200	Monitoring Well Construction
Ground Surface EL 62.19 m									
Asphaltic concrete 0.08 m EL 62.11 m		AU1				0	0.7		
FILL: Gravel with crushed stone, some silty sand 0.33 m EL 61.86 m		SS2	60	50+		1	7.2		
FILL: Brown silty sand, some gravel, occasional cobbles and boulders 1.09 m EL 61.1 m		RC1	100	14		2			
BEDROCK: Very poor to fair quality, grey limestone									
- excellent quality by 3.9m depth		RC2	100	62		3			
		RC3	100	95		4			
						5			
		RC4	100	95		6			
6.04 m EL 56.15 m									
End Borehole						7			
(GWL @ 3.12m - Nov. 29, 2023)						8			

SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

Tunney's Pasture Block 8, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364526.726 **NORTHING:** 5029822.759 **ELEVATION:** 62.24

PROJECT: Phase II - Environmental Site Assessment

BORINGS BY: Truck-Mount Power Auger

REMARKS:

DATE: November 23, 2023

FILE NO. PE6038

HOLE NO. BH22-23

SAMPLE DESCRIPTION	STRATA PLOT	Sample No.	SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm) 0 16.67 33.33 50	Gas Tech (ppm) 0 50 100 150 200	Monitoring Well Construction
Ground Surface EL 62.24 m									
Asphaltic concrete 0.08 m EL 62.16 m		AU1				0	1.2		
FILL: Gravel with crushed stone, some silty sand 0.43 m EL 61.81 m									
FILL: Brown silty sand, some gravel, trace clay, occasional cobbles and boulders 1.32 m EL 60.92 m		SS2	76	50+		1	1.8		
BEDROCK: Fair to good quality, grey limestone		RC1	100	53		2			
- excellent quality by 5.7m depth		RC2	100	75		3			
		RC3	100	83		4			
		RC4	100	100		5			
6.2 m EL 56.04 m						6			
End of Borehole									
(GWL @ 3.75m - Nov. 29, 2023)						7			
						8			

SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

Tunney's Pasture Block 8, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364496.676 **NORTHING:** 5029812.181 **ELEVATION:** 62.63

PROJECT: Phase II - Environmental Site Assessment

BORINGS BY: Truck-Mount Power Auger

REMARKS:

DATE: November 23, 2023

FILE NO. PE6038

HOLE NO. BH23-23

SAMPLE DESCRIPTION	STRATA PLOT	Sample No.	SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm) 0 16.67 33.33 50	Gas Tech (ppm) 0 50 100 150 200	Monitoring Well Construction
Ground Surface EL 62.63 m									
Asphaltic concrete 0.08 m EL 62.55 m		AU1				0	1.6		
FILL: Gravel with crushed stone, some silty sand 0.23 m EL 62.4 m									
Asphaltic concrete 0.38 m EL 62.25 m		RC1	100	94		1			
FILL: Gravel with crushed stone, some silty sand 0.74 m EL 61.89 m									
		RC2	100	78		2			
BEDROCK: Good to excellent quality, grey limestone									
		RC3	100	97		3			
						4			
		RC4	97	94		5			
						6			
6.2 m EL 56.43 m		RC5	95	95					
End of Borehole						7			
(GWL @ 3.84m - Nov. 29, 2023)						8			

SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

Tunney's Pasture Block 8, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364472.875 **NORTHING:** 5029786.562 **ELEVATION:** 62.71

PROJECT: Phase II - Environmental Site Assessment

BORINGS BY: Truck-Mount Power Auger

REMARKS:

DATE: November 23, 2023

FILE NO. PE6038

HOLE NO. BH24-23

SAMPLE DESCRIPTION	STRATA PLOT	Sample No.	SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm) 0 16.67 33.33 50	Gas Tech (ppm) 0 50 100 150 200	Monitoring Well Construction
Ground Surface EL 62.71 m									
Asphaltic concrete 0.08 m EL 62.63 m		AU1				0	1.4		
FILL: Gravel with crushed stone, some silty sand 0.33 m EL 62.38 m		SS2	100	50+			2.0		
FILL: Brown silty sand, occasional crushed stone 1.12 m EL 61.59 m						1			
BEDROCK: Fair to excellent quality, grey limestone		RC1	100	54		2			
		RC2	100	98		3			
		RC3	100	95		4			
		RC4	96	96		5			
6.22 m EL 56.49 m						6			
End of Borehole									
(GWL @ 3.20m - Nov. 29, 2023)						7			
						8			

SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

Tunney's Pasture Block 8, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364497.878 **NORTHING:** 5029860.972 **ELEVATION:** 62.54

PROJECT: Phase II - Environmental Site Assessment

BORINGS BY: Truck-Mount Power Auger

REMARKS:

DATE: November 23, 2023

FILE NO. PE6038

HOLE NO. BH25-23

SAMPLE DESCRIPTION	STRATA PLOT	Sample No.	SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm) 0 16.67 33.33 50	Gas Tech (ppm) 0 50 100 150 200	Monitoring Well Construction
Ground Surface EL 62.54 m									
TOPSOIL 0.23 m EL 62.31 m		AU1				0	0.4		
FILL: Brown silty sand 0.69 m EL 61.85 m		SS2	100	50+		1	0.9		
GLACIAL TILL: Very dense, brown silty sand to sandy silt with gravel, cobbles and boulders 1.27 m EL 61.27 m		RC1	100	96		2			
BEDROCK: Excellent quality, grey limestone - vertical fractures from 2.7 to 4.2m depth		RC2	100	53		3			
		RC3	100	98		4			
		RC4	100	100		5			
6.12 m EL 56.42 m						6			
End of Borehole (GWL @ 3.47m - Nov. 29, 2023)						7			
						8			

SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

Tunney's Pasture Block 8, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 364515.072 **NORTHING:** 5029752.491 **ELEVATION:** 62.72

PROJECT: Phase II - Environmental Site Assessment

BORINGS BY: Truck-Mount Power Auger

REMARKS:

DATE: November 23, 2023

FILE NO. PE6038

HOLE NO. BH26-23

SAMPLE DESCRIPTION	STRATA PLOT	Sample No.	SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm) 0 16.67 33.33 50	Gas Tech (ppm) 0 50 100 150 200	Monitoring Well Construction
Ground Surface EL 62.72 m									
TOPSOIL 0.36 m EL 62.36 m		AU1				0	0.5		
FILL: Brown silty sand 0.91 m EL 61.81 m		SS2	43	50+		1	1.1		
FILL: Brown silty clay, trace sand, gravel, organics, occasional cobbles and boulders 1.58 m EL 61.14 m		RC1	100	33		2			
BEDROCK: Poor to excellent quality, grey limestone		RC2	100	76		3			
		RC3	100	97		4			
		RC4	100	80		5			
6.2 m EL 56.52 m						6			
End of Borehole						7			
(GWL @ 4.17m - Nov. 29, 2023)						8			

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

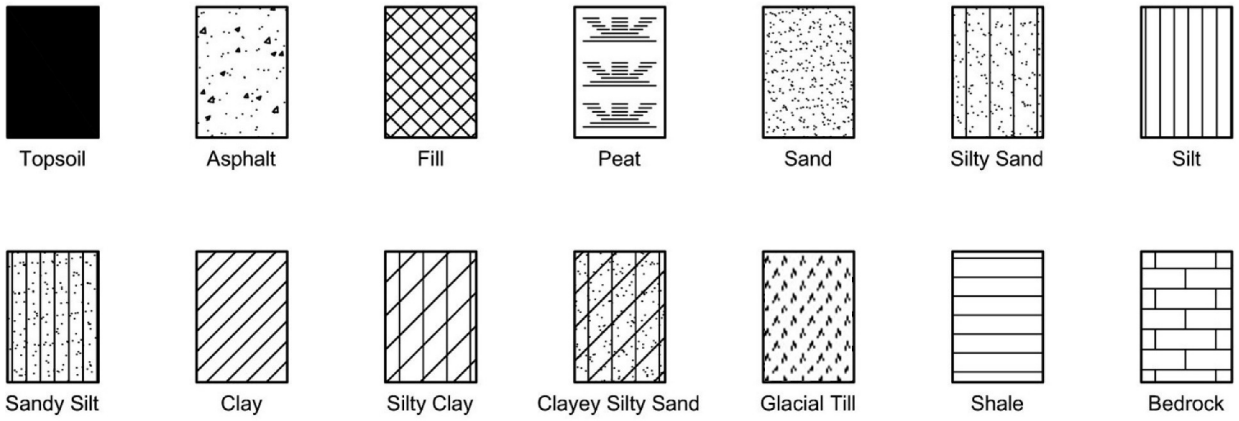
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

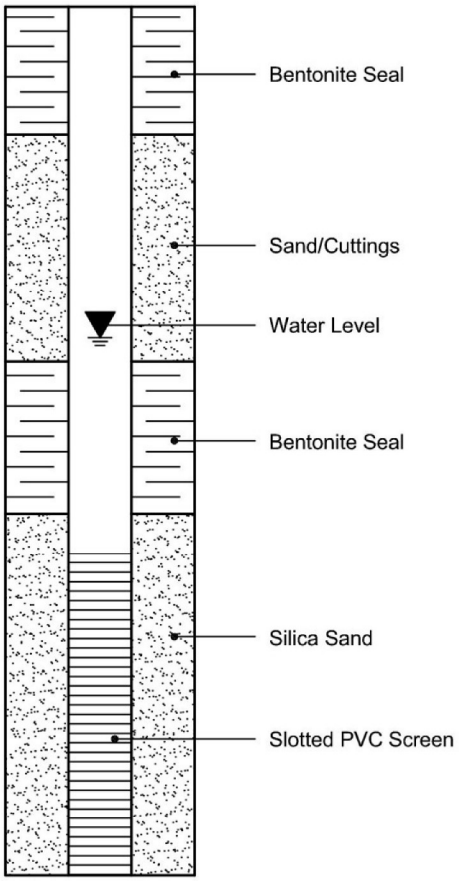
SYMBOLS AND TERMS (continued)

STRATA PLOT

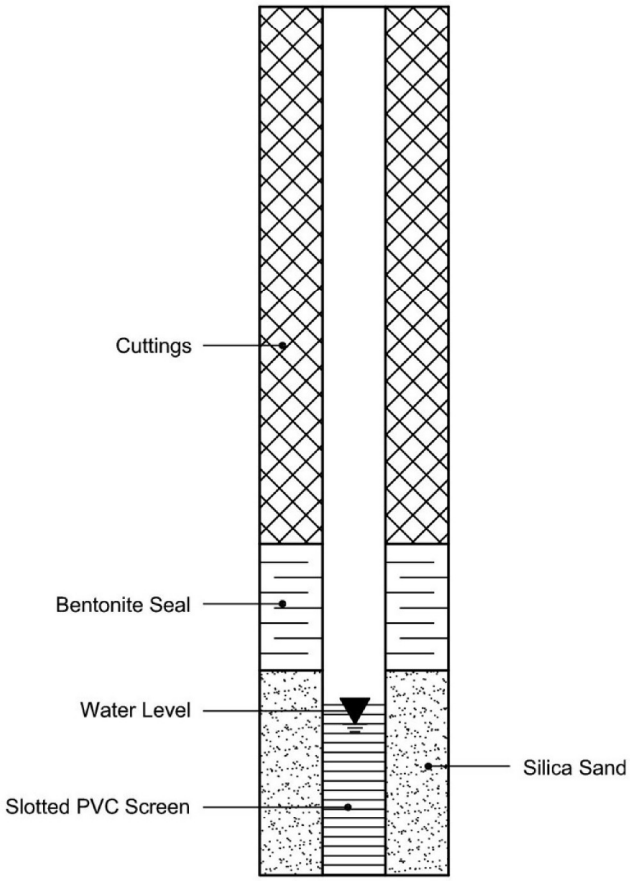


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Jeremy Camposarcone

Client PO: 58931
Project: PE6038
Custody:

Report Date: 4-Dec-2023
Order Date: 27-Nov-2023

Order #: 2348117

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

Paracel ID	Client ID
2348117-01	BH21-23-AU1
2348117-02	BH22-23-SS2
2348117-03	BH23-23-AU1
2348117-04	BH24-23-AU1
2348117-05	BH25-23-SS2
2348117-06	BH26-23-SS2
2348117-07	DUP

Approved By:

Mark Foto, M.Sc.

Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	28-Nov-23	29-Nov-23
CCME-SoilQG: Metals-ICP MS	EPA 6020 - Digestion - ICP-MS	29-Nov-23	29-Nov-23
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	30-Nov-23	30-Nov-23
Conductivity	MOE E3138 - probe @25 °C, water ext	29-Nov-23	29-Nov-23
Mercury by CVAA	EPA 7471B - CVAA, digestion	29-Nov-23	29-Nov-23
PAHs by GC-MS	EPA 8270 - GC-MS, extraction	28-Nov-23	1-Dec-23
PHC F1	CWS Tier 1 - P&T GC-FID	29-Nov-23	30-Nov-23
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	1-Nov-23	1-Dec-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	28-Nov-23	1-Dec-23
SAR	Calculated	29-Nov-23	29-Nov-23
Solids, %	CWS Tier 1 - Gravimetric	29-Nov-23	30-Nov-23
VOCs by P&T GC-MS, Soil Direct Purge	EPA 8260 - P&T GC-MS	28-Nov-23	29-Nov-23

Certificate of Analysis

Report Date: 04-Dec-2023

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 27-Nov-2023

Client PO: **58931**

Project Description: PE6038

	Client ID:	BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1	-	-
	Sample Date:	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00		
	Sample ID:	2348117-01	2348117-02	2348117-03	2348117-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	93.5	87.1	94.8	91.1	-	-
General Inorganics							
SAR	0.01 N/A	3.49	-	7.03	5.64	-	-
Conductivity	5 uS/cm	604	-	997	885	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	3.5	2.8	1.1	-	-
Barium	1.0 ug/g	120	385	257	43.3	-	-
Beryllium	0.5 ug/g	<0.5	0.6	<0.5	<0.5	-	-
Boron	1.0 ug/g	7.9	17.7	9.5	2.7	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	12.1	20.9	8.7	7.0	-	-
Chromium (VI)	0.2 ug/g	<0.2	<0.2	<0.2	<0.2	-	-
Cobalt	5.0 ug/g	<5.0	6.3	<5.0	<5.0	-	-
Copper	5.0 ug/g	12.4	15.4	7.0	8.5	-	-
Lead	1.0 ug/g	7.0	13.7	8.9	2.0	-	-
Mercury	0.1 ug/g	<0.1	<0.1	<0.1	<0.1	-	-
Molybdenum	1.0 ug/g	1.3	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	10.6	15.8	9.8	5.8	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	-	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Tin	5.0 ug/g	<5.0	<5.0	<5.0	<5.0	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	22.0	23.5	15.2	16.6	-	-

	Client ID:	BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1	-	-
	Sample Date:	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00		
	Sample ID:	2348117-01	2348117-02	2348117-03	2348117-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Metals							
Zinc	20.0 ug/g	<20.0	30.1	<20.0	<20.0	-	-
Volatiles							
Benzene	0.002 ug/g	<0.002	-	0.003	<0.002	-	-
Ethylbenzene	0.002 ug/g	<0.002	-	<0.002	<0.002	-	-
Toluene	0.002 ug/g	<0.002	-	<0.002	<0.002	-	-
m,p-Xylenes	0.002 ug/g	<0.002	-	<0.002	<0.002	-	-
o-Xylene	0.002 ug/g	<0.002	-	<0.002	<0.002	-	-
Xylenes, total	0.002 ug/g	<0.002	-	<0.002	<0.002	-	-
Toluene-d8	Surrogate	100%	-	101%	103%	-	-
Acetone	0.100 ug/g	-	<0.100	-	-	-	-
Benzene	0.002 ug/g	-	<0.002	-	-	-	-
Bromodichloromethane	0.005 ug/g	-	<0.005	-	-	-	-
Bromoform	0.005 ug/g	-	<0.005	-	-	-	-
Bromomethane	0.005 ug/g	-	<0.005	-	-	-	-
Carbon Tetrachloride	0.002 ug/g	-	<0.002	-	-	-	-
Chlorobenzene	0.002 ug/g	-	<0.002	-	-	-	-
Chloroethane	0.050 ug/g	-	<0.050	-	-	-	-
Chloroform	0.002 ug/g	-	<0.002	-	-	-	-
Chloromethane	0.050 ug/g	-	<0.050	-	-	-	-
Dibromochloromethane	0.002 ug/g	-	<0.002	-	-	-	-
Ethylene dibromide (dibromoethane,	0.005 ug/g	-	<0.005	-	-	-	-
1,2-Dichlorobenzene	0.002 ug/g	-	<0.002	-	-	-	-
1,3-Dichlorobenzene	0.002 ug/g	-	<0.002	-	-	-	-
1,4-Dichlorobenzene	0.002 ug/g	-	<0.002	-	-	-	-
1,1-Dichloroethane	0.002 ug/g	-	<0.002	-	-	-	-

	Client ID:	BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1	-	-
	Sample Date:	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00		
	Sample ID:	2348117-01	2348117-02	2348117-03	2348117-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
1,2-Dichloroethane	0.002 ug/g	-	<0.002	-	-	-	-
1,1-Dichloroethylene	0.002 ug/g	-	<0.002	-	-	-	-
Dichlorodifluoromethane	0.002 ug/g	-	<0.002	-	-	-	-
cis-1,2-Dichloroethylene	0.002 ug/g	-	<0.002	-	-	-	-
trans-1,2-Dichloroethylene	0.002 ug/g	-	<0.002	-	-	-	-
1,2-Dichloroethylene, total	0.003 ug/g	-	<0.003	-	-	-	-
1,2-Dichloropropane	0.002 ug/g	-	<0.002	-	-	-	-
cis-1,3-Dichloropropylene	0.002 ug/g	-	<0.002	-	-	-	-
trans-1,3-Dichloropropylene	0.002 ug/g	-	<0.002	-	-	-	-
1,3-Dichloropropene, total	0.003 ug/g	-	<0.003	-	-	-	-
Ethylbenzene	0.002 ug/g	-	<0.002	-	-	-	-
Hexane	0.002 ug/g	-	<0.050	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.050 ug/g	-	<0.050	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	0.010 ug/g	-	<0.010	-	-	-	-
Methyl Isobutyl Ketone	0.050 ug/g	-	<0.050	-	-	-	-
Methyl tert-butyl ether	0.010 ug/g	-	<0.010	-	-	-	-
Methylene Chloride	0.005 ug/g	-	<0.005	-	-	-	-
Styrene	0.005 ug/g	-	<0.005	-	-	-	-
1,1,1,2-Tetrachloroethane	0.002 ug/g	-	<0.002	-	-	-	-
1,1,2,2-Tetrachloroethane	0.002 ug/g	-	<0.002	-	-	-	-
Tetrachloroethylene	0.002 ug/g	-	<0.002	-	-	-	-
Toluene	0.002 ug/g	-	<0.002	-	-	-	-
1,2,4-Trichlorobenzene	0.002 ug/g	-	<0.002	-	-	-	-
1,1,1-Trichloroethane	0.002 ug/g	-	<0.002	-	-	-	-
1,1,2-Trichloroethane	0.002 ug/g	-	<0.002	-	-	-	-

	Client ID:	BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1	-	-
	Sample Date:	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00		
	Sample ID:	2348117-01	2348117-02	2348117-03	2348117-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Trichloroethylene	0.002 ug/g	-	<0.002	-	-	-	-
Trichlorofluoromethane	0.005 ug/g	-	<0.005	-	-	-	-
1,3,5-Trimethylbenzene	0.005 ug/g	-	<0.005	-	-	-	-
Vinyl chloride	0.005 ug/g	-	<0.005	-	-	-	-
m,p-Xylenes	0.005 ug/g	-	<0.005	-	-	-	-
o-Xylene	0.002 ug/g	-	<0.002	-	-	-	-
Xylenes, total	0.005 ug/g	-	<0.005	-	-	-	-
4-Bromofluorobenzene	Surrogate	-	113%	-	-	-	-
Dibromofluoromethane	Surrogate	-	112%	-	-	-	-
Toluene-d8	Surrogate	-	101%	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 mg/kg	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 mg/kg	<80 [1]	<4	<40 [1]	<40 [1]	-	-
F3 PHCs (C16-C34)	8 mg/kg	341	24 [3]	<80 [1]	<80 [1]	-	-
F4 PHCs (C34-C50)	6 mg/kg	2190 [2]	32 [3]	400 [2]	366 [2]	-	-
F4G PHCs (gravimetric)	50 ug/g	2780	-	1420	692	-	-
Semi-Volatiles							
1-Methylnaphthalene	0.02 mg/kg	<0.02	<0.02	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 mg/kg	<0.02	<0.02	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 mg/kg	<0.04	<0.04	<0.04	<0.04	-	-
Acenaphthene	0.02 mg/kg	0.06	<0.02	<0.02	<0.02	-	-
Acenaphthylene	0.02 mg/kg	<0.02	<0.02	<0.02	<0.02	-	-
Anthracene	0.02 mg/kg	0.18	<0.02	0.02	0.04	-	-
Benzo [a] anthracene	0.02 mg/kg	0.36	0.06	0.04	0.14	-	-
Benzo [a] pyrene	0.02 mg/kg	0.24	0.04	0.03	0.13	-	-

	Client ID:	BH21-23-AU1	BH22-23-SS2	BH23-23-AU1	BH24-23-AU1	-	-
	Sample Date:	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00	23-Nov-23 09:00		
	Sample ID:	2348117-01	2348117-02	2348117-03	2348117-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Benzo [b] fluoranthene	0.02 mg/kg	0.25	0.07	0.04	0.16	-	-
Benzo [g,h,i] perylene	0.02 mg/kg	0.14	0.03	0.04	0.08	-	-
Benzo [k] fluoranthene	0.02 mg/kg	0.17	0.04	0.02	0.10	-	-
Biphenyl	0.02 mg/kg	<0.02	<0.02	<0.02	<0.02	-	-
Chrysene	0.02 mg/kg	0.33	0.07	0.04	0.11	-	-
Dibenzo [a,h] anthracene	0.02 mg/kg	0.04	<0.02	<0.02	0.02	-	-
Fluoranthene	0.02 mg/kg	0.82	0.14	0.10	0.32	-	-
Fluorene	0.02 mg/kg	0.06	<0.02	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 mg/kg	0.12	0.03	<0.02	0.07	-	-
Naphthalene	0.01 mg/kg	0.01	<0.01	0.01	<0.01	-	-
Phenanthrene	0.02 mg/kg	0.57	0.07	0.08	0.14	-	-
Pyrene	0.02 mg/kg	0.66	0.11	0.08	0.27	-	-
Quinoline	0.10 mg/kg	<0.10	<0.10	<0.10	<0.10	-	-
2-Fluorobiphenyl	Surrogate	75.3%	66.1%	76.5%	74.0%	-	-
Terphenyl-d14	Surrogate	52.6%	57.4%	60.2%	54.7%	-	-

	Client ID:	BH25-23-SS2	BH26-23-SS2	DUP		-	-
	Sample Date:	24-Nov-23 09:00	24-Nov-23 09:00	23-Nov-23 09:00			
	Sample ID:	2348117-05	2348117-06	2348117-07			
	Matrix:	Soil	Soil	Soil			
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	95.9	78.7	93.2	-	-	-
General Inorganics							
SAR	0.01 N/A	-	-	3.52	-	-	-
Conductivity	5 uS/cm	-	-	577	-	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	-	-	-
Arsenic	1.0 ug/g	2.8	1.5	1.9	-	-	-
Barium	1.0 ug/g	64.9	61.8	110	-	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	-	-	-
Boron	1.0 ug/g	12.3	3.8	6.9	-	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	-	-	-
Chromium (VI)	0.2 ug/g	<0.2	<0.2	<0.2	-	-	-
Chromium	5.0 ug/g	12.7	10.4	11.4	-	-	-
Cobalt	5.0 ug/g	5.2	<5.0	<5.0	-	-	-
Copper	5.0 ug/g	8.0	9.4	13.9	-	-	-
Lead	1.0 ug/g	6.0	4.3	5.5	-	-	-
Mercury	0.1 ug/g	<0.1	<0.1	<0.1	-	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	-	-	-
Nickel	5.0 ug/g	12.1	6.8	9.7	-	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	-	-	-
Silver	0.3 ug/g	<0.3	<0.3	1.7	-	-	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	-	-	-
Tin	5.0 ug/g	<5.0	<5.0	<5.0	-	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	-	-	-
Vanadium	10.0 ug/g	10.7	18.3	21.5	-	-	-

	Client ID:	BH25-23-SS2	BH26-23-SS2	DUP		-	-
	Sample Date:	24-Nov-23 09:00	24-Nov-23 09:00	23-Nov-23 09:00			
	Sample ID:	2348117-05	2348117-06	2348117-07			
	Matrix:	Soil	Soil	Soil			
	MDL/Units						
Metals							
Zinc	20.0 ug/g	<20.0	<20.0	<20.0	-	-	-
Volatiles							
Benzene	0.002 ug/g	<0.002	<0.002	<0.002	-	-	-
Ethylbenzene	0.002 ug/g	<0.002	<0.002	<0.002	-	-	-
Toluene	0.002 ug/g	<0.002	<0.002	<0.002	-	-	-
m,p-Xylenes	0.002 ug/g	<0.002	<0.002	<0.002	-	-	-
o-Xylene	0.002 ug/g	<0.002	<0.002	<0.002	-	-	-
Xylenes, total	0.002 ug/g	<0.002	<0.002	<0.002	-	-	-
Toluene-d8	Surrogate	100%	103%	101%	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 mg/kg	<7	<7	<7	-	-	-
F2 PHCs (C10-C16)	4 mg/kg	<4	<4	<40 [1]	-	-	-
F3 PHCs (C16-C34)	8 mg/kg	29	23	80	-	-	-
F4 PHCs (C34-C50)	6 mg/kg	21	18	976 [2]	-	-	-
F4G PHCs (gravimetric)	50 ug/g	-	-	3060	-	-	-
Semi-Volatiles							
1-Methylnaphthalene	0.02 mg/kg	<0.02	<0.02	<0.02	-	-	-
2-Methylnaphthalene	0.02 mg/kg	<0.02	<0.02	<0.02	-	-	-
Methylnaphthalene (1&2)	0.04 mg/kg	<0.04	<0.04	<0.04	-	-	-
Acenaphthene	0.02 mg/kg	<0.02	<0.02	0.13	-	-	-
Acenaphthylene	0.02 mg/kg	<0.02	<0.02	<0.02	-	-	-
Anthracene	0.02 mg/kg	<0.02	<0.02	0.38	-	-	-
Benzo [a] anthracene	0.02 mg/kg	<0.02	<0.02	0.73	-	-	-
Benzo [a] pyrene	0.02 mg/kg	<0.02	<0.02	0.47	-	-	-
Benzo [b] fluoranthene	0.02 mg/kg	<0.02	<0.02	0.52	-	-	-

	Client ID:	BH25-23-SS2	BH26-23-SS2	DUP		-	-
	Sample Date:	24-Nov-23 09:00	24-Nov-23 09:00	23-Nov-23 09:00			
	Sample ID:	2348117-05	2348117-06	2348117-07			
	Matrix:	Soil	Soil	Soil			
	MDL/Units						
Semi-Volatiles							
Benzo [g,h,i] perylene	0.02 mg/kg	<0.02	<0.02	0.28	-	-	-
Benzo [k] fluoranthene	0.02 mg/kg	<0.02	<0.02	0.34	-	-	-
Biphenyl	0.02 mg/kg	<0.02	<0.02	<0.02	-	-	-
Chrysene	0.02 mg/kg	<0.02	<0.02	0.65	-	-	-
Dibenzo [a,h] anthracene	0.02 mg/kg	<0.02	<0.02	0.04	-	-	-
Fluoranthene	0.02 mg/kg	<0.02	0.04	1.78	-	-	-
Fluorene	0.02 mg/kg	<0.02	<0.02	0.12	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 mg/kg	<0.02	<0.02	0.25	-	-	-
Naphthalene	0.01 mg/kg	<0.01	<0.01	0.02	-	-	-
Phenanthrene	0.02 mg/kg	<0.02	<0.02	1.21	-	-	-
Pyrene	0.02 mg/kg	<0.02	0.03	1.47	-	-	-
Quinoline	0.10 mg/kg	<0.10	<0.10	<0.10	-	-	-
2-Fluorobiphenyl	Surrogate	80.2%	56.8%	67.8%	-	-	-
Terphenyl-d14	Surrogate	59.7%	56.3%	57.0%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Conductivity	ND	5	uS/cm					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	mg/kg					
F2 PHCs (C10-C16)	ND	4	mg/kg					
F3 PHCs (C16-C34)	ND	8	mg/kg					
F4 PHCs (C34-C50)	ND	6	mg/kg					
F4G PHCs (gravimetric)	ND	50	ug/g					
Metals								
Antimony	ND	1.0	ug/g					
Arsenic	ND	1.0	ug/g					
Barium	ND	1.0	ug/g					
Beryllium	ND	0.5	ug/g					
Boron	ND	1.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium	ND	5.0	ug/g					
Chromium (VI)	ND	0.2	ug/g					
Cobalt	ND	5.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Mercury	ND	0.1	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Tin	ND	5.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
1-Methylnaphthalene	ND	0.02	mg/kg					
2-Methylnaphthalene	ND	0.02	mg/kg					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Methylnaphthalene (1&2)	ND	0.04	mg/kg					
Acenaphthene	ND	0.02	mg/kg					
Acenaphthylene	ND	0.02	mg/kg					
Anthracene	ND	0.02	mg/kg					
Benzo [a] anthracene	ND	0.02	mg/kg					
Benzo [a] pyrene	ND	0.02	mg/kg					
Benzo [b] fluoranthene	ND	0.02	mg/kg					
Benzo [g,h,i] perylene	ND	0.02	mg/kg					
Benzo [k] fluoranthene	ND	0.02	mg/kg					
Biphenyl	ND	0.02	mg/kg					
Chrysene	ND	0.02	mg/kg					
Dibenzo [a,h] anthracene	ND	0.02	mg/kg					
Fluoranthene	ND	0.02	mg/kg					
Fluorene	ND	0.02	mg/kg					
Indeno [1,2,3-cd] pyrene	ND	0.02	mg/kg					
Naphthalene	ND	0.01	mg/kg					
Phenanthrene	ND	0.02	mg/kg					
Pyrene	ND	0.02	mg/kg					
Quinoline	ND	0.10	mg/kg					
Surrogate: 2-Fluorobiphenyl	*0.918*		*%*	*68.8*	*50-140*			
Surrogate: Terphenyl-d14	*0.748*		*%*	*56.1*	*50-140*			
Volatiles								
Benzene	ND	0.002	ug/g					
Ethylbenzene	ND	0.002	ug/g					
Toluene	ND	0.002	ug/g					
m,p-Xylenes	ND	0.002	ug/g					
o-Xylene	ND	0.002	ug/g					
Xylenes, total	ND	0.002	ug/g					
Surrogate: Toluene-d8	*0.407*		*%*	*102*	*60-140*			
Acetone	ND	0.100	ug/g					
Benzene	ND	0.002	ug/g					
Bromodichloromethane	ND	0.005	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromoform	ND	0.005	ug/g					
Bromomethane	ND	0.005	ug/g					
Carbon Tetrachloride	ND	0.002	ug/g					
Chlorobenzene	ND	0.002	ug/g					
Chloroethane	ND	0.050	ug/g					
Chloroform	ND	0.002	ug/g					
Chloromethane	ND	0.050	ug/g					
Dibromochloromethane	ND	0.002	ug/g					
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.005	ug/g					
1,2-Dichlorobenzene	ND	0.002	ug/g					
1,3-Dichlorobenzene	ND	0.002	ug/g					
1,4-Dichlorobenzene	ND	0.002	ug/g					
1,1-Dichloroethane	ND	0.002	ug/g					
1,2-Dichloroethane	ND	0.002	ug/g					
1,1-Dichloroethylene	ND	0.002	ug/g					
Dichlorodifluoromethane	ND	0.002	ug/g					
cis-1,2-Dichloroethylene	ND	0.002	ug/g					
trans-1,2-Dichloroethylene	ND	0.002	ug/g					
1,2-Dichloroethylene, total	ND	0.003	ug/g					
1,2-Dichloropropane	ND	0.002	ug/g					
cis-1,3-Dichloropropylene	ND	0.002	ug/g					
trans-1,3-Dichloropropylene	ND	0.002	ug/g					
1,3-Dichloropropene, total	ND	0.003	ug/g					
Ethylbenzene	ND	0.002	ug/g					
Hexane	ND	0.050	ug/g					
Methyl Ethyl Ketone (2-Butanone)	ND	0.050	ug/g					
Methyl Butyl Ketone (2-Hexanone)	ND	0.010	ug/g					
Methyl Isobutyl Ketone	ND	0.050	ug/g					
Methyl tert-butyl ether	ND	0.010	ug/g					
Methylene Chloride	ND	0.005	ug/g					
Styrene	ND	0.005	ug/g					
1,1,1,2-Tetrachloroethane	ND	0.002	ug/g					
1,1,2,2-Tetrachloroethane	ND	0.002	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Tetrachloroethylene	ND	0.002	ug/g					
Toluene	ND	0.002	ug/g					
1,2,4-Trichlorobenzene	ND	0.002	ug/g					
1,1,1-Trichloroethane	ND	0.002	ug/g					
1,1,2-Trichloroethane	ND	0.002	ug/g					
Trichloroethylene	ND	0.002	ug/g					
Trichlorofluoromethane	ND	0.005	ug/g					
1,3,5-Trimethylbenzene	ND	0.005	ug/g					
Vinyl chloride	ND	0.005	ug/g					
m,p-Xylenes	ND	0.005	ug/g					
o-Xylene	ND	0.002	ug/g					
Xylenes, total	ND	0.005	ug/g					
Surrogate: 4-Bromofluorobenzene	*0.444*		*%*	*111*	*60-140*			
Surrogate: Dibromofluoromethane	*0.434*		*%*	*109*	*60-140*			
Surrogate: Toluene-d8	*0.407*		*%*	*102*	*60-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	3.04	0.01	N/A	3.52			14.6	30	
Conductivity	374	5	uS/cm	378			1.0	5	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	mg/kg	ND			NC	40	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	2.4	1.0	ug/g	2.5			5.0	30	
Barium	119	1.0	ug/g	117			1.6	30	
Beryllium	0.5	0.5	ug/g	ND			NC	30	
Boron	8.3	1.0	ug/g	6.4			26.2	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	14.0	5.0	ug/g	14.0			0.5	30	
Chromium (VI)	ND	0.2	ug/g	ND			NC	35	
Cobalt	ND	5.0	ug/g	ND			NC	30	
Copper	10.7	5.0	ug/g	11.0			2.9	30	
Lead	10.2	1.0	ug/g	10.7			4.2	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	10.1	5.0	ug/g	10.2			1.2	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Tin	ND	5.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	20.3	10.0	ug/g	19.0			6.2	30	
Zinc	28.4	20.0	ug/g	29.2			2.6	30	
Physical Characteristics									
% Solids	94.4	0.1	% by Wt.	94.1			0.4	25	
Semi-Volatiles									
1-Methylnaphthalene	ND	0.02	mg/kg	ND			NC	40	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
2-Methylnaphthalene	ND	0.02	mg/kg	ND			NC	40	
Acenaphthene	ND	0.02	mg/kg	ND			NC	40	
Acenaphthylene	0.084	0.02	mg/kg	0.097			14.2	40	
Anthracene	0.127	0.02	mg/kg	0.130			1.9	40	
Benzo [a] anthracene	0.322	0.02	mg/kg	0.347			7.4	40	
Benzo [a] pyrene	0.250	0.02	mg/kg	0.259			3.5	40	
Benzo [b] fluoranthene	0.263	0.02	mg/kg	0.299			12.7	40	
Benzo [g,h,i] perylene	0.166	0.02	mg/kg	0.178			7.0	40	
Benzo [k] fluoranthene	0.159	0.02	mg/kg	0.183			14.1	40	
Biphenyl	ND	0.02	mg/kg	ND			NC	40	
Chrysene	0.213	0.02	mg/kg	0.215			0.5	40	
Dibenzo [a,h] anthracene	0.042	0.02	mg/kg	0.044			5.8	40	
Fluoranthene	0.922	0.02	mg/kg	0.988			6.9	40	
Fluorene	ND	0.02	mg/kg	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.155	0.02	mg/kg	0.166			7.2	40	
Naphthalene	ND	0.01	mg/kg	ND			NC	40	
Phenanthrene	0.172	0.02	mg/kg	0.159			8.2	40	
Pyrene	0.786	0.02	mg/kg	0.812			3.3	40	
Quinoline	ND	0.10	mg/kg	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.21*		*%*		*80.2*	*50-140*			
Surrogate: Terphenyl-d14	*0.816*		*%*		*54.1*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	190	7	mg/kg	ND	95.1	85-115			
F2 PHCs (C10-C16)	74	4	mg/kg	ND	92.3	80-120			
F3 PHCs (C16-C34)	215	8	mg/kg	ND	110	80-120			
F4 PHCs (C34-C50)	137	6	mg/kg	ND	110	80-120			
F4G PHCs (gravimetric)	830	50	ug/g	ND	83.0	80-120			
Metals									
Arsenic	48.4	1.0	ug/g	1.0	94.7	70-130			
Barium	91.0	1.0	ug/g	47.0	88.0	70-130			
Beryllium	46.2	0.5	ug/g	ND	92.2	70-130			
Boron	45.9	1.0	ug/g	2.5	86.8	70-130			
Cadmium	43.7	0.5	ug/g	ND	87.4	70-130			
Chromium	50.0	5.0	ug/g	5.6	88.8	70-130			
Chromium (VI)	4.7	0.2	ug/g	ND	87.5	70-130			
Cobalt	46.7	5.0	ug/g	ND	89.4	70-130			
Copper	48.3	5.0	ug/g	ND	87.9	70-130			
Lead	47.3	1.0	ug/g	4.3	86.1	70-130			
Mercury	1.36	0.1	ug/g	ND	90.6	70-130			
Molybdenum	42.1	1.0	ug/g	ND	83.9	70-130			
Nickel	48.7	5.0	ug/g	ND	89.2	70-130			
Selenium	41.9	1.0	ug/g	ND	83.7	70-130			
Silver	41.9	0.3	ug/g	ND	83.8	70-130			
Thallium	44.9	1.0	ug/g	ND	89.6	70-130			
Tin	44.0	5.0	ug/g	ND	87.9	70-130			
Uranium	46.2	1.0	ug/g	ND	92.0	70-130			
Vanadium	53.0	10.0	ug/g	ND	90.8	70-130			
Zinc	53.5	20.0	ug/g	ND	83.7	70-130			
Semi-Volatiles									
1-Methylnaphthalene	0.159	0.02	mg/kg	ND	84.1	50-140			
2-Methylnaphthalene	0.170	0.02	mg/kg	ND	90.3	50-140			
Acenaphthene	0.198	0.02	mg/kg	ND	105	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthylene	0.159	0.02	mg/kg	ND	95.2	50-140			
Anthracene	0.178	0.02	mg/kg	ND	107	50-140			
Benzo [a] anthracene	0.164	0.02	mg/kg	ND	98.5	50-140			
Benzo [a] pyrene	0.118	0.02	mg/kg	ND	71.1	50-140			
Benzo [b] fluoranthene	0.157	0.02	mg/kg	ND	94.0	50-140			
Benzo [g,h,i] perylene	0.131	0.02	mg/kg	ND	78.6	50-140			
Benzo [k] fluoranthene	0.163	0.02	mg/kg	ND	98.0	50-140			
Biphenyl	0.157	0.02	mg/kg	ND	94.4	50-140			
Chrysene	0.167	0.02	mg/kg	ND	100	50-140			
Dibenzo [a,h] anthracene	0.125	0.02	mg/kg	ND	75.2	50-140			
Fluoranthene	0.199	0.02	mg/kg	ND	119	50-140			
Fluorene	0.139	0.02	mg/kg	ND	83.5	50-140			
Indeno [1,2,3-cd] pyrene	0.133	0.02	mg/kg	ND	80.0	50-140			
Naphthalene	0.139	0.01	mg/kg	ND	83.6	50-140			
Phenanthrene	0.176	0.02	mg/kg	ND	106	50-140			
Pyrene	0.189	0.02	mg/kg	ND	113	50-140			
Quinoline	0.119	0.10	mg/kg	ND	71.3	50-140			
Surrogate: 2-Fluorobiphenyl	*1.11*		*%*		*73.6*	*50-140*			
Surrogate: Terphenyl-d14	*0.829*		*%*		*55.0*	*50-140*			
Volatiles									
Benzene	0.187	0.002	ug/g	ND	93.4	60-140			
Ethylbenzene	0.162	0.002	ug/g	ND	80.8	60-140			
Toluene	0.163	0.002	ug/g	ND	81.6	60-140			
m,p-Xylenes	0.373	0.002	ug/g	ND	93.1	60-140			
o-Xylene	0.177	0.002	ug/g	ND	88.4	60-140			
Surrogate: Toluene-d8	*0.383*		*%*		*95.7*	*60-140*			
Acetone	0.513	0.100	ug/g	ND	103	60-140			
Benzene	0.187	0.002	ug/g	ND	93.4	60-140			
Bromodichloromethane	0.216	0.005	ug/g	ND	108	60-140			
Bromoform	0.210	0.005	ug/g	ND	105	60-140			
Carbon Tetrachloride	0.179	0.002	ug/g	ND	89.7	60-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	0.171	0.002	ug/g	ND	85.3	60-140			
Chloroform	0.204	0.002	ug/g	ND	102	60-140			
Chloromethane	0.223	0.050	ug/g	ND	111	60-140			
Dibromochloromethane	0.212	0.002	ug/g	ND	106	60-140			
Ethylene dibromide (dibromoethane, 1,2-)	0.163	0.005	ug/g	ND	81.7	60-130			
1,2-Dichlorobenzene	0.188	0.002	ug/g	ND	94.1	60-140			
1,3-Dichlorobenzene	0.171	0.002	ug/g	ND	85.3	60-140			
1,4-Dichlorobenzene	0.190	0.002	ug/g	ND	95.0	60-140			
1,1-Dichloroethane	0.232	0.002	ug/g	ND	116	60-140			
1,2-Dichloroethane	0.208	0.002	ug/g	ND	104	60-140			
1,1-Dichloroethylene	0.203	0.002	ug/g	ND	101	60-140			
cis-1,2-Dichloroethylene	0.174	0.002	ug/g	ND	87.2	60-140			
trans-1,2-Dichloroethylene	0.194	0.002	ug/g	ND	97.2	60-140			
1,2-Dichloropropane	0.189	0.002	ug/g	ND	94.5	60-140			
cis-1,3-Dichloropropylene	0.173	0.002	ug/g	ND	86.7	60-140			
trans-1,3-Dichloropropylene	0.197	0.002	ug/g	ND	98.7	60-140			
Ethylbenzene	0.162	0.002	ug/g	ND	80.8	60-140			
Methyl Ethyl Ketone (2-Butanone)	0.428	0.050	ug/g	ND	85.6	60-140			
Methyl Butyl Ketone (2-Hexanone)	0.565	0.010	ug/g	ND	113	60-140			
Methyl Isobutyl Ketone	0.339	0.050	ug/g	ND	67.7	60-140			
Methyl tert-butyl ether	0.516	0.010	ug/g	ND	103	60-140			
Methylene Chloride	0.203	0.005	ug/g	ND	102	60-140			
Styrene	0.180	0.005	ug/g	ND	90.0	60-140			
1,1,1,2-Tetrachloroethane	0.197	0.002	ug/g	ND	98.4	60-140			
1,1,2,2-Tetrachloroethane	0.182	0.002	ug/g	ND	91.1	60-140			
Tetrachloroethylene	0.161	0.002	ug/g	ND	80.3	60-140			
Toluene	0.163	0.002	ug/g	ND	81.6	60-140			
1,2,4-Trichlorobenzene	0.197	0.002	ug/g	ND	98.6	60-140			
1,1,1-Trichloroethane	0.215	0.002	ug/g	ND	108	60-140			
1,1,2-Trichloroethane	0.181	0.002	ug/g	ND	90.3	60-140			
Trichloroethylene	0.174	0.002	ug/g	ND	87.0	60-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	0.206	0.005	ug/g	ND	103	60-140			
1,3,5-Trimethylbenzene	0.206	0.005	ug/g	ND	103	60-140			
Vinyl chloride	0.214	0.005	ug/g	ND	107	60-140			
m,p-Xylenes	0.373	0.005	ug/g	ND	93.1	60-140			
o-Xylene	0.177	0.002	ug/g	ND	88.4	60-140			
Surrogate: 4-Bromofluorobenzene	*0.421*		*%*		*105*	*60-140*			
Surrogate: Dibromofluoromethane	*0.393*		*%*		*98.2*	*60-140*			
Surrogate: Toluene-d8	*0.383*		*%*		*95.7*	*60-140*			

Qualifier Notes:

Sample Qualifiers :

1: Elevated reporting limits due to the nature of the sample matrix.

2: GC-FID signal did not return to baseline by C50

3: Some peak(s) in the GC-FID Chromatogram are not typical of petroleum hydrocarbon distillates. May be the result of high concentrations of non-mineral based compounds not completely removed by the method cleanup. Results may be biased high.

Sample Data Revisions:

None

Certificate of Analysis

Report Date: 04-Dec-2023

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 27-Nov-2023

Client PO: 58931

Project Description: PE6038

Work Order Revisions / Comments:

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis unlesss otherwise noted.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2348117	

Client Name:	Paterson Group Inc.	Project Ref:	PE6038
Contact Name:	Jeremy Camposarcone	Quote #:	
Address:	9 AURIGA DRIVE OTTAWA ON K2E 7T9	PO #:	58931
Telephone:	613-226-7381	E-mail:	jcamposarcone@patersongroup.ca amenyhart@patersongroup.ca

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required: _____

☒ REG 153/04 ☐ REG 406/19

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

Other Regulation

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHC F1-F4 + BTEX	VOCs/PHCs F1-F4	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	pH	EC/SAR			
1	BH21-23-AU1	S		3	11/23/2023		✔		✔	✔	✔	✔			✔			
2	BH22-23-SS2	S		3	11/23/2023			✔	✔	✔	✔	✔						
3	BH23-23-AU1	S		3	11/23/2023		✔		✔	✔	✔	✔			✔			
4	BH24-23-AU1	S		3	11/23/2023		✔		✔	✔	✔	✔			✔			
5	BH25-23-SS2	S		3	11/24/2023		✔		✔	✔	✔	✔						
6	BH26-23-SS2	S		3	11/24/2023		✔		✔	✔	✔	✔			✔			
7	DUP	S		3	11/23/2023		✔		✔	✔	✔	✔			✔			
8																		
9																		
10																		

Required Analysis

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):		Received By Driver/Depot:	Received at Lab: SD
Relinquished By (Print):	Jeremy Camposarcone	Date/Time:	Date/Time: Nov 27, 2023 4:54
Date/Time:	11/27/2023	Temperature: °C	Temperature: 10.2 C

Verified By:
Date/Time: Nov 27 2023 9:11
pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Adrian Menyhart

Client PO: 58993
Project: PE6038
Custody:

Report Date: 7-Dec-2023
Order Date: 1-Dec-2023

Order #: 2348542

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

Paracel ID	Client ID
2348542-01	BH21-23-GW1
2348542-02	BH22-23-GW1
2348542-03	BH25-23-GW1
2348542-04	BH26-23-GW1
2348542-05	DUP-1-GW

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	4-Dec-23	4-Dec-23
Chromium, hexavalent, water, low level	MOE E3056 - colourimetric	4-Dec-23	4-Dec-23
Metals, ICP-MS	EPA 200.8 - ICP-MS	4-Dec-23	5-Dec-23
PAHs by GC-MS	EPA 625 - GC-MS, extraction	7-Dec-23	7-Dec-23
PHC F1	CWS Tier 1 - P&T GC-FID	4-Dec-23	4-Dec-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	4-Dec-23	4-Dec-23
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	4-Dec-23	4-Dec-23

Certificate of Analysis

Report Date: 07-Dec-2023

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 1-Dec-2023

Client PO: **58993**

Project Description: **PE6038**

	Client ID:	BH21-23-GW1	BH22-23-GW1	BH25-23-GW1	BH26-23-GW1	-	-
	Sample Date:	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00		
	Sample ID:	2348542-01	2348542-02	2348542-03	2348542-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Metals							
Aluminum	1 ug/L	4	9	5	12	-	-
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	0.7	-	-
Arsenic	1 ug/L	<1	<1	<1	<1	-	-
Barium	1 ug/L	180	65	125	203	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Boron	10 ug/L	77	81	41	125	-	-
Cadmium	0.01 ug/L	<0.01	<0.01	0.02	0.01	-	-
Calcium	100 ug/L	562000	450000	193000	470000	-	-
Chromium (VI)	1 ug/L	<1	<1	<1	<1	-	-
Chromium	1 ug/L	<1	<1	<1	<1	-	-
Cobalt	0.5 ug/L	1.9	0.6	0.6	<0.5	-	-
Copper	0.5 ug/L	1.7	1.7	6.4	3.6	-	-
Iron	100 ug/L	<100	<100	<100	<100	-	-
Lead	0.1 ug/L	<0.1	<0.1	0.1	<0.1	-	-
Magnesium	200 ug/L	61300	91000	27500	38900	-	-
Manganese	5 ug/L	88	17	20	8	-	-
Molybdenum	0.5 ug/L	2.6	10.6	2.9	12.9	-	-
Nickel	1 ug/L	5	3	2	1	-	-
Selenium	1 ug/L	<1	<1	<1	<1	-	-
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1	-	-
Thallium	0.1 ug/L	<0.1	0.1	<0.1	0.2	-	-
Titanium	5 ug/L	<5	<5	<5	<5	-	-
Uranium	0.1 ug/L	2.6	2.1	3.5	0.8	-	-
Vanadium	0.5 ug/L	2.0	0.7	0.8	4.3	-	-
Zinc	5 ug/L	6	11	15	<5	-	-

	Client ID:	BH21-23-GW1	BH22-23-GW1	BH25-23-GW1	BH26-23-GW1	-	-
	Sample Date:	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00		
	Sample ID:	2348542-01	2348542-02	2348542-03	2348542-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Acetone	5.0 ug/L	-	<5.0	-	-	-	-
Benzene	0.5 ug/L	-	<0.5	-	-	-	-
Bromodichloromethane	0.5 ug/L	-	<0.5	-	-	-	-
Bromoform	0.5 ug/L	-	<0.5	-	-	-	-
Bromomethane	0.5 ug/L	-	<0.5	-	-	-	-
Carbon Tetrachloride	0.2 ug/L	-	<0.2	-	-	-	-
Chlorobenzene	0.5 ug/L	-	<0.5	-	-	-	-
Chloroethane	1.0 ug/L	-	<1.0	-	-	-	-
Chloroform	0.5 ug/L	-	<0.5	-	-	-	-
Chloromethane	3.0 ug/L	-	<3.0	-	-	-	-
Dibromochloromethane	0.5 ug/L	-	<0.5	-	-	-	-
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	-	-	-	-
1,2-Dibromoethane	0.2 ug/L	-	<0.2	-	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	-	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	-	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	-	-	-	-
1,1-Dichloroethane	0.5 ug/L	-	<0.5	-	-	-	-
1,2-Dichloroethane	0.5 ug/L	-	<0.5	-	-	-	-
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	-	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	-	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	-	-	-	-
1,2-Dichloroethylene, total	0.5 ug/L	-	<0.5	-	-	-	-
1,2-Dichloropropane	0.5 ug/L	-	<0.5	-	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	-	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	-	-	-	-

	Client ID:	BH21-23-GW1	BH22-23-GW1	BH25-23-GW1	BH26-23-GW1	-	-
	Sample Date:	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00		
	Sample ID:	2348542-01	2348542-02	2348542-03	2348542-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	-	-	-	-
Ethylbenzene	0.5 ug/L	-	<0.5	-	-	-	-
Hexane	1.0 ug/L	-	<1.0	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	-	<10.0	-	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	-	-	-	-
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	-	-	-	-
Methylene Chloride	5.0 ug/L	-	<5.0	-	-	-	-
Styrene	0.5 ug/L	-	<0.5	-	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	-	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	-	-	-	-
Tetrachloroethylene	0.5 ug/L	-	<0.5	-	-	-	-
Toluene	0.5 ug/L	-	<0.5	-	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	-	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	-	-	-	-
Trichloroethylene	0.5 ug/L	-	<0.5	-	-	-	-
Trichlorofluoromethane	1.0 ug/L	-	<1.0	-	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	-	<0.5	-	-	-	-
Vinyl chloride	0.5 ug/L	-	<0.5	-	-	-	-
m,p-Xylenes	0.5 ug/L	-	<0.5	-	-	-	-
o-Xylene	0.5 ug/L	-	<0.5	-	-	-	-
Xylenes, total	0.5 ug/L	-	<0.5	-	-	-	-
4-Bromofluorobenzene	Surrogate	-	82.6%	-	-	-	-
Dibromofluoromethane	Surrogate	-	111%	-	-	-	-
Toluene-d8	Surrogate	-	106%	-	-	-	-

	Client ID:	BH21-23-GW1	BH22-23-GW1	BH25-23-GW1	BH26-23-GW1	-	-
	Sample Date:	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00		
	Sample ID:	2348542-01	2348542-02	2348542-03	2348542-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Benzene	0.0005 mg/L	<0.0005	-	<0.0005	<0.0005	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	-	<0.0005	<0.0005	-	-
Toluene	0.0005 mg/L	<0.0005	-	<0.0005	<0.0005	-	-
m,p-Xylenes	0.0005 mg/L	<0.0005	-	<0.0005	<0.0005	-	-
o-Xylene	0.0005 mg/L	<0.0005	-	<0.0005	<0.0005	-	-
Xylenes, total	0.0005 mg/L	<0.0005	-	<0.0005	<0.0005	-	-
Toluene-d8	Surrogate	104%	-	105%	108%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	0.025 mg/L	<0.025	<0.025	<0.025	<0.025	-	-
F2 PHCs (C10-C16)	0.1 mg/L	<0.1	<0.1	<0.1	<0.1	-	-
F3 PHCs (C16-C34)	0.1 mg/L	<0.1	<0.1	<0.1	<0.1	-	-
F4 PHCs (C34-C50)	0.1 mg/L	<0.1	<0.1	<0.1	<0.1	-	-
Semi-Volatiles							
Acenaphthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Acridine	0.10 ug/L	<0.10	<0.10	<0.10	<0.10	-	-
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Anthracene	0.01 ug/L	<0.01	0.03	<0.01	<0.01	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Biphenyl	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Chrysene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-

	Client ID:	BH21-23-GW1	BH22-23-GW1	BH25-23-GW1	BH26-23-GW1	-	-
	Sample Date:	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00	29-Nov-23 09:00		
	Sample ID:	2348542-01	2348542-02	2348542-03	2348542-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Semi-Volatiles							
Fluoranthene	0.01 ug/L	<0.01	0.06	<0.01	<0.01	-	-
Fluorene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	<0.10	<0.10	-	-
Naphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05	-	-
Phenanthrene	0.05 ug/L	<0.05	0.07	<0.05	<0.05	-	-
Pyrene	0.01 ug/L	<0.01	0.05	<0.01	<0.01	-	-
Quinoline	0.10 ug/L	<0.10	<0.10	<0.10	<0.10	-	-
2-Fluorobiphenyl	Surrogate	71.4%	67.1%	71.8%	71.1%	-	-
Terphenyl-d14	Surrogate	80.7%	81.6%	79.7%	86.2%	-	-

	Client ID:	DUP-1-GW				-	-
	Sample Date:	29-Nov-23 09:00					
	Sample ID:	2348542-05					
	Matrix:	Ground Water					
	MDL/Units						
Volatiles							
Acetone	5.0 ug/L	<5.0	-	-	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	-	-	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-	-	-

	Client ID:	DUP-1-GW				-	-
	Sample Date:	29-Nov-23 09:00					
	Sample ID:	2348542-05					
	Matrix:	Ground Water					
	MDL/Units						
Volatiles							
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	-	-	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-	-	-
4-Bromofluorobenzene	Surrogate	82.2%	-	-	-	-	-
Dibromofluoromethane	Surrogate	111%	-	-	-	-	-
Toluene-d8	Surrogate	111%	-	-	-	-	-

	Client ID:	DUP-1-GW				-	-
	Sample Date:	29-Nov-23 09:00					
	Sample ID:	2348542-05					
	Matrix:	Ground Water					
	MDL/Units						
Hydrocarbons							
F1 PHCs (C6-C10)	0.025 mg/L	<0.025	-	-	-	-	-
F2 PHCs (C10-C16)	0.1 mg/L	<0.1	-	-	-	-	-
F3 PHCs (C16-C34)	0.1 mg/L	<0.1	-	-	-	-	-
F4 PHCs (C34-C50)	0.1 mg/L	<0.1	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	0.025	mg/L					
F2 PHCs (C10-C16)	ND	0.1	mg/L					
F3 PHCs (C16-C34)	ND	0.1	mg/L					
F4 PHCs (C34-C50)	ND	0.1	mg/L					
Metals								
Aluminum	ND	1	ug/L					
Antimony	ND	0.5	ug/L					
Arsenic	ND	1	ug/L					
Barium	ND	1	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10	ug/L					
Cadmium	ND	0.01	ug/L					
Calcium	ND	100	ug/L					
Chromium (VI)	ND	1	ug/L					
Chromium	ND	1	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Iron	ND	100	ug/L					
Lead	ND	0.1	ug/L					
Magnesium	ND	200	ug/L					
Manganese	ND	5	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1	ug/L					
Selenium	ND	1	ug/L					
Silver	ND	0.1	ug/L					
Thallium	ND	0.1	ug/L					
Titanium	ND	5	ug/L					
Uranium	ND	0.1	ug/L					
Vanadium	ND	0.5	ug/L					
Zinc	ND	5	ug/L					
Semi-Volatiles								
Acenaphthene	ND	0.05	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthylene	ND	0.05	ug/L					
Acridine	ND	0.10	ug/L					
Anthracene	ND	0.01	ug/L					
Benzo [a] anthracene	ND	0.01	ug/L					
Benzo [a] pyrene	ND	0.01	ug/L					
Benzo [b] fluoranthene	ND	0.05	ug/L					
Benzo [g,h,i] perylene	ND	0.05	ug/L					
Benzo [k] fluoranthene	ND	0.05	ug/L					
Biphenyl	ND	0.05	ug/L					
Chrysene	ND	0.05	ug/L					
Dibenzo [a,h] anthracene	ND	0.05	ug/L					
Fluoranthene	ND	0.01	ug/L					
Fluorene	ND	0.05	ug/L					
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L					
1-Methylnaphthalene	ND	0.05	ug/L					
2-Methylnaphthalene	ND	0.05	ug/L					
Methylnaphthalene (1&2)	ND	0.10	ug/L					
Naphthalene	ND	0.05	ug/L					
Phenanthrene	ND	0.05	ug/L					
Pyrene	ND	0.01	ug/L					
Quinoline	ND	0.10	ug/L					
Surrogate: 2-Fluorobiphenyl	*13.6*		*%*	*68.0*	*50-140*			
Surrogate: Terphenyl-d14	*16.0*		*%*	*80.0*	*50-140*			
Volatiles								
Acetone	ND	5.0	ug/L					
Benzene	ND	0.5	ug/L					
Bromodichloromethane	ND	0.5	ug/L					
Bromoform	ND	0.5	ug/L					
Bromomethane	ND	0.5	ug/L					
Carbon Tetrachloride	ND	0.2	ug/L					
Chlorobenzene	ND	0.5	ug/L					
Chloroethane	ND	1.0	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.5	ug/L					
Chloromethane	ND	3.0	ug/L					
Dibromochloromethane	ND	0.5	ug/L					
Dichlorodifluoromethane	ND	1.0	ug/L					
1,2-Dibromoethane	ND	0.2	ug/L					
1,2-Dichlorobenzene	ND	0.5	ug/L					
1,3-Dichlorobenzene	ND	0.5	ug/L					
1,4-Dichlorobenzene	ND	0.5	ug/L					
1,1-Dichloroethane	ND	0.5	ug/L					
1,2-Dichloroethane	ND	0.5	ug/L					
1,1-Dichloroethylene	ND	0.5	ug/L					
cis-1,2-Dichloroethylene	ND	0.5	ug/L					
trans-1,2-Dichloroethylene	ND	0.5	ug/L					
1,2-Dichloroethylene, total	ND	0.5	ug/L					
1,2-Dichloropropane	ND	0.5	ug/L					
cis-1,3-Dichloropropylene	ND	0.5	ug/L					
trans-1,3-Dichloropropylene	ND	0.5	ug/L					
1,3-Dichloropropene, total	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Hexane	ND	1.0	ug/L					
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L					
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L					
Methyl Isobutyl Ketone	ND	5.0	ug/L					
Methyl tert-butyl ether	ND	2.0	ug/L					
Methylene Chloride	ND	5.0	ug/L					
Styrene	ND	0.5	ug/L					
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L					
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L					
Tetrachloroethylene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
1,1,1-Trichloroethane	ND	0.5	ug/L					
1,1,2-Trichloroethane	ND	0.5	ug/L					
Trichloroethylene	ND	0.5	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L					
1,3,5-Trimethylbenzene	ND	0.5	ug/L					
Vinyl chloride	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: 4-Bromofluorobenzene	*64.7*		*%*	*80.9*	*50-140*			
Surrogate: Dibromofluoromethane	*92.8*		*%*	*116*	*50-140*			
Surrogate: Toluene-d8	*79.4*		*%*	*99.3*	*50-140*			
Benzene	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
m,p-Xylenes	ND	0.0005	mg/L					
o-Xylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: Toluene-d8	*0.0794*		*%*	*99.3*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L	ND			NC	30	
Metals									
Aluminum	4.6	1	ug/L	4.5			3.0	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	174	1	ug/L	180			3.5	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	77	10	ug/L	77			1.1	20	
Cadmium	ND	0.01	ug/L	0.01			NC	30	
Calcium	529000	1000	ug/L	562000			6.1	20	
Chromium (VI)	ND	1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	1.88	0.5	ug/L	1.92			2.1	20	
Copper	1.71	0.5	ug/L	1.74			1.8	20	
Iron	ND	100	ug/L	ND			NC	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Magnesium	60100	200	ug/L	61300			2.0	20	
Manganese	86.6	5	ug/L	87.9			1.5	20	
Molybdenum	2.61	0.5	ug/L	2.58			1.2	20	
Nickel	4.8	1	ug/L	4.6			2.6	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Titanium	ND	5	ug/L	ND			NC	20	
Uranium	2.7	0.1	ug/L	2.6			3.5	20	
Vanadium	1.99	0.5	ug/L	2.05			2.9	20	
Zinc	6	5	ug/L	6			2.4	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroethane	ND	1.0	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Chloromethane	ND	3.0	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dibromoethane	ND	0.2	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*68.4*		*%*		*85.4*	*50-140*			
Surrogate: Dibromofluoromethane	*82.5*		*%*		*103*	*50-140*			
Surrogate: Toluene-d8	*86.4*		*%*		*108*	*50-140*			
Benzene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: Toluene-d8	*0.0864*		*%*		*108*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1.90	0.025	mg/L	ND	110	85-115			
F2 PHCs (C10-C16)	1.5	0.1	mg/L	ND	91.8	60-140			
F3 PHCs (C16-C34)	4.2	0.1	mg/L	ND	108	60-140			
F4 PHCs (C34-C50)	3.3	0.1	mg/L	ND	134	60-140			
Metals									
Aluminum	58.1	1	ug/L	4.5	107	80-120			
Antimony	42.7	0.5	ug/L	ND	85.4	80-120			
Arsenic	45.9	1	ug/L	ND	91.0	80-120			
Barium	69.9	1	ug/L	29.6	80.6	80-120			
Beryllium	44.8	0.5	ug/L	ND	89.6	80-120			
Boron	102	10	ug/L	58	87.5	80-120			
Cadmium	4.17	0.01	ug/L	0.01	83.2	80-120			
Calcium	11100	100	ug/L	ND	111	80-120			
Chromium (VI)	143	1	ug/L	ND	71.5	70-130			
Chromium	51.1	1	ug/L	ND	102	80-120			
Cobalt	49.2	0.5	ug/L	1.92	94.6	80-120			
Copper	42.7	0.5	ug/L	1.74	82.0	80-120			
Iron	2250	100	ug/L	ND	89.3	80-120			
Lead	52.1	0.1	ug/L	ND	104	80-120			
Magnesium	10700	200	ug/L	ND	107	80-120			
Manganese	133	5	ug/L	87.9	90.2	80-120			
Molybdenum	46.0	0.5	ug/L	2.58	86.8	80-120			
Nickel	49.2	1	ug/L	4.6	89.1	80-120			
Selenium	45.4	1	ug/L	ND	90.7	80-120			
Silver	41.2	0.1	ug/L	ND	82.3	80-120			
Thallium	41.2	0.1	ug/L	ND	82.4	80-120			
Titanium	54.8	5	ug/L	ND	109	80-120			
Uranium	44.2	0.1	ug/L	2.6	83.2	80-120			
Vanadium	51.1	0.5	ug/L	2.05	98.2	80-120			
Zinc	44	5	ug/L	ND	86.2	80-120			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Semi-Volatiles									
Acenaphthene	3.77	0.05	ug/L	ND	75.3	50-140			
Acenaphthylene	4.23	0.05	ug/L	ND	84.5	50-140			
Acridine	5.63	0.10	ug/L	ND	113	50-140			
Anthracene	4.65	0.01	ug/L	ND	93.0	50-140			
Benzo [a] anthracene	4.21	0.01	ug/L	ND	84.3	50-140			
Benzo [a] pyrene	3.28	0.01	ug/L	ND	65.7	50-140			
Benzo [b] fluoranthene	4.15	0.05	ug/L	ND	83.0	50-140			
Benzo [g,h,i] perylene	3.62	0.05	ug/L	ND	72.4	50-140			
Benzo [k] fluoranthene	4.44	0.05	ug/L	ND	88.8	50-140			
Biphenyl	4.22	0.05	ug/L	ND	84.3	50-140			
Chrysene	4.03	0.05	ug/L	ND	80.6	50-140			
Dibenzo [a,h] anthracene	3.73	0.05	ug/L	ND	74.7	50-140			
Fluoranthene	4.93	0.01	ug/L	ND	98.7	50-140			
Fluorene	3.75	0.05	ug/L	ND	74.9	50-140			
Indeno [1,2,3-cd] pyrene	3.99	0.05	ug/L	ND	79.7	50-140			
1-Methylnaphthalene	3.62	0.05	ug/L	ND	72.5	50-140			
2-Methylnaphthalene	3.81	0.05	ug/L	ND	76.1	50-140			
Naphthalene	3.73	0.05	ug/L	ND	74.6	50-140			
Phenanthrene	3.91	0.05	ug/L	ND	78.2	50-140			
Pyrene	5.01	0.01	ug/L	ND	100	50-140			
Quinoline	4.35	0.10	ug/L	ND	87.0	50-140			
Surrogate: 2-Fluorobiphenyl	*14.8*		*%*		*74.0*	*50-140*			
Surrogate: Terphenyl-d14	*16.6*		*%*		*83.2*	*50-140*			
Volatiles									
Acetone	95.7	5.0	ug/L	ND	95.7	50-140			
Benzene	47.6	0.5	ug/L	ND	119	60-130			
Bromodichloromethane	40.7	0.5	ug/L	ND	102	60-130			
Bromoform	46.9	0.5	ug/L	ND	117	60-130			
Bromomethane	46.5	0.5	ug/L	ND	116	50-140			
Carbon Tetrachloride	38.1	0.2	ug/L	ND	95.2	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	40.2	0.5	ug/L	ND	100	60-130			
Chloroethane	37.1	1.0	ug/L	ND	92.8	50-140			
Chloroform	40.8	0.5	ug/L	ND	102	60-130			
Chloromethane	43.0	3.0	ug/L	ND	108	50-140			
Dibromochloromethane	46.1	0.5	ug/L	ND	115	60-130			
Dichlorodifluoromethane	47.8	1.0	ug/L	ND	120	50-140			
1,2-Dibromoethane	51.3	0.2	ug/L	ND	128	60-130			
1,2-Dichlorobenzene	45.5	0.5	ug/L	ND	114	60-130			
1,3-Dichlorobenzene	49.2	0.5	ug/L	ND	123	60-130			
1,4-Dichlorobenzene	39.8	0.5	ug/L	ND	99.6	60-130			
1,1-Dichloroethane	38.8	0.5	ug/L	ND	97.1	60-130			
1,2-Dichloroethane	35.0	0.5	ug/L	ND	87.6	60-130			
1,1-Dichloroethylene	40.0	0.5	ug/L	ND	100	60-130			
cis-1,2-Dichloroethylene	44.6	0.5	ug/L	ND	111	60-130			
trans-1,2-Dichloroethylene	44.3	0.5	ug/L	ND	111	60-130			
1,2-Dichloropropane	43.8	0.5	ug/L	ND	109	60-130			
cis-1,3-Dichloropropylene	47.0	0.5	ug/L	ND	118	60-130			
trans-1,3-Dichloropropylene	39.4	0.5	ug/L	ND	98.4	60-130			
Ethylbenzene	43.6	0.5	ug/L	ND	109	60-130			
Hexane	45.7	1.0	ug/L	ND	114	60-130			
Methyl Ethyl Ketone (2-Butanone)	135	5.0	ug/L	ND	135	50-140			
Methyl Butyl Ketone (2-Hexanone)	120	10.0	ug/L	ND	120	50-140			
Methyl Isobutyl Ketone	133	5.0	ug/L	ND	133	50-140			
Methyl tert-butyl ether	97.5	2.0	ug/L	ND	97.5	50-140			
Methylene Chloride	45.9	5.0	ug/L	ND	115	60-130			
Styrene	48.8	0.5	ug/L	ND	122	60-130			
1,1,1,2-Tetrachloroethane	41.8	0.5	ug/L	ND	104	60-130			
1,1,2,2-Tetrachloroethane	47.8	0.5	ug/L	ND	120	60-130			
Tetrachloroethylene	46.4	0.5	ug/L	ND	116	60-130			
Toluene	49.7	0.5	ug/L	ND	124	60-130			
1,1,1-Trichloroethane	39.2	0.5	ug/L	ND	98.0	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2-Trichloroethane	43.5	0.5	ug/L	ND	109	60-130			
Trichloroethylene	41.5	0.5	ug/L	ND	104	60-130			
Trichlorofluoromethane	39.6	1.0	ug/L	ND	99.1	60-130			
1,3,5-Trimethylbenzene	44.7	0.5	ug/L	ND	112	60-130			
Vinyl chloride	37.9	0.5	ug/L	ND	94.7	50-140			
m,p-Xylenes	78.0	0.5	ug/L	ND	97.5	60-130			
o-Xylene	51.5	0.5	ug/L	ND	129	60-130			
Surrogate: 4-Bromofluorobenzene	*61.8*		*%*		*77.2*	*50-140*			
Surrogate: Dibromofluoromethane	*97.5*		*%*		*122*	*50-140*			
Surrogate: Toluene-d8	*63.0*		*%*		*78.8*	*50-140*			
Benzene	0.0476	0.0005	mg/L	ND	119	60-130			
Ethylbenzene	0.0436	0.0005	mg/L	ND	109	60-130			
Toluene	0.0497	0.0005	mg/L	ND	124	60-130			
m,p-Xylenes	0.0780	0.0005	mg/L	ND	97.5	60-130			
o-Xylene	0.0515	0.0005	mg/L	ND	129	60-130			
Surrogate: Toluene-d8	*0.0630*		*%*		*78.8*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container and COC sample IDs don't match. Report includes container IDs as directed by client. -
Applies to Samples: DUP-1-GW

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

PARACEL LABORATORIES LTD.

Paracel ID: 2348542

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2348542	

Page 1 of 1

Client Name: Paterson Group Inc.	Project Ref: PE6038
Contact Name:	Quote #:
Address: 9 AURIGA DRIVE OTTAWA ON K2E 7T9	PO #: 58993
Telephone: 613-226-7381	E-mail: amenyhart@patersongroup.ca jcamposarcone@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required:

☒ REG 153/04 ☐ REG 406/19

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

Other Regulation

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHC F1-F4 + BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	pH				
1	BH21-23-GW1	GW		7	11/29/2023		✔		✔	✔	✔	✔						
2	BH22-23-GW1	GW		7	11/29/2023		✔	✔	✔	✔	✔	✔						
3	BH25-23-GW1	GW		7	11/29/2023		✔		✔	✔	✔	✔						
4	BH26-23-GW1	GW		7	11/29/2023		✔		✔	✔	✔	✔						
5	DUP	GW		3	11/29/2023		✔	✓	✔	✔	✔	✔						
6																		
7																		
8																		
9																		
10																		

Required Analysis

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: HP	Verified By:
Relinquished By (Print): Jeremy Camposarcone	Date/Time:	Date/Time: Dec 1, 23 | 16:55	Date/Time: Dec 2 2023
Date/Time: 12/1/2023	Temperature: °C	Temperature: 16.1, 16.1 °	pH Verified: ☐ By:

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Subcontracted Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Adrian Menyhart

Paracel Report No.	**2348542**
Client Project(s):	**PE6038**
Client PO:	**58993**
Reference:	**Standing Offer**
CoC Number:	

Order Date:	01-Dec-23
Report Date:	11-Dec-23

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	Analysis
2348542-01	BH21-23-GW1	Mercury - trace level
2348542-02	BH22-23-GW1	Mercury - trace level
2348542-03	BH25-23-GW1	Mercury - trace level
2348542-04	BH26-23-GW1	Mercury - trace level

TESTMARK Laboratories Ltd.
Committed to Quality and Service

CERTIFICATE OF ANALYSIS

Client:	Dale Robertson	Work Order Number:	521132
Company:	Paracel Laboratories Ltd. - Ottawa	PO #:	
Address:	300-2319 St. Laurent Blvd.	Regulation:	CCME Long Term Freshwater Quality Guidelines
	Ottawa, ON, K1G 4J8	Project #:	2348542
Phone/Fax:	(613) 731-9577 / (613) 731-9064	DWS #:	
Email:	drobertson@paracellabs.com	Sampled By:	
Date Order Received:	12/6/2023	Analysis Started:	12/7/2023
Arrival Temperature:	16 C	Analysis Completed:	12/8/2023

WORK ORDER SUMMARY

ANALYSES WERE PERFORMED ON THE FOLLOWING SAMPLES. THE RESULTS RELATE ONLY TO THE ITEMS TESTED.

Sample Description	Lab ID	Matrix	Type	Comments	Date Collected	Time Collected
BH21-23-GW1	1959060	Ground Water	Grab		11/29/2023	10:30 AM
BH22-23-GW1	1959061	Ground Water	Grab		11/29/2023	12:00 PM
BH25-23-GW1	1959062	Ground Water	Grab		11/29/2023	4:00 PM
BH26-23-GW1	1959063	Ground Water	Grab		11/29/2023	4:40 PM

METHODS AND INSTRUMENTATION

THE FOLLOWING METHODS WERE USED FOR YOUR SAMPLE(S):

Method	Lab	Description	Reference
Mercury Dis. Water CV FF (S8)	Timmins	Determination of Dissolved Inorganic Mercury by Cold Vapour AA -> Field-Filtered	Modified from EPA 245.7

1335 Riverside Drive, Timmins, ON, P4R 1A6
Phone: (705) 531-1121 Fax: (705) 531-1125 Web: www.testmark.ca

TESTMARK Laboratories Ltd.
Committed to Quality and Service

CERTIFICATE OF ANALYSIS

Paracel Laboratories Ltd. - Ottawa

Work Order Number: 521132

This report has been approved by:

Adam Tam, M.Sc.
Laboratory Director

WORK ORDER RESULTS

Sample Description	BH21 - 23 - GW1		BH22 - 23 - GW1		BH25 - 23 - GW1		BH26 - 23 - GW1			
Sample Date	11/29/2023 10:30 AM		11/29/2023 12:00 PM		11/29/2023 4:00 PM		11/29/2023 4:40 PM			
Lab ID	1959060		1959061		1959062		1959063			
Mercury by CV (Dissolved)	Result	MDL	Result	MDL	Result	MDL	Result	MDL	Units	Criteria: CCME Long Term Freshwater Quality Guidelines
Dissolved Mercury	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	ug/L	~

LEGEND

Dates: Dates are formatted as mm/dd/year throughout this report.

MDL: Method detection limit or minimum reporting limit.

~: In a criteria column indicates the criteria is not applicable for the parameter row.

Organic Soil Analysis: Data reported for organic analysis in soils samples are corrected for moisture content.

Quality Control: All associated Quality Control data is available on request.

Field Data: Reports containing Field Parameters represent data that has been collected and provided by the client. Testmark is not responsible for the validity of this data which may be used in subsequent calculations.

Sample Condition Deviations: A noted sample condition deviation may affect the validity of the result. Results apply to the sample(s) as received.

ICPMS Dustfall Insoluble: The ICPMS Dustfall Insoluble Portion method analyzes only the particulate matter from the Dustfall Sampler which is retained on the analysis filter during the Dustfall method.

Regulation Comparisons: Disclaimer: Please note that regulation criteria are provided for comparative purposes, however the onus on ensuring the validity of this comparison rests with the client.

1335 Riverside Drive, Timmins, ON, P4R 1A6
Phone: (705) 531-1121 Fax: (705) 531-1125 Web: www.testmark.ca

PARACEL LABORATORIES LTD.

Paracel ID: 2348542

Paracel Order Number (Lab Use Only): 2348542

Chain Of Custody (Lab Use Only)

Page 1 of 1

Client Name: Paterson Group Inc.	Project Ref: PE6038
Contact Name:	Quote #:
Address: 9 AURIGA DRIVE, OTTAWA ON K2E 7T9	PO #: 58993
Telephone: 613-226-7381	E-mail: amenyhart@patersongroup.ca, jcamposarcone@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular

Date Required:

☒ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table

For RSC: ☐ Yes ☐ No

Other Regulation

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHC F1-F4 + BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	pH				
1	BH21-23-GW1	GW		7	11/29/2023		✓		✓	✓	✓	✓						
2	BH22-23-GW1	GW		7	11/29/2023		✓	✓	✓	✓	✓	✓						
3	BH25-23-GW1	GW		7	11/29/2023		✓		✓	✓	✓	✓						
4	BH26-23-GW1	GW		7	11/29/2023		✓		✓	✓	✓	✓						
5	DUP	GW		3	11/29/2023		✓	✓	✓	✓	✓	✓						
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: HP	Verified By:
Relinquished By (Print): Jeremy Camposarcone	Date/Time:	Date/Time: Dec 1, 23 16:55	Date/Time: Dec 2 2023
Date/Time: 12/1/2023	Temperature: °C	Temperature: 16.1, 16.1°	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Jeremy Camposarcone

Client PO: 59297
Project: PE6038
Custody:

Report Date: 1-Feb-2024
Order Date: 26-Jan-2024

Order #: 2404486

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

Paracel ID	Client ID
2404486-01	BH23-23-GW1
2404486-02	BH24-23-GW1

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	29-Jan-24	29-Jan-24
Hardness	Hardness as CaCO3	29-Jan-24	29-Jan-24
Chromium, hexavalent, water, low level	MOE E3056 - colourimetric	31-Jan-24	31-Jan-24
Metals, ICP-MS	EPA 200.8 - ICP-MS	29-Jan-24	29-Jan-24
PAHs by GC-MS	EPA 625 - GC-MS, extraction	31-Jan-24	31-Jan-24
PHC F1	CWS Tier 1 - P&T GC-FID	29-Jan-24	29-Jan-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Jan-24	27-Jan-24

	Client ID:	BH23-23-GW1	BH24-23-GW1	-	-	-	-
	Sample Date:	25-Jan-24 12:00	25-Jan-24 12:00	-	-		
	Sample ID:	2404486-01	2404486-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
General Inorganics							
Hardness	1 mg/L	1600	1100	-	-	-	-
Metals							
Aluminum	1 ug/L	<10 [1]	<10 [1]	-	-	-	-
Antimony	0.5 ug/L	<5.0 [1]	<5.0 [1]	-	-	-	-
Arsenic	1 ug/L	<10 [1]	<10 [1]	-	-	-	-
Barium	1 ug/L	275 [1]	208 [1]	-	-	-	-
Beryllium	0.5 ug/L	<5.0 [1]	<5.0 [1]	-	-	-	-
Boron	10 ug/L	121 [1]	<100 [1]	-	-	-	-
Cadmium	0.01 ug/L	<0.1 [1]	<0.1 [1]	-	-	-	-
Calcium	100 ug/L	560000 [1]	399000 [1]	-	-	-	-
Chromium	1 ug/L	<10 [1]	<10 [1]	-	-	-	-
Chromium (VI)	1 ug/L	1	<1	-	-	-	-
Cobalt	0.5 ug/L	<5.0 [1]	<5.0 [1]	-	-	-	-
Copper	0.5 ug/L	<5.0 [1]	5.5 [1]	-	-	-	-
Iron	100 ug/L	<1000 [1]	<1000 [1]	-	-	-	-
Lead	0.1 ug/L	<1.0 [1]	<1.0 [1]	-	-	-	-
Magnesium	200 ug/L	48800 [1]	25500 [1]	-	-	-	-
Manganese	5 ug/L	<50 [1]	<50 [1]	-	-	-	-
Molybdenum	0.5 ug/L	5.3 [1]	8.5 [1]	-	-	-	-
Nickel	1 ug/L	<10 [1]	<10 [1]	-	-	-	-
Selenium	1 ug/L	8930 [1]	<10 [1]	-	-	-	-
Silver	0.1 ug/L	<1.0 [1]	<1.0 [1]	-	-	-	-
Thallium	0.1 ug/L	<1.0 [1]	<1.0 [1]	-	-	-	-
Titanium	5 ug/L	<50 [1]	<50 [1]	-	-	-	-
Uranium	0.1 ug/L	2.0 [1]	3.3 [1]	-	-	-	-

	Client ID:	BH23-23-GW1	BH24-23-GW1	-	-	-	-
	Sample Date:	25-Jan-24 12:00	25-Jan-24 12:00	-	-		
	Sample ID:	2404486-01	2404486-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Metals							
Vanadium	0.5 ug/L	<5.0 [1]	<5.0 [1]	-	-	-	-
Zinc	5 ug/L	<50 [1]	<50 [1]	-	-	-	-
Volatiles							
Benzene	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
Toluene	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
m,p-Xylenes	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
o-Xylene	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
Xylenes, total	0.0005 mg/L	<0.0005	<0.0005	-	-	-	-
Toluene-d8	Surrogate	106%	104%	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	0.025 mg/L	<0.025	<0.025	-	-	-	-
F2 PHCs (C10-C16)	0.1 mg/L	<0.1	<0.1	-	-	-	-
F3 PHCs (C16-C34)	0.1 mg/L	<0.1	<0.1	-	-	-	-
F4 PHCs (C34-C50)	0.1 mg/L	<0.1	<0.1	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Acridine	0.10 ug/L	<0.10	<0.10	-	-	-	-
Anthracene	0.01 ug/L	<0.01	0.01	-	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	-	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	0.05	-	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	0.08	-	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-	-	-

	Client ID:	BH23-23-GW1	BH24-23-GW1	-	-	-	-
	Sample Date:	25-Jan-24 12:00	25-Jan-24 12:00	-	-		
	Sample ID:	2404486-01	2404486-02	-	-		
	Matrix:	Ground Water	Ground Water	-	-		
	MDL/Units						
Semi-Volatiles							
Biphenyl	0.05 ug/L	<0.05	<0.05	-	-	-	-
Chrysene	0.05 ug/L	<0.05	0.06	-	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Fluoranthene	0.01 ug/L	<0.01	0.11	-	-	-	-
Fluorene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	-	-	-
Naphthalene	0.05 ug/L	<0.05	<0.05	-	-	-	-
Phenanthrene	0.05 ug/L	<0.05	0.06	-	-	-	-
Pyrene	0.01 ug/L	<0.01	0.09	-	-	-	-
Quinoline	0.10 ug/L	<0.10	<0.10	-	-	-	-
2-Fluorobiphenyl	Surrogate	63.2%	61.3%	-	-	-	-
Terphenyl-d14	Surrogate	82.8%	85.2%	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	0.025	mg/L					
F2 PHCs (C10-C16)	ND	0.1	mg/L					
F3 PHCs (C16-C34)	ND	0.1	mg/L					
F4 PHCs (C34-C50)	ND	0.1	mg/L					
Metals								
Aluminum	ND	1	ug/L					
Antimony	ND	0.5	ug/L					
Arsenic	ND	1	ug/L					
Barium	ND	1	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10	ug/L					
Cadmium	ND	0.01	ug/L					
Calcium	ND	100	ug/L					
Chromium (VI)	ND	1	ug/L					
Chromium	ND	1	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Iron	ND	100	ug/L					
Lead	ND	0.1	ug/L					
Magnesium	ND	200	ug/L					
Manganese	ND	5	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1	ug/L					
Selenium	ND	1	ug/L					
Silver	ND	0.1	ug/L					
Thallium	ND	0.1	ug/L					
Titanium	ND	5	ug/L					
Uranium	ND	0.1	ug/L					
Vanadium	ND	0.5	ug/L					
Zinc	ND	5	ug/L					
Semi-Volatiles								
Acenaphthene	ND	0.05	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthylene	ND	0.05	ug/L					
Acridine	ND	0.10	ug/L					
Anthracene	ND	0.01	ug/L					
Benzo [a] anthracene	ND	0.01	ug/L					
Benzo [a] pyrene	ND	0.01	ug/L					
Benzo [b] fluoranthene	ND	0.05	ug/L					
Benzo [g,h,i] perylene	ND	0.05	ug/L					
Benzo [k] fluoranthene	ND	0.05	ug/L					
Biphenyl	ND	0.05	ug/L					
Chrysene	ND	0.05	ug/L					
Dibenzo [a,h] anthracene	ND	0.05	ug/L					
Fluoranthene	ND	0.01	ug/L					
Fluorene	ND	0.05	ug/L					
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L					
1-Methylnaphthalene	ND	0.05	ug/L					
2-Methylnaphthalene	ND	0.05	ug/L					
Methylnaphthalene (1&2)	ND	0.10	ug/L					
Naphthalene	ND	0.05	ug/L					
Phenanthrene	ND	0.05	ug/L					
Pyrene	ND	0.01	ug/L					
Quinoline	ND	0.10	ug/L					
Surrogate: 2-Fluorobiphenyl	*13.4*		*%*	*67.1*	*50-140*			
Surrogate: Terphenyl-d14	*21.0*		*%*	*105*	*50-140*			
Volatiles								
Benzene	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
m,p-Xylenes	ND	0.0005	mg/L					
o-Xylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: Toluene-d8	*0.0866*		*%*	*108*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	0.025	mg/L	ND			NC	30	
Metals									
Aluminum	ND	10	ug/L	ND			NC	20	
Antimony	ND	5.0	ug/L	ND			NC	20	
Arsenic	ND	10	ug/L	ND			NC	20	
Barium	287	10	ug/L	275			4.4	20	
Beryllium	ND	5.0	ug/L	ND			NC	20	
Boron	127	100	ug/L	121			4.7	20	
Cadmium	ND	0.1	ug/L	ND			NC	30	
Calcium	574000	1000	ug/L	560000			2.5	20	
Chromium (VI)	1	1	ug/L	1			0.0	20	
Chromium	ND	10	ug/L	ND			NC	20	
Cobalt	ND	5.0	ug/L	ND			NC	20	
Copper	ND	5.0	ug/L	ND			NC	20	
Iron	ND	1000	ug/L	ND			NC	20	
Lead	ND	1.0	ug/L	ND			NC	20	
Magnesium	53700	2000	ug/L	48800			9.4	20	
Manganese	ND	50	ug/L	ND			NC	20	
Molybdenum	5.03	5.0	ug/L	5.32			5.6	20	
Nickel	ND	10	ug/L	ND			NC	20	
Selenium	ND	10	ug/L	8930			NC	20	
Silver	ND	1.0	ug/L	ND			NC	20	
Thallium	ND	1.0	ug/L	ND			NC	20	
Titanium	ND	50	ug/L	ND			NC	20	
Uranium	2.2	1.0	ug/L	2.0			9.4	20	
Vanadium	ND	5.0	ug/L	ND			NC	20	
Zinc	ND	50	ug/L	ND			NC	20	
Volatiles									
Benzene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	ND	0.0005	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: Toluene-d8	*0.0835*		*%*		*104*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1.98	0.025	mg/L	ND	99.0	85-115			
F2 PHCs (C10-C16)	1.4	0.1	mg/L	ND	88.4	60-140			
F3 PHCs (C16-C34)	4.1	0.1	mg/L	ND	105	60-140			
F4 PHCs (C34-C50)	2.6	0.1	mg/L	ND	105	60-140			
Metals									
Aluminum	48.8	1	ug/L	5.4	86.9	80-120			
Antimony	44.0	0.5	ug/L	ND	87.7	80-120			
Arsenic	49.7	1	ug/L	ND	98.8	80-120			
Barium	63.5	1	ug/L	20.0	87.0	80-120			
Beryllium	46.3	0.5	ug/L	ND	92.7	80-120			
Boron	41	10	ug/L	ND	82.6	80-120			
Cadmium	4.55	0.01	ug/L	ND	90.9	80-120			
Calcium	8870	100	ug/L	ND	88.7	80-120			
Chromium (VI)	141	1	ug/L	ND	70.5	70-130			
Chromium	46.9	1	ug/L	ND	93.4	80-120			
Cobalt	45.6	0.5	ug/L	ND	91.1	80-120			
Copper	44.7	0.5	ug/L	1.96	85.4	80-120			
Iron	2240	100	ug/L	ND	88.7	80-120			
Lead	42.2	0.1	ug/L	ND	84.3	80-120			
Magnesium	9020	200	ug/L	ND	90.2	80-120			
Manganese	47.4	5	ug/L	ND	93.1	80-120			
Nickel	45.8	1	ug/L	ND	90.8	80-120			
Selenium	46.1	1	ug/L	ND	91.9	80-120			
Silver	46.3	0.1	ug/L	ND	92.5	80-120			
Thallium	43.5	0.1	ug/L	ND	87.1	80-120			
Titanium	48.9	5	ug/L	ND	97.8	80-120			
Uranium	43.6	0.1	ug/L	ND	87.2	80-120			
Vanadium	46.9	0.5	ug/L	ND	93.7	80-120			
Zinc	48	5	ug/L	ND	89.9	80-120			
Semi-Volatiles									

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthene	3.85	0.05	ug/L	ND	77.0	50-140			
Acenaphthylene	3.85	0.05	ug/L	ND	77.0	50-140			
Acridine	3.28	0.10	ug/L	ND	65.5	50-140			
Anthracene	3.58	0.01	ug/L	ND	71.6	50-140			
Benzo [a] anthracene	4.06	0.01	ug/L	ND	81.3	50-140			
Benzo [a] pyrene	3.65	0.01	ug/L	ND	72.9	50-140			
Benzo [b] fluoranthene	4.50	0.05	ug/L	ND	90.0	50-140			
Benzo [g,h,i] perylene	2.64	0.05	ug/L	ND	52.9	50-140			
Benzo [k] fluoranthene	4.19	0.05	ug/L	ND	83.8	50-140			
Biphenyl	3.43	0.05	ug/L	ND	68.6	50-140			
Chrysene	4.15	0.05	ug/L	ND	83.0	50-140			
Dibenzo [a,h] anthracene	2.52	0.05	ug/L	ND	50.5	50-140			
Fluoranthene	3.94	0.01	ug/L	ND	78.9	50-140			
Fluorene	3.69	0.05	ug/L	ND	73.8	50-140			
Indeno [1,2,3-cd] pyrene	2.55	0.05	ug/L	ND	51.0	50-140			
1-Methylnaphthalene	4.20	0.05	ug/L	ND	84.1	50-140			
2-Methylnaphthalene	4.22	0.05	ug/L	ND	84.5	50-140			
Naphthalene	3.96	0.05	ug/L	ND	79.1	50-140			
Phenanthrene	3.92	0.05	ug/L	ND	78.4	50-140			
Pyrene	4.72	0.01	ug/L	ND	94.4	50-140			
Quinoline	3.61	0.10	ug/L	ND	72.2	50-140			
Surrogate: 2-Fluorobiphenyl	*13.6*		*%*		*68.1*	*50-140*			
Surrogate: Terphenyl-d14	*17.3*		*%*		*86.5*	*50-140*			
Volatiles									
Benzene	0.0313	0.0005	mg/L	ND	78.2	60-130			
Ethylbenzene	0.0391	0.0005	mg/L	ND	97.6	60-130			
Toluene	0.0400	0.0005	mg/L	ND	100	60-130			
m,p-Xylenes	0.0760	0.0005	mg/L	ND	95.0	60-130			
o-Xylene	0.0365	0.0005	mg/L	ND	91.2	60-130			
Surrogate: Toluene-d8	*0.0826*		*%*		*103*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1: Elevated Reporting Limit due to matrix interference.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

- When reported, data for F4G has been processed using a silica gel cleanup.

PARAC LABORATORIES

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Paracel Order Number (Lab Use Only): 2404486

Chain Of Custody (Lab Use Only)

Client Name: Paterson

Contact Name: Jeremy Camposarcone

Address: 9 Auriga Drive

Telephone: 613-226-7381

Project Ref: PE6038

Quote #:

PO #: 59297

E-mail: jcamposarcone@patersongroup.ca
amayhart@patersongroup.ca

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☑ Regular

Date Required:

☑ REG 153/04 ☐ REG 406/19

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
							Required Analysis											
1	BH23-23-GW1	GW		7	1/25/2024	PM	✓		✓	✓	✓	✓						
2	BH24-23-GW1	GW		7	1/25/2024		✓		✓	✓	✓	✓						
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Relinquished By (Sign):

Relinquished By (Print): Jeremy Camposarcone

Date/Time: 1/26/2024

Received at Depot:

Date/Time:

Temperature: °C

Received at Lab: 1652

Date/Time: Jan 26/24

Temperature: 7.3, 11.9

Method of Delivery:

Verified By:

Date/Time: Jan 27/24 9:18

pH Verified: ☐ By:

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Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Subcontracted Analysis

Paterson Group Consulting Engineers (Ottawa)
9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Jeremy Camposarcone

Paracel Report No.	**2404486**
Client Project(s):	**PE6038**
Client PO:	**59297**
Reference:	**#24-017 Standing Offer 2024**
CoC Number:	

Order Date:	26-Jan-24
Report Date:	2-Feb-24

Sample(s) from this project were subcontracted for the listed parameters. A copy of the subcontractor's report is attached

Paracel ID	Client ID	Analysis
2404486-01	BH23-23-GW1	Mercury - trace level
2404486-02	BH24-23-GW1	Mercury - trace level

TESTMARK Laboratories Ltd.
Committed to Quality and Service

CERTIFICATE OF ANALYSIS

Client:	Dale Robertson	Work Order Number:	525175
Company:	Paracel Laboratories Ltd. - Ottawa	PO #:	
Address:	300-2319 St. Laurent Blvd.	Regulation:	CCME Long Term Freshwater Quality Guidelines
	Ottawa, ON, K1G 4J8	Project #:	2404486
Phone/Fax:	(613) 731-9577 / (613) 731-9064	DWS #:	
Email:	drobertson@paracellabs.com	Sampled By:	
Date Order Received:	1/31/2024	Analysis Started:	2/1/2024
Arrival Temperature:	11 C	Analysis Completed:	2/2/2024

WORK ORDER SUMMARY

ANALYSES WERE PERFORMED ON THE FOLLOWING SAMPLES. THE RESULTS RELATE ONLY TO THE ITEMS TESTED.

Sample Description	Lab ID	Matrix	Type	Comments	Date Collected	Time Collected
BH23-23-GW1	1972238	Ground Water	Grab		1/25/2024	
BH24-23-GW1	1972239	Ground Water	Grab		1/25/2024	

METHODS AND INSTRUMENTATION

THE FOLLOWING METHODS WERE USED FOR YOUR SAMPLE(S):

Method	Lab	Description	Reference
Mercury Dis. Water CV FF (S8)	Timmins	Determination of Dissolved Inorganic Mercury by Cold Vapour AA	Modified from EPA 245.7

This report has been approved by:

Adam Tam, M.Sc.
Laboratory Director

1335 Riverside Drive, Timmins, ON, P4R 1A6
Phone: (705) 531-1121 Fax: (705) 531-1125 Web: www.testmark.ca

CERTIFICATE OF ANALYSIS

Paracel Laboratories Ltd. - Ottawa

Work Order Number: 525175

WORK ORDER RESULTS

Sample Description	BH23 - 23 - GW1		BH24 - 23 - GW1			
Sample Date	1/25/2024 12:00 AM		1/25/2024 12:00 AM			
Lab ID	1972238		1972239			
Mercury by CV (Dissolved)	Result	MDL	Result	MDL	Units	Criteria: CCME Long Term Freshwater Quality Guidelines
Dissolved Mercury	<0.01	0.01	<0.01	0.01	ug/L	~

LEGEND

Dates: Dates are formatted as mm/dd/year throughout this report.

MDL: Method detection limit or minimum reporting limit.

~: In a criteria column indicates the criteria is not applicable for the parameter row.

Organic Soil Analysis: Data reported for organic analysis in soils samples are corrected for moisture content.

Quality Control: All associated Quality Control data is available on request.

Field Data: Reports containing Field Parameters represent data that has been collected and provided by the client. Testmark is not responsible for the validity of this data which may be used in subsequent calculations.

Sample Condition Deviations: A noted sample condition deviation may affect the validity of the result. Results apply to the sample(s) as received.

ICPMS Dustfall Insoluble: The ICPMS Dustfall Insoluble Portion method analyzes only the particulate matter from the Dustfall Sampler which is retained on the analysis filter during the Dustfall method.

Regulation Comparisons: Disclaimer: Please note that regulation criteria are provided for comparative purposes, however the onus on ensuring the validity of this comparison rests with the client.

1335 Riverside Drive, Timmins, ON, P4R 1A6
Phone: (705) 531-1121 Fax: (705) 531-1125 Web: www.testmark.ca

PARAC LABORATORIES

Paracel ID: 2404486

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www.paracellabs.com

Paracel Order Number (Lab Use Only): 2404486

Chain Of Custody (Lab Use Only)

Page 1 of 1

Client Name: Paterson

Contact Name: Jeremy Camposarcone

Address: 9 Auriga Drive

Telephone: 613-226-7381

Project Ref: PE6038

Quote #:

PO #: 59297

E-mail: jcamposarcone@patersongroup.ca
amayhart@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☑ Regular

Date Required:

☑ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table

For RSC: ☐ Yes ☐ No

Other Regulation

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Required Analysis
1	BH23-23-GW1	GW		7	1/25/2024	PM	✓		✓	✓	✓	✓		
2	BH24-23-GW1	GW		7	1/25/2024		✓		✓	✓	✓	✓		
3														
4														
5														
6														
7														
8														
9														
10														

Comments:

Relinquished By (Sign):

Relinquished By (Print): Jeremy Camposarcone

Date/Time: 1/26/2024

Received at Depot:

Date/Time:

Temperature: °C

Received at Lab: 16:52

Date/Time: Jan 26/24

Temperature: 7.3, 11.9

Method of Delivery:

Verified By:

Date/Time: Jan 27/24 9:18

pH Verified: ☑ By:

Chain of Custody (Feb) xlsx

Revision 5.0

PATERSON GROUP

Soil & Groundwater Management Plan

Proposed Residential Development

Tunney's Pasture (Block 8)
Ottawa, Ontario

Prepared for Arcadis IBI Group

TABLE OF CONTENTS

1.0 Introduction

This Soil and Groundwater Management Plan (SGMP) was developed to minimize the soil and groundwater onsite that will require off-site disposal and when off-site disposal is required, ensuring that proper handling and disposal methods are undertaken. A high level fee estimate for the required items for soil and groundwater management during construction have been included at the end of this letter.

2.0 Soil Reuse

Without further assessment, soil in the vicinity of BH21-23 should be assumed impacted above site standards, and will require off-site disposal.

Other than material at BH21-23, soil is considered suitable for reuse on the subject site provided that the soil is not considered heavily impacted (no visible free product or significant petroleum hydrocarbon (PHC) odours) and is not used as final cover for landscaping purposes (with the exception of segregated topsoil and granular materials).

The excavated soil may be suitable for reuse on-site as backfill from a geotechnical perspective provided that it is maintained in a relatively dry condition, can be properly compacted, and is approved by the geotechnical engineer at the time of construction. Additionally, based on the conditions observed. cobbles and boulders are likely to be encountered in certain areas of the excavation. Thus, prior to reusing this soil, it will be necessary to cull out all material in excess of 300 mm in its largest dimension. Alternatively, cobbles and boulders could be processed and blended with the fill to a gradation suitable for reuse as engineered fill.

Site excavated soil can also be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and compacted to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective standard Proctor maximum dry density (SPMDD). Site excavated soil is not suitable for use as backfill against foundation walls due to the frost heave potential of the site excavated soils below settlement sensitive areas, such as concrete sidewalks and exterior concrete entrance areas.

It is recommended that stockpiles of excavated material intended for reuse be protected against increases in moisture content by securely covering the stockpiles prior to and during precipitation events. Therefore, the placement and compaction of the on-site soil should be completed during relatively dry and non-freezing conditions. If, due to any of the above conditions, the existing fill becomes unsuitable for reuse as engineered fill based on the geotechnical engineer, it should be transported and properly disposed off-

site, and an imported fill material should be used. Protection of materials from increased moisture content is considered to be the responsibility of the Contractor.

3.0 Groundwater Re-use

Groundwater at borehole BH23-23 should be re-tested prior to construction activities to assess for the presence of selenium.

Otherwise, groundwater is generally considered to be suitable to manage on-site during situations where free product is not observed and no risk to the workers or the natural environment is considered to be present relating to its re-use. The groundwater must be able to be managed without entering any surface water bodies without appropriate treatment and permits.

4.0 Soil Requiring Off-Site Disposal

Soil is considered to require off-site disposal from an environmental perspective when the soil is heavily impacted. Heavily impacted soil is considered impacts that can re-contaminate areas due to leaching and consists of free product visible in the soil and/or significant PHC odours.

Based on the findings of this assessment, the shallow fill material present beneath the surficial asphalt at BH21-23 is contaminated with heavier fractions of petroleum hydrocarbons (PHC F3 and PHC $F_{4\ gravimetric}$) and PAHs. Given the low-mobility of these contaminants, it is expected that the contamination is confined to the fill material within a localized area around BH21-23. This contaminated soil will require excavation and disposal at a licensed waste disposal facility.

Excavated soil is not considered to be suitable for reuse on site during conditions where, in the opinion of the geotechnical engineer, the soil is saturated and/or does not have a suitable gradation for placement and compaction that will not achieve the required compaction specifications.

Soil to be disposed off-site must be evaluated by environmental personnel prior to their disposal. Heavily impacted soil must be disposed at an approved waste disposal facility. Soil observed to be clean or marginally impacted can be disposed of at a variety of waste disposal facilities, including, but not limited to, clean fill sites (clean soil only) and interim transfer stations. Based on the quality of the soil, as determined by the environmental personnel, the soil must be sent to the appropriate disposal facility.

At this time, soil disposal locations have not been selected. These locations will be selected by the construction contractor prior to mobilization.

5.0 Groundwater Requiring Off-Site Disposal

Groundwater must be disposed of off-site in situations where free product is observed. The groundwater must be disposed of following all applicable laws and regulations. Licensed pumping contractors are required to dispose of any impacted groundwater. If impacted groundwater is observed, all reasonable efforts must be made to limit the quantity of impacted groundwater pumped and disposed. Similarly, if a spill occurs all reasonable efforts should be made to protect the surface and groundwater resources. At no time is groundwater to be disposed of directly to surface water resources.

Any offsite groundwater must be disposed of through an approved method. Grossly impacted groundwater where a sheen and/or odour is identified must be treated prior to removal from site or be removed from site with the intention of offsite treatment. Excess groundwater may also be able to be disposed within the City of Ottawa Sanitary and/or Storm sewer system. Prior to disposal to the sewer system, a sewer discharge agreement must be completed with the City of Ottawa.

5.1 Construction Dewatering

The site-specific construction dewatering protocols will be provided in project- specific geotechnical and/or hydrogeological reports.

Generally, it is recommended that additional analytical testing prior to construction mobilization should be carried out to determine the appropriate disposal method. Any environmentally impacted groundwater should be pumped into a storage tanker for testing and potentially treatment before discharging to the sanitary sewer.

5.2 Groundwater Monitoring Decommissioning

All groundwater monitoring wells must be decommissioned in accordance with Ontario Regulation 903/90. It is recommended that the groundwater monitoring wells remain in place and in viable condition for as long as possible, to allow for any potential re-sampling.

6.0 Permits and Agreements

It is anticipated that the following permits and agreements will be required to conduct the Construction Contractor Obligations (with respect to the Soil and Groundwater Management Plan);

- ❑ Permit to Take Water (or water taking EASR)
- ❑ City of Ottawa Storm and/or Sanitary Sewer Discharge agreement
- ❑ Landfill agreement for soil disposal
- ❑ Clean Fill agreement for soil disposal

7.0 Soil Stockpiles and Handling

Any soil and construction debris that is temporarily stockpiled must be done so within the confines of the perimeter protection/construction fencing. All stockpiles will be covered, by the trade contractor, with plastic tarps (10 mil plastic minimum), or an impermeable geotextile and secured from wind. The stockpiles will be covered with plastic in a reasonable time frame as weather conditions dictate. If the stockpile is continuously being accessed then the stockpile will be covered prior to the end of the work day, as weather conditions dictate. Storm water runoff from the plastic covering is to be diverted away from all surface water resources and from open construction excavations.

Stockpiles should be clearly identified to eliminate cross contamination and improper usage. Soil identified as grossly impacted should be immediately loaded into truck and disposed of at the licensed waste facility. The volume of excess soil disposed of at the landfill should be minimized using segregation during excavation and subsequent stockpile sampling programs.

8.0 Federal and Provincial Confirmatory Soil and Groundwater Sampling Protocols

The soil and groundwater sampling protocols followed during the field sampling programs in Ontario should be in general accordance with the MECP document entitled *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996.

8.1 Soil and Groundwater Standards

The soil and groundwater standards for the Ontario portion of the site were taken from the document entitled *"Soil, Groundwater and Sediment Standards for Use under Part XV.I of the Environmental Protection Act"* prepared by the Ontario Ministry of the Environment (now Ministry of the Environment, Conservation and Parks), dated April 15, 2011. Several of the Tables found in the document may be applicable to the subject site. The following Table may be applicable.

The Table 7 Standards are based on the following considerations:

- ❑ Coarse-Grained Soil Conditions
- ❑ Non-Potable Groundwater Conditions
- ❑ Residential Land Use
- ❑ Shallow Soil Conditions

The applicable federal soil and groundwater standards are considered to be the Canadian Council of Ministers of the Environment (CCME). The standards are taken from the document entitled "*Canadian Environmental Quality Guidelines*", however, due to the proposed use of the block(s) as privately owned operations, only Provincial standards are deemed to apply for future uses.

Note that due to the proposed change in land use to a more sensitive use (e.g. commercial to residential), a Record of Site Condition will be required prior to redevelopment.

8.2 Stockpile Sampling

Stockpiled soils are subject to minimum sampling requirements under O.Reg. 153/04. The sampling requirements are shown below;

MINIMUM STOCKPILE SAMPLING FREQUENCY	
Stockpile Volume (m^3)	Minimum Number of Analysed Samples
≤ 130	3
> 130 to 220	4
> 220 to 320	5
> 320 to 430	6
> 430 to 550	7
> 550 to 670	8
> 670 to 800	9
> 800 to 950	10
> 950 to 1100	11
> 1100 to 1250	12
> 1250 to 1400	13
> 1400 to 1550	14
> 1550 to 1700	15
> 1700 to 1850	16
> 1850 to 2050	17
> 2050 to 2200	18
> 2200 to 2350	19
> 2350 to 2500	20
> 2500 to 2700	21
> 2700 to 2900	22
> 2900 to 3100	23
> 3100 to 3300	24
> 3300 to 3500	25
> 3501 to 3700	26
> 3700 to 3900	27
> 3900 to 4100	28
> 4100 to 4300	29
> 4300 to 4500	30
> 4500 to 4700	31
> 4700 to 5000	32
> 5000	32+(Volume-5000)÷300

The soil samples collected from the stockpiles are required to be tested for the following (as a minimum) Petroleum Hydrocarbons F1-F4, Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), Metals, hydride forming Metals, sodium adsorption ratio (SAR), electrical conductivity (EC), and any other contaminants of concern, as identified by the environmental consultant (Qualified Person). Analysis for EC and SAR is only required in areas where a substance (namely road salt) has been applied for the purposes of keeping the area safe under conditions of snow or ice.

9.0 Applicable Municipal Laws, Standards, Codes and Guidelines

9.1 Soil and Groundwater Standards

No municipal soil standards and guidelines are considered to apply.

Groundwater discharged into the sewer systems of the City of Ottawa and City of Gatineau must follow the applicable bylaws.

City of Ottawa

The City of Ottawa requires that all discharges fall within the limits of Sewer Use By-law No. 2003-514. A sewer use agreement is expected to be required to manage excess groundwater at selected sites.

10.0 Imported Material

All imported material may originate from a licensed pit, quarry or other aggregate site licensed under the Aggregate Resources Act, or, from a source site where all applicable excess soil regulations have been met. Imported material will be required to meet the specific standard for its final use. If clean fill is imported onto site from a property not licensed under the Aggregate Resources Act, in-situ, or stockpile sampling as outlined in Section 8.3, will be required prior to final placement.

All imported soil must be placed in accordance with Ontario Regulation 406/19.

11.0 Quality Assurance and Quality Control

A minimum of 10% of samples will be submitted as duplicates for the purposes of QA/QC. Only one parameter grouping per QA/QC sample is required.

Additional QA/QC procedures are outlined in the Environmental Quality Management Plan, available under a separate cover.

12.0 Unexpected Environmental Impacts

If unexpected environmental impacts are encountered during the course of construction or redevelopment of the block(s), the environmental consultant or their representative should be notified immediately and work should avoid the area until an inspection is completed.

Following an inspection by the environmental consultant or their representative recommendations will be made regarding appropriate material handling procedures at the location. Additional investigative work may be required to delineate the impacted areas (if required).

13.0 Estimated Soil and Groundwater Management Budget

The following table presents the approximate costs related to items discussed in this soil and groundwater management plan. The amount of material requiring disposal at a landfill was estimated using the full column depth (to bedrock) over a representative area of potentially impacted material. For further delineation of the impacted area, additional fieldwork would be required. This Soil and Groundwater Management Plan does not include any items related to remediating or dealing with the groundwater that exceeds the SCS and limits of the sanitary sewer use by-law.

Table 1: Estimated Costs for Soil and Groundwater Management

Item	**Fees**
On-Site and Excess Soil Management (O.Reg. 406/19), including: • Reporting • Supplemental testing • Meetings and Consultation with stakeholders and contractors Note that the On-site and Excess Soil testing will provide valuable information for soil delineation purposes.	$70,000
Soil remediation – tipping fees ($60/mt) (does not include contractor cost associated with loading and hauling material)	$18,000
Soil remediation. Includes: • Site supervision • Confirmatory soil sampling • Reporting	$10,000
Record of Site Condition (O.Reg. 153/04) – initial submission (note that additional revisions and submissions may be required based on Ministry comments)	$20,000 $10,000 (revisions)
Permit to take water or Water taking EASR (whichever is applicable)	$20,000 *$8,000*
City of Ottawa sewer discharge testing and permits	$5,000
TOTAL	$153,000