PATERSON GROUP

Phase II Environmental Site Assessment

Part of 1500 Merivale Road
Ottawa, Ontario

Prepared for Claridge Homes

Report: PE5066-4
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EXECUTIVE SUMMARY

Assessment

A Phase II-ESA was conducted for part of a larger property of land addressed as 1500 Merivale Road, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address the potentially contaminating activities (PCAs) that were identified during the 2024 Phase I-ESA and were considered to result in areas of potential environmental concern (APECs) on the Phase II-ESA Property.

The subsurface investigation was conducted during the interim of January 26 to January 31, 2024. The field program consisted of drilling nine boreholes (BH1-24 – BH9-24) throughout the Phase II ESA Property, five of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 5.3 m to 7.1 m below the existing grade, with the exception of BH1-24 and BH2-24 which were advanced to depths of 12.85 m and 12.78 m below the existing grade, respectively. All boreholes were terminated within the overburden (glacial till) with the exception of BH1-24 and BH2-24, which were terminated within the underlying limestone bedrock. Six previously installed groundwater monitoring wells (MW13-21, MW13-23, MW13-44, MW13-45, MW13-46 and MW13-51) were also located on-site and utilized as part of this investigation.

A total of 35 soil samples (including four duplicates) were submitted for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (collectively known as BTEX), petroleum hydrocarbons (PHCs (F_1-F_4)), metals, polycyclic aromatic hydrocarbons (PAHs), pH, electrical conductivity (EC) and/or sodium adsorption ratio (SAR). Based on the findings of this Phase II-ESA, the concentration of zinc detected in soil samples BH7-24-SS2 and BH7-24-SS3 and the concentration of various PAH parameters in soil sample BH17-24-SS3 exceed the MECP Table 3 Residential Standards. Additionally, the concentration of barium or vanadium in soil samples BH4-24-SS3, BH7-24-SS6 and BH8-24-SS7 exceed the MECP Table 3 Residential Standards. These parameters are considered to be naturally occurring and are not considered to be a contaminant of concern on the Phase II-ESA Property. The remaining parameter concentrations in all other soil samples tested as part of this Phase II-ESA comply with the MECP Table 3 Residential Standards.

Based on the findings of the previous investigations conducted on the Phase II-ESA Property, impacted soil was identified within the southeastern portion of the Phase II ESA Property.

A total of 16 groundwater samples were recovered and submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs and/or PAHs. Based on the findings of this Phase II-ESA, BTEX (benzene) and/or PHC (PHC F2 and/or PHC F3) groundwater was identified in the vicinity of MW13-23, MW13-45 and MW13-51, located within the central portion of the Phase II-ESA Property. The remaining parameter concentrations in all other groundwater samples tested as part of this Phase II-ESA comply with the MECP Table 3 Residential Standards.

Based on the findings of the previous investigations conducted on the Phase II-ESA Property, impacted groundwater was identified the southeastern portion of the Phase II-ESA Property.

Recommendations

Soil

It is our understanding that the Phase II-ESA Property is to be redeveloped for residential purposes in the near future. It is recommended that soil and groundwater remediation program be completed in conjunction with site redevelopment. This will require the segregation of clean soil from impacted soil, the latter of which will require disposal at an approved waste disposal facility.

Prior to off-site disposal at a licenced landfill site, at least one leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

Excess soils generated during construction excavation must be handled in accordance with O.Reg. 406/19. Preliminary excess soil testing was carried out as part of this investigation; the results of the testing program will be provided under separate cover.

Groundwater

The groundwater within the overburden on the southeastern portion of the Phase II-ESA is impacted by BTEX and/or PHCs. It is recommended that a groundwater remediation program is carried out in conjunction with the soil remediation program during redevelopment of the site.

Monitoring Wells

It is recommended that the monitoring wells installed on the Phase II-ESA Property remain viable for future monitoring, if required. It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903 at the time of the construction excavation. Further information can be provided upon request in this regard.

1.0 INTRODUCTION

At the request of Mr. Vincent Denomme of Claridge Homes, Paterson Group (Paterson) conducted a Phase II-Environmental Site Assessment (Phase II-ESA) for part of a larger parcel of land addressed as 1500 Merivale Road, in the City of Ottawa, Ontario. The purpose of this Phase II-ESA was to address the areas of potential environmental concern (APECs) identified on the Phase II-ESA Property s a result the findings of the previous Phase I-ESA completed by Paterson in 2024.

Based on previous investigations conducted for the Phase II-ESA Property, impacted soil and groundwater was identified on the Phase II-ESA Property. The previous investigations for the Phase II-ESA Property are discussed in the 2024 Phase I-ESA. While this report discusses the findings of the current investigation, historical data is presented in the data tables and drawings appended to this report.

1.1 Site Description

Address:	Part of 1500 Merivale Road, Ottawa, Ontario.
Legal Description:	Part of Lot 19, Concession A (Rideau Front); Registered Plan 30; Geographic Township of Nepean, City of Ottawa, Ontario.
Property Identification Number (PIN):	Part of 04686-0027
Location:	The Phase I ESA Property is located on the west side of Merivale Road, approximately 200 m east of Clyde Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.
Latitude and Longitude:	45° 21’ 37" N, 75° 44' 09" W

Site Description:

Configuration:	Irregular.
Site Area:	0.35 hectares (approximate).
Zoning:	AM10[2217] h(34) – Arterial Mainstreet Zone

Current Uses:	The Phase II-ESA Property is primarily vacant land with a paved roadway (Kimway Crescent) along the north portion.
Services:	The Phase II-ESA Property is located within a municipally serviced area.

1.2 Property Ownership

The current registered property owner of the Phase II ESA Property is Claridge Homes. Paterson was retained to complete this Phase II-ESA by Mr. Vincent Denomme with Claridge Homes, whose offices are located at 210 Gladstone Avenue. Mr. Denomme can be contacted via telephone at 613-233-6030.

1.3 Current and Proposed Future Uses

The Phase II-ESA Property consists of vacant land with a paved roadway along the north portion. It is our understanding that the Phase II ESA Property is to be redeveloped with a 10-storey residential mid-rise building with associated underground parking.

1.4 Applicable Site Condition Standard

The site condition standards for the subject property were obtained from Table 3 of the document entitled, *"Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act"*, prepared by the Ministry of the Environment, Conservation and Parks (MECP), and dated April 15, 2011. The selected MECP standards are based on the following considerations:

- ❒ Full depth generic site conditions
- ❒ Coarse-grained site conditions
- ❒ Non-potable groundwater conditions
- ❒ Residential land use

Section 35 of O.Reg. 153/04 does apply to the Phase II ESA Property in that the property relies upon municipal drinking water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II ESA Property, as the property is not within 30m of an environmentally sensitive area and the pH of the surface and subsurface soils is between 5 and 9.

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

The residential standards were selected based on the proposed future use of the Phase II ESA Property. Coarse-grained soil standards were chosen as a conservative approach.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II ESA Property is located in a mixed commercial and residential area and is situated on the west side of Merivale Road, approximately 200 m east of Clyde Avenue, in the City of Ottawa, Ontario.

The regional topography in the general area of the Phase II ESA Property slopes downward to the south and the east. Site drainage on site consists primarily of infiltration and sheet flow to catch basins located along adjacent roadways and parking areas.

2.2 Previous Investifations

Based on previous investigations conducted for the Phase II-ESA Property, impacted soil and groundwater was identified on the Phase II-ESA Property. While this report discusses the findings of the current investigation, historical data is presented in the data tables and drawings appended to this report.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted during the interim of January 26 to January 31, 2024. The field program consisted of drilling nine boreholes (BH1-24 – BH9-24) throughout the Phase II ESA Property, five of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 5.3 m to 7.1 m below the existing grade, apart from BH1-24 and BH2-24 which were advanced to depths of approximately 12.9 m and 12.8 m below the existing grade, respectively. All boreholes were terminated within the overburden (glacial till) except for BH1-24 and BH2-24, which were terminated within the underlying limestone bedrock. Six previously installed groundwater monitoring wells (MW13-21, MW13-23, MW13-44, MW13-45, MW13-46 and MW13-51) were also located on-site and utilized as part of this investigation.

The borehole and associated monitoring well locations are shown on Drawing PE5066-10 – Test Hole Location Plan, appended to this report.

3.2 Media Investigated

During the subsurface investigation, soil and groundwater samples were obtained with select samples submitted for laboratory analysis. The rationale for sampling and analyzing these samples is based on the Contaminants of Potential Concern identified in the 2024 Phase I ESA.

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on the information from NRCAN, bedrock in the area of the site consists of interbedded limestone and dolomite of the Gull River Formation. Based on the maps, the surficial geology consists of till with an overburden thickness ranging from 3 to 10 m.

The topographic maps indicate that the elevation of the Phase I-ESA Property is approximately 95 m above sea level. The regional topography in the general area of the Phase I-ESA Property slopes downward to the south and the east. Based on previous investigations conducted on the Phase I-ESA Property, groundwater is generally expected to flow towards the southeast.

Fill Placement

No evidence of fill material was observed on the exterior of the Phase I-ESA Property at the time of the site inspection. Based on previous subsurface investigations conducted on the Phase I-ESA Property, fill material is present in the area of the former on-site commercial building.

Water Bodies and Areas of Natural Significance

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

Potable Water Wells

An MECP well record search was conducted on March 15, 2024, for all drilled wells within the Phase I Study Area. No potable supply well records were identified for the Phase I-ESA Property. The search identified 90 well records for surrounding properties within the Phase I Study Area, 49 of which pertain to domestic/commercial water supply wells. The records for the domestic/commercial supply wells indicate that they were all installed in 1961 or earlier. Based on the significant development within the Phase I Study Area since the installation of the domestic/commercial supply wells and the presence of City of Ottawa municipal water services within the Phase I Study Area, it is our opinion that domestic supply wells are no longer in use by properties within the Phase I Study Area.

Monitoring Wells

Several monitoring wells were identified on the central and south portion of the Phase I ESA associated with subsurface investigations previously conducted (and one concurrent subsurface investigation) on the Phase I-ESA Property. No potable wells or private sewage systems were observed on site, nor are any expected to be present, as the site has never been formally developed.

Based on the borehole logs from previous investigations and the reviewed well records, overburden in the vicinity of the Phase I-ESA Property consists of clay and/or sand with boulders. Bedrock consisting of limestone, was generally encountered at an average depth of approximately 5.5 to 11.3 m below ground surface.

Existing Buildings and Structures

No buildings or permanent structures are present on the Phase I-ESA Property. The concrete slab of the former on-site commercial building was identified on the southeast portion of the Phase I-ESA Property.

Subsurface Structures and Utilities

The Phase I-ESA Property is situated within a municipally serviced area. Underground utilities identified on the Phase I-ESA Property at the time of the site inspection include natural gas services.

Neighbouring Land Use

At the time of the site inspection, a total of four existing off-site PCAs were identified within the Phase I Study Area. The existing off-site PCAs identified at the time of the site inspection include the automotive service garages addressed 1375-1377 Clyde Avenue, 1380 Baseline Road and 1453 Merivale Road (approximately 100 m west, 150 m northwest and 195 m northeast of the Phase I-ESA Property, respectively) and the retail fuel outlet addressed 1432 Baseline Road (approximately 200 m northwest of the Phase I-ESA Property). The identified PCAs are not considered to results in APECs on the Phase I-ESA Property due to their respective separation distance and/or their down/cross-gradient orientation with respect to the anticipated groundwater flow to the southeast. Current land use and PCAs identified at the time of the site inspection are illustrated on Drawing PE5066-9 – Surrounding Land Use Plan, provided in the Figures section following the text.

Potentially Contaminating Activities

As per Section 7.1 of this report, four on-site and one off-site PCA are considered to result in five APECs on the Phase I-ESA Property. The PCAs, APECs and associated contaminants of potential concern (CPCs) are the table below.

Table of Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I-ESA Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 Possible Former Automotive Service Garage	Southeast portion of the Phase I-ESA Property	*"Item 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems"*	On-site	BTEX VOCs PHCs (F_1-F_4)	Soil Groundwater
APEC 2 Former Heating Oil Underground Storage Tank	Central portion of the Phase I-ESA Property	*"Item 28: Gasoline and Associated Products Storage in Fixed Tanks"*	On-site	BTEX VOCs PHCs (F_1-F_4)	Soil Groundwater

Table of Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I-ESA Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 3 Fill Material of Unknown Quality	In the area of the former commercial building on the Phase I-ESA Property	*"Item 30 – Importation of Fill Material of Unknown Quality"*	On-site	BTEX PHCs Metals As, Sb, Se	Soil
APEC 4[1] Application of Road Salt	Throughout the Phase I-ESA Property	*"Item NA: Application of road salt for the safety of vehicular or pedestrian traffic under conditions of snow or ice"*	On-site	Electrical Conductivity (EC) Sodium Adsorption Ratio (SAR)	Soil
APEC 5 Former Off-Site Automotive Service Garage and Retail Fuel Outlet	Southeast portion of the Phase I-ESA Property (1480 Merivale Road)	*"Item 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems"*	Off-site	BTEX VOCs PHCs (F_1-F_4) PAHs	Soil Groundwater

1 – In accordance with Section 49.1 of O.Reg. 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. The exemption outlined in Section 49.1 is being relied up with respect to the Phase I-ESA Property.

A total of 15 other off-site PCAs were identified within the Phase I Study Area but were deemed not to be of any environmental concern to the Phase I-ESA Property based on their respective separation distance and/or their cross/down-gradient orientation with respect to the anticipated groundwater flow to the southeast.

Contaminants of Potential Concern

As per the Table of Areas of Potential Environmental Concern, contaminants of potential concern (CPCs) in the soil and/or groundwater beneath the Phase I-ESA Property include the following:

- ❑ Petroleum Hydrocarbons Fractions 1 through 4 (PHCs F_1-F_4)
- ❑ Benzene, Toluene, Ethylbenzene, Xylene (BTEX)
- ❑ Volatile Organic Compounds (VOCs)
- ❑ Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- ❑ Polycyclic Aromatic Hydrocarbons (PAHs)

In accordance with Section 49.1 of O.Reg.153/04, as amended, electrical conductivity (EC) and sodium adsorption ratio (SAR) are not considered to be CPCs.

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 historical on-site and a historical off-site PCA that have resulted in APECs on the Phase I-ESA Property. Additional off-site PCAs identified within the study area are not considered to represent APECs on the Phase I-ESA Property based on their respective separation distance and/or their cross/down-gradient orientation with respect to the anticipated groundwater flow to the southeast.

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted during the interim of January 26 to January 31, 2024. The field program consisted of drilling nine boreholes (BH1-24 – BH9-24) throughout the Phase II ESA Property, five of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 5.3 m to 7.1 m below the existing grade, apart from BH1-24 and BH2-24 which were advanced to depths of approximately 12.9 m and 12.8 m below the existing grade, respectively. All boreholes were terminated within the overburden (glacial till) except for BH1-24 and BH2-24, which were terminated within the underlying limestone bedrock.

The boreholes were placed to further assess APECs identified during the 2024 Phase I-ESA, to delineate previously identified impacts and to characterize soil for off-site disposal and/or possible re-use.

The boreholes were drilled with a low-clearance track-mounted drill rig, operated by George Downing Estate Drilling of Hawkesbury, Ontario, under the full-time supervision of Paterson personnel.

The locations of the boreholes are illustrated on Drawing PE5066-10 – 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 67 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.

In general, the subsurface profile at the borehole locations consists of a thin layer of either topsoil, concrete (slab from the former on-site commercial building), asphaltic concrete, underlain by fill material (except in BH6-24) over top of glacial till. The glacial till was underlain by limestone bedrock.

The fill material was observed at ground surface or beneath the topsoil or asphaltic concrete layer and generally consists of brown silty sand and/or silty clay with varying amounts of gravel.

Limestone bedrock was encountered in BH1-24 and BH2-24 at depths of 8.74 and 8.57 m below existing ground surface, respectively. Bedrock was not encountered in the remaining boreholes.

Specific details of the soil profile at each test hole location are presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

4.3 Field Screening Measurements

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples. An RKI Eagle detector with methane elimination was calibrated to hexane and used to measure the combustible vapour concentrations.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The parts per million (ppm) scale is used to measure concentrations of hydrocarbon vapours that are too low to register on the Lower Explosive Limit (LEL) scale. The explosive point, 100% LEL, represents the leanest mixture which will burn (or explode) if ignited.

The maximum combustible vapour reading measured was 45 ppm and therefore the results of the vapour screening were not considered to be indicative of potential contamination. Vapour readings are noted on the Soil Profile and Test Data Sheets, appended to this report.

It should be noted that a hydrocarbon odour was identified in BH1-24 at a depth of approximately 2.0 m below existing ground surface that was decreasing with depth. No other visual or olfactory indications of potential hydrocarbons, or visual indications of deleterious fill material or metal impacts, were identified in the soil samples. Soil samples were selected based on a combination of the vapour screening, visual screening, sample depth and/or sample location.

4.4 Groundwater Monitoring Well Installation

A total of five groundwater monitoring wells were installed on the subject site as part of this Phase II ESA investigation. These monitoring wells were constructed using either 32 mm or 50 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen and a bentonite seal was placed above the screen to minimize cross-contamination. A summary of the monitoring well construction details are listed in Table 1: Test Hole Summary Details and in the Soil Profile and Test Data Sheets, appended to this report.

4.5 Field Measurement of Water Quality Parameters

A groundwater sampling event was conducted on January 2, 2024, January 3, 2024, from six monitoring wells remaining on-site from the Pinchin Phase II-ESA (MW13-21, MW13-23, MW13-44, MW13-45, MW13-46 and MW13-51). A second groundwater sampling event was conducted on February 6, 2024, from the five monitoring wells installed as part of the current investigation (BH1-24, BH2-24, BH3-24, BH4-24 and BH7-24) and two monitoring wells remaining on-site from the 2014 Pinchin Phase II-ESA (MW13-23 and MW13-45). 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, the field parameters were relatively stable, or the well was dry. Stabilized field parameter values are summarized in Table 2: Stabilized Water Quality Parameters, appended to this report.

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

Based on the guidelines outlined in the Sampling and Analysis Plan, soil samples were submitted for analysis of the parameters listed in Table 3: Soil Testing Summary, appended to this report.

Based on the guidelines outlined in the Sampling and Analysis Plan, groundwater samples were submitted for analysis of the parameters listed in Table 4: Groundwater Testing Summary, appended to this report.

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, 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

Stratigraphy at the Phase II Property generally consists of the following:

- **Concrete** from the former slab of the on-site commercial building was identified at ground surface in BH1-24, BH2-24 and BH5-24- and extended to a maximum depth of 0.13 mbgs. Groundwater was not encountered in this layer.

- **Topsoil** with organics and gravel was identified at ground surface in BH6-24 and BH8-24 and extended to a maximum depth of 0.46 mbgs. Groundwater was not encountered in this layer.

- **Asphaltic Concrete** was identified at ground surface in BH3-24 and BH4-24 and extended to a depth of 0.03 mbgs. Groundwater was not encountered in this layer.

- **Fill material** generally consisting of topsoil with organics, some gravel and varying amounts of clay was identified at ground surface in BH7-24 and BH9-24 and extended to a maximum depth of 0.69 mbgs. A subsurface layer of fill material consisting of brown silty sand or clay with varying amounts of gravel, topsoil and organics was encountered in each borehole, with the exception of BH6-24 and extended to a maximum depth of 2.59 mbgs. Groundwater was encountered in this layer in BH5-24 and BH7-24.

- **Topsoil** with peat and/or wood was encountered in BH4-24 and BH5-24 beneath the fill material and extended to a maximum depth of 2.97 mbgs. Groundwater was not encountered in this layer.

- **Glacial till** consisting of brown silty clay or sand with varying amounts of gravel, cobbles and boulders was identified beneath the surficial topsoil layer, the fill material or the subsurface topsoil in each borehole and extended to a maximum depth of 8.74 mbgs. Groundwater was encountered in this layer in BH1-24, BH2-24 and BH3-24.

- **Limestone Bedrock** was encountered in BH1-24 and BH2-24 at depths of 8.74 and 8.56 mbgs, respectively. Groundwater was not encountered in this layer.

The stratigraphy of the Phase II-ESA Property, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets, appended to this report.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured on January 2, 2024, January 3, 2024, from six monitoring wells remaining on-site from the Pinchin Phase II-ESA (MW13-21, MW13-23, MW13-44, MW13-45, MW13-46 and MW13-51) and on February 6, 2024, from the five monitoring wells installed as part of the current investigation (BH1-24, BH2-24, BH3-24, BH4-24 and BH7-24) and two monitoring wells remaining on-site from the 2014 Pinchin Phase II-ESA (MW13-23 and MW13-45). The groundwater levels are summarized in Table 5: Groundwater Levels, appended to this report.

The groundwater at the Phase II ESA Property was generally encountered within the overburden unit at depths ranging from approximately 1.6 m to 3.0 m below the existing ground surface.

A petroleum odour was identified within the groundwater recovered from MW13-51 at the time of the January 4, 2024, sampling event. No other unusual visual or olfactory observations were noted within the groundwater samples recovered from the remaining boreholes.

Using the groundwater elevations recorded during the February 6, 2024 sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, groundwater flow was measured in a southeasterly direction, with a hydraulic gradient of 0.05 m/m. Groundwater contours are shown on Drawing PE5066-10 – Test Hole Location Plan, appended to this report.

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. Preliminary grain-size analysis indicates on-site soils are find-med grained, but as a conservative approach, the more stringent coarse-grained soil standards were chosen for this assessment.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in combustible vapour reading measured from 0 to 45 ppm. The vapour readings obtained from the field screening indicate that there is a negligible potential for the presence of volatile substances.

It should be noted that a hydrocarbon odour was identified in BH1-24 at a depth of approximately 2.0 m below existing ground surface that was decreasing with depth. No other visual or olfactory indications of potential hydrocarbons, or visual indications of deleterious fill material or metal impacts, were identified in the soil samples.

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 35 soil samples (including four duplicates) were submitted for laboratory analysis of either, BTEX, PHCs (F_1-F_4), metals, PAHs, pH, EC and/or SAR. The results of the analytical testing are presented in Table 6: Soil Analytical Test Results, as well as on the laboratory certificates of analysis, appended to this report.

Based on previous investigations conducted for the Phase II ESA Property, soil impacted with BTEX, PHCs and/or PAHs was identified on the southeastern portion of the Phase II-ESA Property. While this report discusses the findings of the current investigation, historical soil data is presented in the data tables and drawings appended to this report.

BTEX and PHCs (F_1-F_4)

All BTEX and PHC parameter concentrations detected in the soil samples analysed as part of this Phase II-ESA comply with the selected MECP Table 3 Residential Standards. The analytical results for BTEX and PHCs in the tested soil are shown on Drawing PE5066-11 – Analytical Testing Plan – Soil (BTEX and PHCs), appended to this report.

Metals (including arsenic (As), antimony (Sb) and selenium (Se))

The concentration of zinc in soil samples BH7-24-SS2 and BH7-24-SS3 exceeds the MECP Table 3 Residential Standard.

Additionally, the concentration of barium or vanadium in soil samples BH4-24-SS3, BH7-24-SS6 and BH8-24-SS7 exceed the MECP Table 3 Residential Standards. As further discussed below in the CSM, these exceedances are naturally occurring in clay soils and are not considered to represent contaminants of concern on the Phase II-ESA Property.

All remaining metals parameters identified in each of the soil samples analyzed as part of this Phase II-ESA comply with the MECP Table 3 Residential Standards. The analytical results for metals in the tested soil are shown on Drawing PE5066-13 – Analytical Testing Plan – Soil (Metals).

PAHs

PAH parameters were identified in soil sample BH7-24-SS3, all of which comply with the selected MECP Table 3 Residential Standards. No PAH parameters were identified in the remaining soil samples submitted for analytical testing as part of this Phase II-ESA. The analytical results for PAHs in the tested soil are shown on Drawing PE5066-14 – Analytical Testing Plan – Soil (PAHs).

EC/SAR

All soil samples analyzed for pH comply with the selected MECP Table 3 Residential Standards. As noted in Table 1, in accordance with Section 49.1 of O. Reg 153/04, EC and SAR standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined, based on a Phase I-ESA, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow and/or ice. The analytical results for pH, EC and SAR in the tested soil are not shown on the drawings appended to this report as they have been deemed to meet the standard based on Section 49.1 of O. Reg 153/04.

Maximum Soil Parameter Concentrations

The maximum concentration of each parameter identified in soil samples analyzed on the Phase II-ESA Property (from both the current Phase II-ESA and previous investigations) are presented in Table 6A: Maximum Concentrations - Soil, appended to this report.

5.6 Groundwater Quality

A total of 16 groundwater samples were recovered from the monitoring wells installed in boreholes BH1-24, BH2-24, BH3-24, BH4-24 and BH7-24, as well as existing monitoring wells MW13-21, MW13-23, MW13-44, MW13-45, MW13-46, and MW13-51 on January 3, 2024, January 4, 2024 and/or February 6, 2024 and submitted for laboratory analysis of BTEX, PHCs (F1-F4), VOCs and/or PAHs.

The results of the analytical testing are presented in Table 7: Groundwater Analytical Test Results, as well as on the laboratory certificates of analysis, appended to this report.

Based on previous investigations conducted for the Phase II ESA Property, groundwater impacted with BTEX and/or PHCs was identified on the Phase II ESA Property. While this report discusses the findings of the current investigation, historical groundwater data is presented in the data tables and drawings appended to this report.

BTEX and PHCs (F_1-F_4)

The concentration of benzene, PHC F2 and/or PHC F3 in groundwater samples MW13-23-GW2, MW13-45-GW2 and MW13-51 exceed the MECP Table 3 Residential Standards. All remaining BTEX and PHC parameter concentrations detected in the groundwater samples analysed as part of this Phase II-ESA comply with the selected MECP Table 3 Residential Standards. The analytical results for BTEX and PHCs in the tested groundwater are shown on Drawing PE5066-15 – Analytical Testing Plan – Groundwater (BTEX and PHCs), appended to this report.

VOCs

All VOC parameter concentrations detected in the groundwater samples analysed as part of this Phase II-ESA comply with the selected MECP Table 3 Residential Standards. The analytical results for VOCs in the tested groundwater are shown on Drawing PE5066-16 – Analytical Testing Plan – Groundwater (BTEX and PHCs), appended to this report.

PAHs

PAH parameters were identified in groundwater sample MW13-23 (the only groundwater sample submitted for analysis of PAHs), all of which comply with the selected MECP Table 3 Residential Standards. The analytical results for PAHs in the tested groundwater are shown on Drawing PE5066-18 – Analytical Testing Plan – Groundwater (PAHs).

Maximum Groundwater Parameter Concentrations

The maximum concentration of each parameter identified in groundwater samples analyzed on the Phase II-ESA Property (from both the current Phase II-ESA and previous investigations) are presented in Table 7A: Maximum Concentrations - Groundwater, appended to this report.

5.7 Quality Assurance and Quality Control Results

All soil and groundwater samples were handled in accordance with the Analytical Protocol with respect to holding time, preservation method, storage requirement, and container type.

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

As per the Sampling and Analysis Plan, duplicate soil samples were obtained from samples BH3-24-SS6, BH5-24-SS6, BH8-24-SS5 and BH9-24-SS6 and submitted for laboratory analysis of BTEX, PHCs, metals, PAHs, EC and/or SAR parameters. Additionally, duplicate groundwater samples were obtained from MW13-45, MW13-45-GW2, and MW13-51 and submitted for laboratory analysis of BTEX, PHCs and/or VOCs. The duplicates were collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results. The RPD calculations for the soil samples are provided in Table 8: QA/QC Calculations.

Typically, RPD values below 20% are considered to be of satisfactory quality. The relative percent difference (RPD) results calculated for various soil and groundwater parameters fell outside of the acceptable range of 20%.

Despite the exceeded RPD values for various parameters calculated between the original and duplicate samples, it should be noted that the concentrations of the parameters were well within the selected MECP Table 3 Residential Standards in all samples, with the exception of groundwater sample MW13-45-GW2 and MW13-51 for which both the original and/or duplicate exceed the MECP Table 3 Residential Standards for benzene, PHC F2 and/or PHC F3. It is our opinion that the decision-making usefulness of the samples is not considered to be impaired, and thus the quality of the field data collected during this remediation 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. Conclusions and recommendations are discussed in a subsequent section.

Site Description

The Phase II-ESA Property is part of a larger property of land addressed as 1500 Merivale Road, in the City of Ottawa, Ontario. The Phase II ESA Property is located on the west side of Merivale Road, approximately 200 m east of Clyde Avenue.

The Phase II Property is an irregular shaped parcel of land, with an approximate area of 0.35 hectares. At the time of the 2024 Phase I-ESA, the Phase II-ESA Property existed as vacant land with a paved roadway along the north portion.

Residential and commercial properties within the 250m study area are serviced with municipal water.

Background

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As described in Subsection 7.1 of the Phase I-ESA report, as well as Subsection 2.2 of this report, the following PCAs, as described by Table 2 of O.Reg. 153/04, are considered to result in APECs on the Phase II-ESA Property:

- PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems – this PCA is associated with the possible former on-site automotive service garage on the southeast portion of the Phase I-ESA Property and the former off-site automotive service garage addressed 1480 Merivale Road, adjacent to the south of the Phase I-ESA Property (APEC 1 and APEC 5, respectively).
- PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks – this PCA is associated with the historical on-site heating oil UST on the central portion of the Phase I-ESA Property (APEC 2).
- PCA 30 – Importation of Fill Material of Unknown Quality – this PCA is associated with potential presence of fill material of unknown quality identified in the area of the former on-site commercial building (APEC 3)

Based on the findings of the Phase I ESA, it is considered likely that road salt was historically applied to the surface of the former on-site parking areas, access lanes and the existing access roadway on the north portion of the Phase I-ESA Property for the safety of vehicular and pedestrian traffic under conditions of ice and/or snow. Although not defined as a specific PCA under Column A of Table 2 of O.Reg. 153/04, the use of salt for safety purposes is considered to result in an APEC on the Phase I-ESA Property (APEC 4).

According to Section 49.1 of O.Reg. 153/04, if an applicable site condition standard is exceeded at a property solely because of the following reason, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act: "The qualified person has determined, based on a phase one environmental site assessment or a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both."

In accordance with Section 49.1 of O.Reg. 153/04, any EC and SAR concentrations on the Phase I-ESA Property that exceed the MECP Table 3 Residential Standards for a residential/institutional land use are deemed not to be exceeded for the purpose of Part XV.1 of the Act. This exemption is being relied on for APEC 4.

The remaining 14 off-site PCAs (existing or historical) identified within the Phase I Study Area are not considered to result in APECs on the Phase I-ESA Property due to their respective separation distance and/or their down/cross-gradient orientation with respect to the anticipated groundwater flow to the southeast.

All APECs are outlined on Drawing PE5066-8 – Site Plan, while all PCAs identified within the Phase I Study Area are presented on Drawing PE5066-9 – Surrounding Land Use Plan in the Figures section of this report, following the text.

Contaminants of Potential Concern

Based on the past uses of the Phase I-ESA Property and the potentially contaminating activities, the following Contaminants of Potential Concern (CPCs) have been identified:

- ❑ Petroleum Hydrocarbons Fractions 1 through 4 (PHCs F_1-F_4)
- ❑ Benzene, Toluene, Ethylbenzene, Xylene (BTEX)
- ❑ Volatile Organic Compounds (VOCs)
- ❑ Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- ❑ Polycyclic Aromatic Hydrocarbons (PAHs)

These CPCs have the potential to be present in the soil matric and/or the groundwater beneath the Phase I-ESA Property. In accordance with Section 49.1 of O.Reg.153/04, as amended, electrical conductivity (EC) and sodium adsorption ratio (SAR) are not considered to be CPCs.

Subsurface Structures and Utilities

The Phase I-ESA Property is situated within a municipally serviced area. Underground utilities identified on the Phase I-ESA Property at the time of the site inspection include natural gas services and private water and sewer service along the north portion of the Phase II-ESA Property. Based on the findings of this assessment, the on-site underground utilities are not considered to have contributed to contaminant transport.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II-ESA Property generally consists of:

- ❒ **Concrete** from the former slab of the on-site commercial building was identified at ground surface in BH1-24, BH2-24 and BH5-24- and extended to a maximum depth of 0.13 mbgs. Groundwater was not encountered in this layer.
- ❒ **Topsoil** with organics and gravel was identified at ground surface in BH6-24 and BH8-24 and extended to a maximum depth of 0.46 mbgs. Groundwater was not encountered in this layer.

- **Asphaltic Concrete** was identified at ground surface in BH3-24 and BH4-24 and extended to a depth of 0.03 mbgs. Groundwater was not encountered in this layer.

- **Fill material** generally consisting of topsoil with organics, some gravel and varying amounts of clay was identified at ground surface in BH7-24 and BH9-24 and extended to a maximum depth of 0.69 mbgs. A subsurface layer of fill material consisting of brown silty sand or clay with varying amounts of gravel, cobbles, boulders, topsoil and organics was encountered in each borehole, with the exception of BH6-24 and extended to a maximum depth of 2.59 mbgs. Groundwater was encountered in this layer in BH5-24 and BH7-24.

- **Topsoil** with peat and/or woof was encountered in BH4-24 and BH5-24 beneath the fill material and extended to a maximum depth of 2.97 mbgs. Groundwater was not encountered in this layer.

- **Glacial till** consisting of `brown silty clay or sand with varying amounts of gravel, cobbles and boulders was identified beneath the surficial topsoil layer, the fill material or the subsurface topsoil in each borehole and extended to a maximum depth of 8.74 mbgs. Groundwater was encountered in this layer in BH1-24, BH2-24 and BH3-24.

- **Limestone Bedrock** was encountered in BH1-24 and BH2-24 at depths of 8.74 and 8.56 mbgs, respectively. Groundwater was not encountered in this layer.

The stratigraphy of the Phase II-ESA Property, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets, appended to this report.

Hydrogeological Characteristics

The groundwater at the Phase II-ESA Property was encountered within the overburden at depths ranging from approximately 1.6 m to 2.1 mbgs, with the exceptions of BH1-24 and BH2-24, where the deep monitoring wells were installed and the groundwater was encountered within the overburden at depths of approximately 2.4 and 3.0 mbgs, respectively. During the most recent groundwater sampling event, groundwater flow was measured in a southeasterly direction, with a hydraulic gradient of 0.08 m/m.

Groundwater contours are shown on Drawing PE5066-10 – Test Hole Location Plan, appended to this report.

Approximate Depth to Bedrock

The bedrock, consisting of limestone was encountered at depths of 8.74 and 8.57 m below existing ground surface in BH1-24 and BH2-24, respectively. Bedrock was not confirmed in the remaining boreholes.

Approximate Depth to Water Table

The depth to the water table at the Phase II-ESA Property varies between approximately 1.56 to 2.14 m below existing grade (and up to 3.01 m below existing grade in the deep wells on the Phase II-ESA Property).

Sections 41 and 43.1 of Ontario Regulation 153/04

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the Phase II Property, in that the Phase II Property is not within 30m of an environmentally sensitive area and the pH of the surface soil is between 5 and 9 while the pH of the subsurface soil is between 5 and 11.

Section 43.1 of the Regulation does not apply to the Phase II Property as bedrock is not located less than 2 m below ground surface and there are no water bodies located on or within 30m of the Phase II Property.

Existing Buildings and Structures

No buildings or permanent structures are present on the Phase II-ESA Property. The concrete slab of the former on-site commercial building was identified on the southeast portion of the Phase II-ESA Property.

Fill Placement

Fill material, generally consisting of brown silty sand or clay with varying amounts of gravel, cobbles, boulders, topsoil and organics, was identified in the area of the former on-site commercial building. It should be noted that a hydrocarbon odour was identified in BH1-24 at a depth of approximately 2.0 m below existing ground surface that was decreasing with depth. No other visual or olfactory indications of potential hydrocarbons, or visual indications of deleterious fill material or metal impacts, were identified at the time of the field program.

Proposed Buildings and Other Structures

It is our understanding that the Phase II ESA Property is to be redeveloped with a 10-storey residential mid-rise building with associated underground parking.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are known to exist within the Phase I Study Area.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II-ESA, metals (zinc) impacted soil was identified in the vicinity of BH7-24, located within the central portion of the Phase II-ESA Property.

Based on the findings of the previous investigations conducted on the Phase II-ESA Property, BTEX, PHC and/or PAH impacted soil was identified in the vicinity of MW13-23, MW13-45, BH13-49 and BH13-51, located within the southeastern portions of the Phase II ESA Property.

It should be noted that barium and vanadium concentrations in excess of the selected MECP Table 3 Standards were identified in the soil on the Phase II-ESA Property (as part of both the current Phase II-ESA and previous investigations). These parameter concentrations are considered to be representative of naturally occurring elevated levels in silty clay deposits within the Ottawa region for the reasons provided below:

- ❑ No potential sources of barium or vanadium were identified on the subject land during the Phase I ESA

- ❑ Concentrations of barium and vanadium identified in the fill material overlying the clay layer were not elevated and comply with the selected MECP Table 3 Standards.

As such, it is the opinion of the QP that barium and vanadium are not contaminants of concern at the Phase II-ESA Property.

Based on the findings of this Phase II-ESA, BTEX (benzene) and/or PHC (PHC F2 and/or PHC F3) groundwater was identified in the vicinity of MW13-23, MW13-45 and MW13-51, located within the southeastern portion of the Phase II-ESA Property.

Based on the findings of the previous investigations conducted on the Phase II-ESA Property, BTEX (benzene) and/or PHC impacted groundwater was identified in the vicinity of MW13-21, MW13-23 and MW13-45, located within the southeastern portion of the Phase II-ESA Property.

The analytical test results for the soil and groundwater samples tested are shown on the Analytical Testing Plans, appended to this report.

Types of Contaminants

Based on the findings of this Phase II-ESA and previous environmental investigations, the contaminants of concern (COCs) at the Phase II-ESA Property are considered to be BTEX, PHCs, metals and PAHs.

Contaminated Media

Based on the findings of this Phase II-ESA and previous environmental investigations, the contaminants of concern identified in the soil on the Phase II-ESA Property are considered to be BTEX, PHCs, metals and PAHs.

Based on the findings of this Phase II-ESA and previous environmental investigations, the contaminants of concern identified in the groundwater on the Phase II-ESA Property are considered to be BTEX and PHCs.

What Is Known About Areas Where Contaminants Are Present

According to the analytical test results, BTEX, PHC, metal, and/or PAH impacted soil was identified within the central and southeastern portions of the Phase II-ESA Property. BTEX and PHC impacted groundwater is present within the southeastern portion of the Phase II-ESA Property.

These areas were formerly occupied by a former possible automotive service garage and a former heating oil underground storage tank (UST).

Distribution and Migration of Contaminants

BTEX, PHCs, metals and PAHs impacted soil was identified in the upper 6m of the overburden within the vicinity of BH7-24, MW13-23, MW13-45, BH13-49 and BH13-51. Based on the analytical test results, this contamination is anticipated to be limited to the central and southeastern portions of the Phase II-ESA Property, in the vicinity of the former possible automotive service garage and former heating oil UST.

BTEX and/or PHC impacted groundwater was identified in the southeastern portion of the subject site, in the vicinity of MW13-21, MW13-23, MW13-45 and MW13-51. Based on the analytical test results, this contamination is anticipated to be limited to the overburden on the southeastern portion of the Phase II-ESA Property, in the vicinity of the former possible automotive service garage.

Discharge of Contaminants

The metals impacted soil in the vicinity of BH7-24 may be related to fill material on the site.

The BTEX, PHC and/or PAH impacted soil in the vicinity of MW13-23, MW13-45, BH13-49 and BH13-51 is considered to have potentially resulted from the former possible on-site automotive service garage and direct discharge release to the subsurface from the former heating oil UST.

The BTEX and/or PHC impacted groundwater within the southeastern portion of the subject site is considered to have resulted from the former possible on-site automotive service garage and direct discharge release to the subsurface from the former heating oil UST.

Climatic and Meteorological Conditions

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

Based on the results of this Phase II-ESA and previous environmental investigations, downward leaching and fluctuation in groundwater levels may have contributed to contaminant migration at the Phase II-ESA Property.

Potential for Vapour Intrusion

Given that there are no buildings or structures present on the Phase II-ESA Property, there is no current potential for vapour intrusion. During redevelopment, all soil and groundwater exceeding the MECP Table 3 Residential Standards will be removed and disposed of off-site. As such, there is no anticipated potential for future vapour intrusion at the Phase II-ESA Property

6.0 CONCLUSIONS

Assessment

A Phase II-ESA was conducted for part of a larger property of land addressed as 1500 Merivale Road, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address the potentially contaminating activities (PCAs) that were identified during the 2024 Phase I-ESA and were considered to result in areas of potential environmental concern (APECs) on the Phase II-ESA Property.

The subsurface investigation was conducted during the interim of January 26 to January 31, 2024. The field program consisted of drilling nine boreholes (BH1-24 – BH9-24) throughout the Phase II ESA Property, five of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 5.3 m to 7.1 m below the existing grade, with the exception of BH1-24 and BH2-24 which were advanced to depths of 12.85 m and 12.78 m below the existing grade, respectively. All boreholes were terminated within the overburden (glacial till) with the exception of BH1-24 and BH2-24, which were terminated within the underlying limestone bedrock. Six previously installed groundwater monitoring wells (MW13-21, MW13-23, MW13-44, MW13-45, MW13-46 and MW13-51) were also located on-site and utilized as part of this investigation.

A total of 35 soil samples (including four duplicates) were submitted for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (collectively known as BTEX), petroleum hydrocarbons (PHCs (F_1-F_4)), metals, polycyclic aromatic hydrocarbons (PAHs), pH, electrical conductivity (EC) and/or sodium adsorption ratio (SAR). Based on the findings of this Phase II-ESA, the concentration of zinc detected in soil samples BH7-24-SS2 and BH7-24-SS3 and the concentration of various PAH parameters in soil sample BH17-24-SS3 exceed the MECP Table 3 Residential Standards. Additionally, the concentration of barium or vanadium in soil samples BH4-24-SS3, BH7-24-SS6 and BH8-24-SS7 exceed the MECP Table 3 Residential Standards. These parameters are considered to be naturally occurring and are not considered to be a contaminant of concern on the Phase II-ESA Property. The remaining parameter concentrations in all other soil samples tested as part of this Phase II-ESA comply with the MECP Table 3 Residential Standards.

Based on the findings of the previous investigations conducted on the Phase II-ESA Property, impacted soil was identified within the southeastern portion of the Phase II ESA Property.

A total of 16 groundwater samples were recovered and submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs and/or PAHs. Based on the findings of this Phase II-ESA, BTEX (benzene) and/or PHC (PHC F2 and/or PHC F3) groundwater was identified in the vicinity of MW13-23, MW13-45 and MW13-51, located within the central portion of the Phase II-ESA Property. The remaining parameter concentrations in all other groundwater samples tested as part of this Phase II-ESA comply with the MECP Table 3 Residential Standards.

Based on the findings of the previous investigations conducted on the Phase II-ESA Property, impacted groundwater was identified the southeastern portion of the Phase II-ESA Property.

Recommendations

Soil

It is our understanding that the Phase II-ESA Property is to be redeveloped for residential purposes in the near future. It is recommended that soil and groundwater remediation program be completed in conjunction with site redevelopment. This will require the segregation of clean soil from impacted soil, the latter of which will require disposal at an approved waste disposal facility.

Prior to off-site disposal at a licenced landfill site, at least one leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

Excess soils generated during construction excavation must be handled in accordance with O.Reg. 406/19. Preliminary excess soil testing was carried out as part of this investigation; the results of the testing program will be provided under separate cover.

Groundwater

The groundwater within the overburden on the southeastern portion of the Phase II-ESA is impacted by BTEX and/or PHCs. It is recommended that a groundwater remediation program is carried out in conjunction with the soil remediation program during redevelopment of the site.

Monitoring Wells

It is recommended that the monitoring wells installed on the Phase II-ESA Property remain viable for future monitoring, if required. It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903 at the time of the construction excavation. Further information can be provided upon request in this regard.

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 meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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

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

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

Paterson Group Inc.

Jeremy Camposarcone, B.Eng.

Karyn Munch, P.Eng., Q.P.ESA

Report Distribution

- Claridge Homes
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5066-8 – SITE PLAN

DRAWING PE5066-9 – SURROUNDING LAND USE PLAN

DRAWING PE5066-10 – TEST HOLE LOCATION PLAN

DRAWING PE5066-11 – ANALYTICAL TESTING PLAN – SOIL (BTEX and PHCs)

DRAWING PE5066-11A – CROSS SECTION A-A' – SOIL (BTEX and PHCs)

DRAWING PE5066-12 – ANALYTICAL TESTING PLAN – SOIL (VOCs)

DRAWING PE5066-12A – CROSS SECTION A-A' – SOIL (VOCs)

DRAWING PE5066-13 – ANALYTICAL TESTING PLAN – SOIL (METALS)

DRAWING PE5066-13A – CROSS SECTION A-A' – SOIL (METALS)

DRAWING PE5066-14 – ANALYTICAL TESTING PLAN – SOIL (PAHs)

DRAWING PE5066-14A – CROSS SECTION A-A' – SOIL (PAHs)

DRAWING PE5066-15 – ANALYTICAL TESTING PLAN – GROUNDWATER (BTEX and PHCs)

DRAWING PE5066-15A – CROSS SECTION A-A' – GROUNDWATER (BTEX and PHCs)

DRAWING PE5066-16 – ANALYTICAL TESTING PLAN – GROUNDWATER (VOCs)

DRAWING PE5066-16A – CROSS SECTION A-A' – GROUNDWATER (VOCs)

DRAWING PE5066-17 – ANALYTICAL TESTING PLAN – GROUNDWATER (METALS)

DRAWING PE5066-17A – CROSS SECTION A-A' – GROUNDWATER (METALS)

DRAWING PE5066-18 – ANALYTICAL TESTING PLAN – GROUNDWATER (PAHs)

DRAWING PE5066-18A – CROSS SECTION A-A' – GROUNDWATER (PAHs)

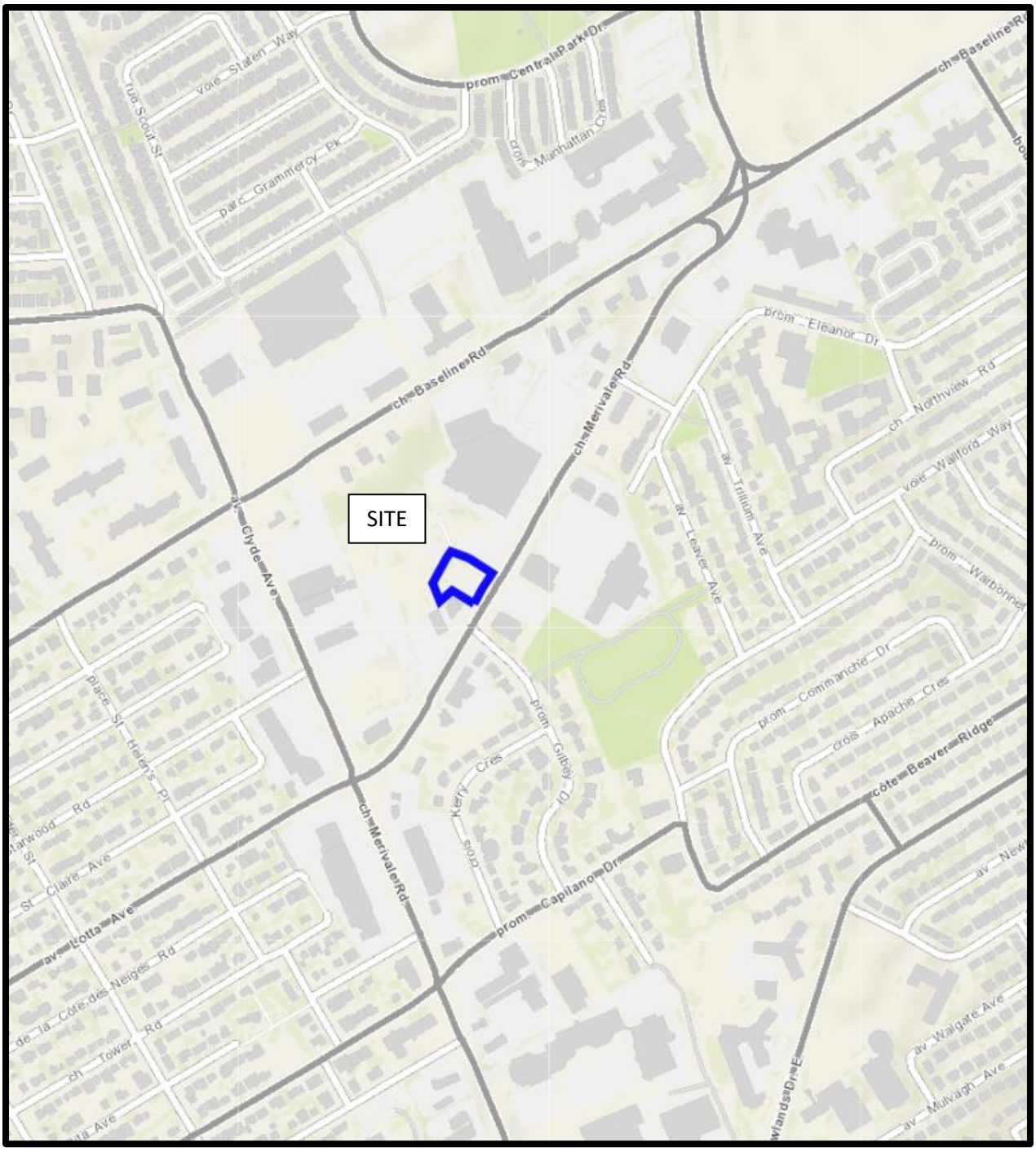
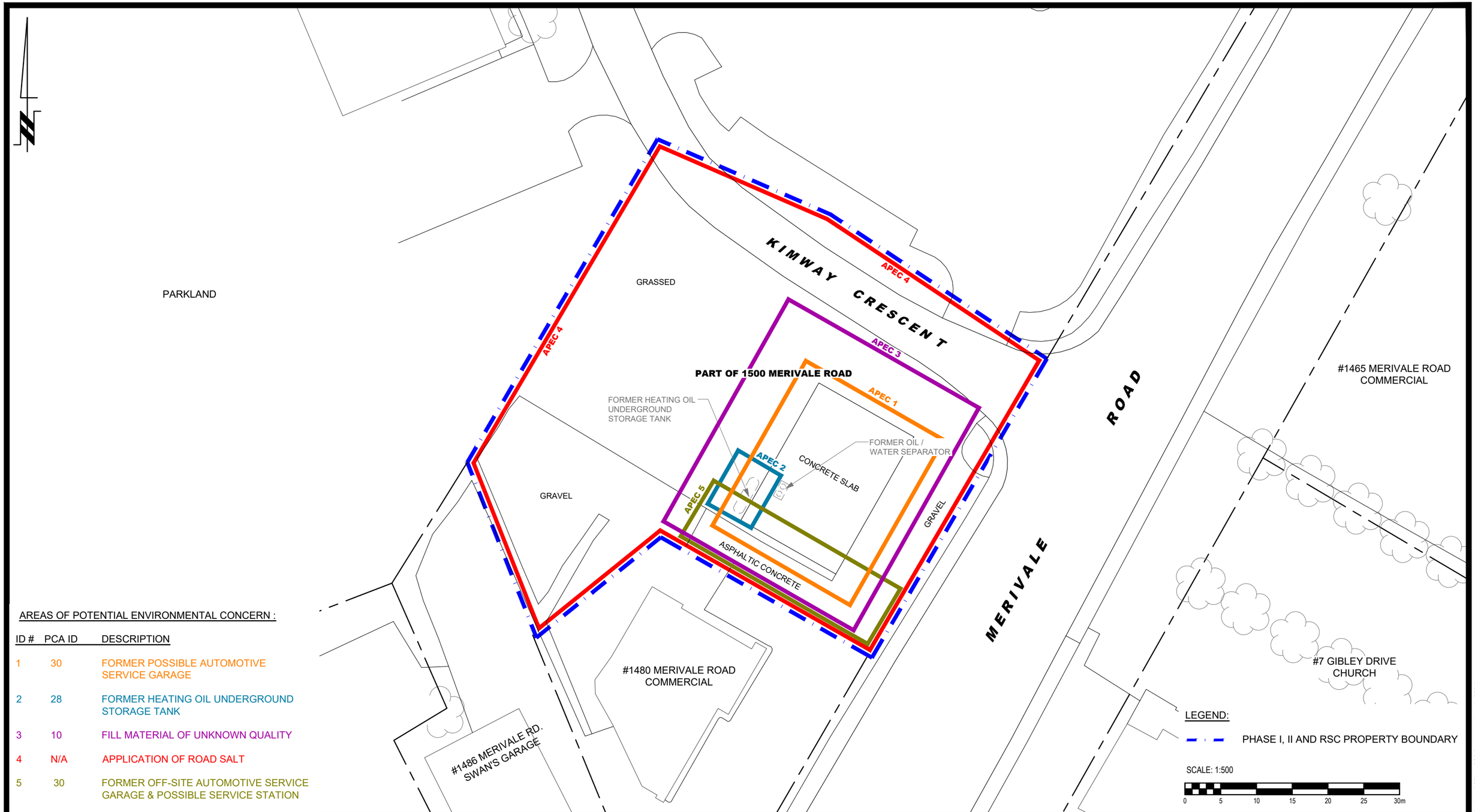


FIGURE 1

KEY PLAN

PATERSON GROUP



AREAS OF POTENTIAL ENVIRONMENTAL CONCERN :

ID #	PCA ID	DESCRIPTION
1	30	FORMER POSSIBLE AUTOMOTIVE SERVICE GARAGE
2	28	FORMER HEATING OIL UNDERGROUND STORAGE TANK
3	10	FILL MATERIAL OF UNKNOWN QUALITY
4	N/A	APPLICATION OF ROAD SALT
5	30	FORMER OFF-SITE AUTOMOTIVE SERVICE GARAGE & POSSIBLE SERVICE STATION

LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

SCALE: 1:500

0 5 10 15 20 25 30m

PATERSON GROUP
9 AURIGA DRIVE
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NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-3
Checked by: JC	Dwg. No.: PE5066-8
Approved by: KM	Revision No.:

11x17

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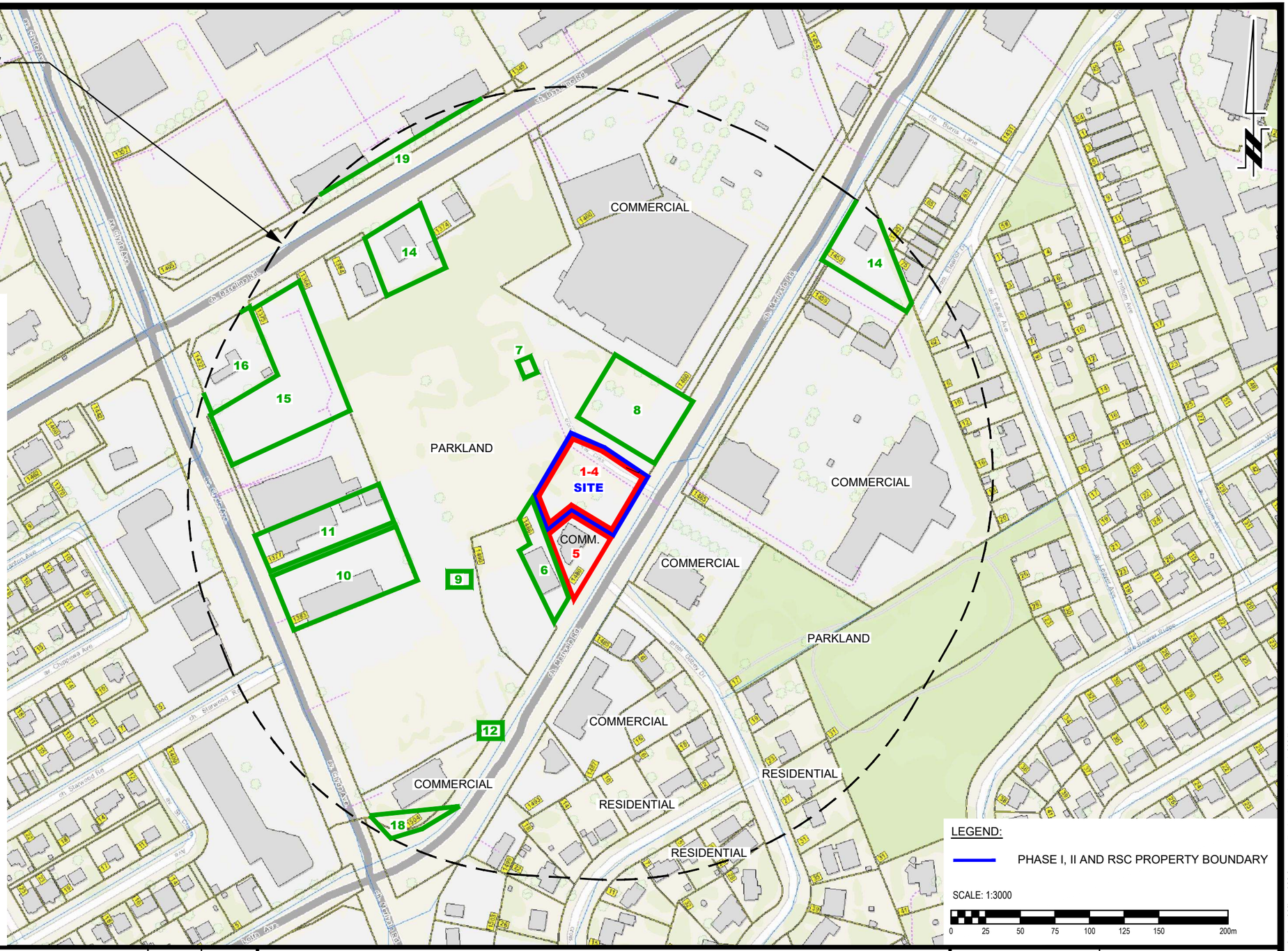
PHASE I - ENVIRONMENTAL SITE ASSESSMENT STUDY AREA

POTENTIALLY CONTAMINATING ACTIVITIES :

ID #	PCA ID	ADDRESS	DESCRIPTION
1	30	ON-SITE	FORMER POSSIBLE AUTOMOTIVE SERVICE GARAGE
2	28	ON-SITE	FORMER HEATING OIL UNDERGROUND STORAGE TANK
3	10	ON-SITE	FILL MATERIAL OF UNKNOWN QUALITY
4	N/A	ON-SITE	APPLICATION OF ROAD SALT
5	28	ON-SITE	FORMER OFF-SITE AUTOMOTIVE SERVICE GARAGE & POSSIBLE SERVICE STATION
6	52	1486 MERIVALE RD.	FORMER AUTOMOTIVE SERVICE GARAGE
7	N/A	8-10 KIMWAY CRES.	FORMER MACHINE SHOP
8	28	1464-1468 MERIVALE ROAD	FORMER RETAIL FUEL OUTLET AND FORMER DRY CLEANERS
9	28	1492 MERIVALE RD.	FORMER TRANSPORT OFFICE WITH ONE ASSOCIATED UNDERGROUND STORAGE TANK
10	N/A	1383 CLYDE AVENUE	FORMER COMMERCIAL PRINTERS
11	52 / 28	1375-1377 CLYDE AVE	EXISTING AUTOMOTIVE SERVICE GARAGE & PRIVATE FUEL OUTLET
12	N/A	1366 MERIVALE RD.	KNOWN CHLORINATED SOLVENTS IMPACTED GROUNDWATER
13	52	1493 MERIVALE RD.	FORMER AUTOMOTIVE SERVICE GARAGE AND FORMER RETAIL FUEL OUTLET
14	52	1380 BASELINE RD.	EXISTING AUTOMOTIVE SERVICE GARAGE
15	52 / 28	1400 BASELINE RD.	FORMER RETAIL FUEL OUTLET AND FORMER AUTOMOTIVE SERVICE GARAGE
16	52	1453 MERIVALE RD.	EXISTING AUTOMOTIVE SERVICE GARAGE AND FORMER RETAIL FUEL OUTLET
17	28 / 52	1432 BASELINE RD.	EXISTING RETAIL FUEL OUTLET AND FORMER AUTOMOTIVE SERVICE GARAGE
18	52	PART OF 1504 MERIVALE ROAD	FORMER AUTOMOTIVE SERVICE GARAGE AND FORMER RETAIL FUEL OUTLET
19	28 / N/A	1357 BASELINE RD.	FORMER HIGH SCHOOL WITH AN ASSOCIATED UNDERGROUND STORAGE TANK AND KNOWN IMPACTED SOIL AND GROUNDWATER



LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

SCALE: 1:3000

0 25 50 75 100 125 150 200m

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:3000	Date: 03/2024
Drawn by: YA	Report No.: PE5066-3
Checked by: JC	Dwg. No.: PE5066-9
Approved by: KM	Revision No.:

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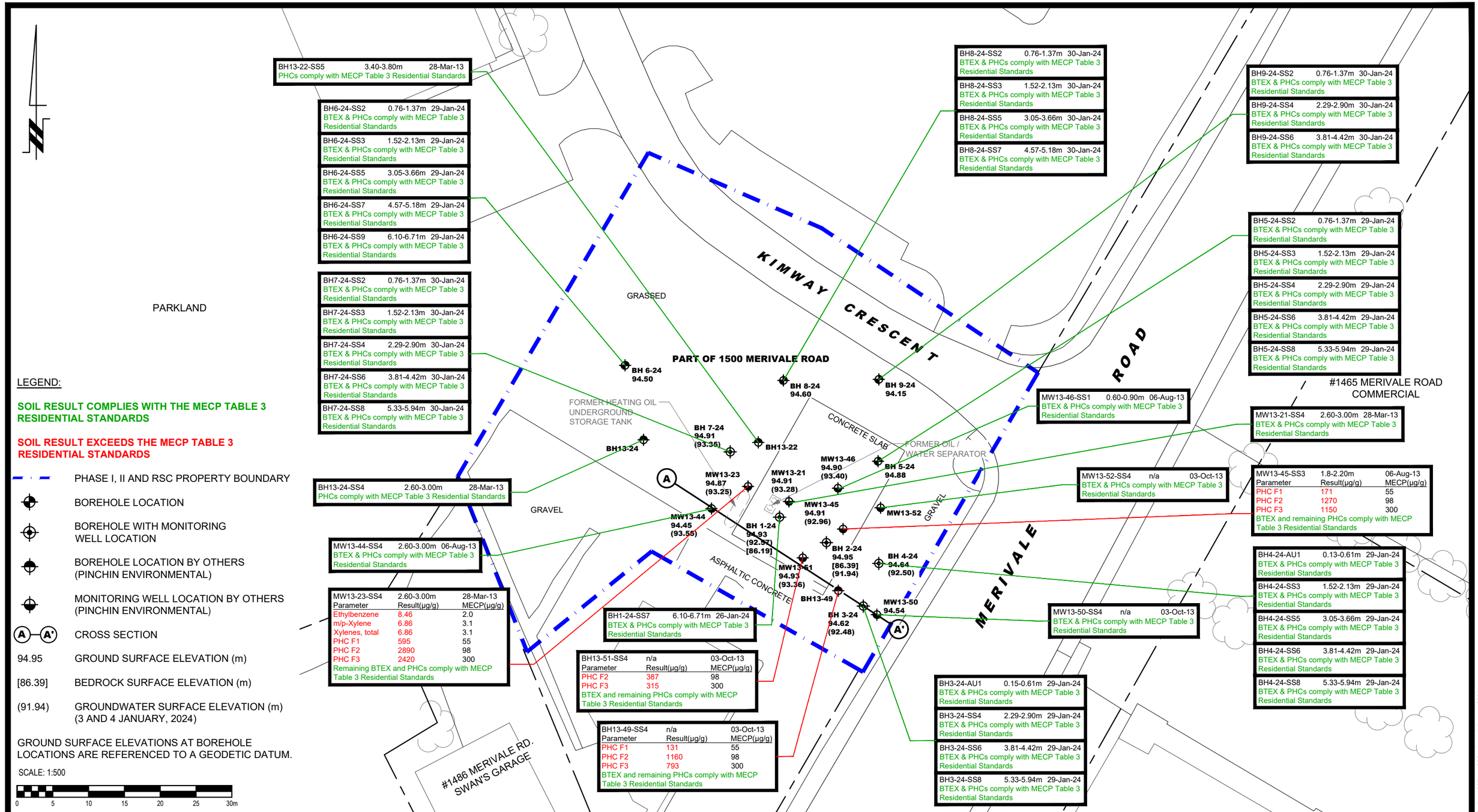
11x17



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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs)

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-11
Approved by: KM	Revision No.:

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11x17

MW13-23-SS4	2.60-3.00m	28-Mar-13
Parameter	Result(µg/g)	MECP(µg/g)
Ethylbenzene	8.46	2.0
m/p-Xylene	6.86	3.1
Xylenes, total	6.86	3.1
PHC F1	595	55
PHC F2	2890	98
PHC F3	2420	300

Remaining BTEX and PHCs comply with MECP Table 3 Residential Standards

BH13-51-SS4	n/a	03-Oct-13
Parameter	Result(µg/g)	MECP(µg/g)
PHC F2	387	98
PHC F3	315	300

BTEX and remaining PHCs comply with MECP Table 3 Residential Standards

BH3-24-AU1 0.15-0.61m 29-Jan-24
BTEX & PHCs comply with MECP Table 3 Residential Standards

BH3-24-SS4 2.29-2.90m 29-Jan-24
BTEX & PHCs comply with MECP Table 3 Residential Standards

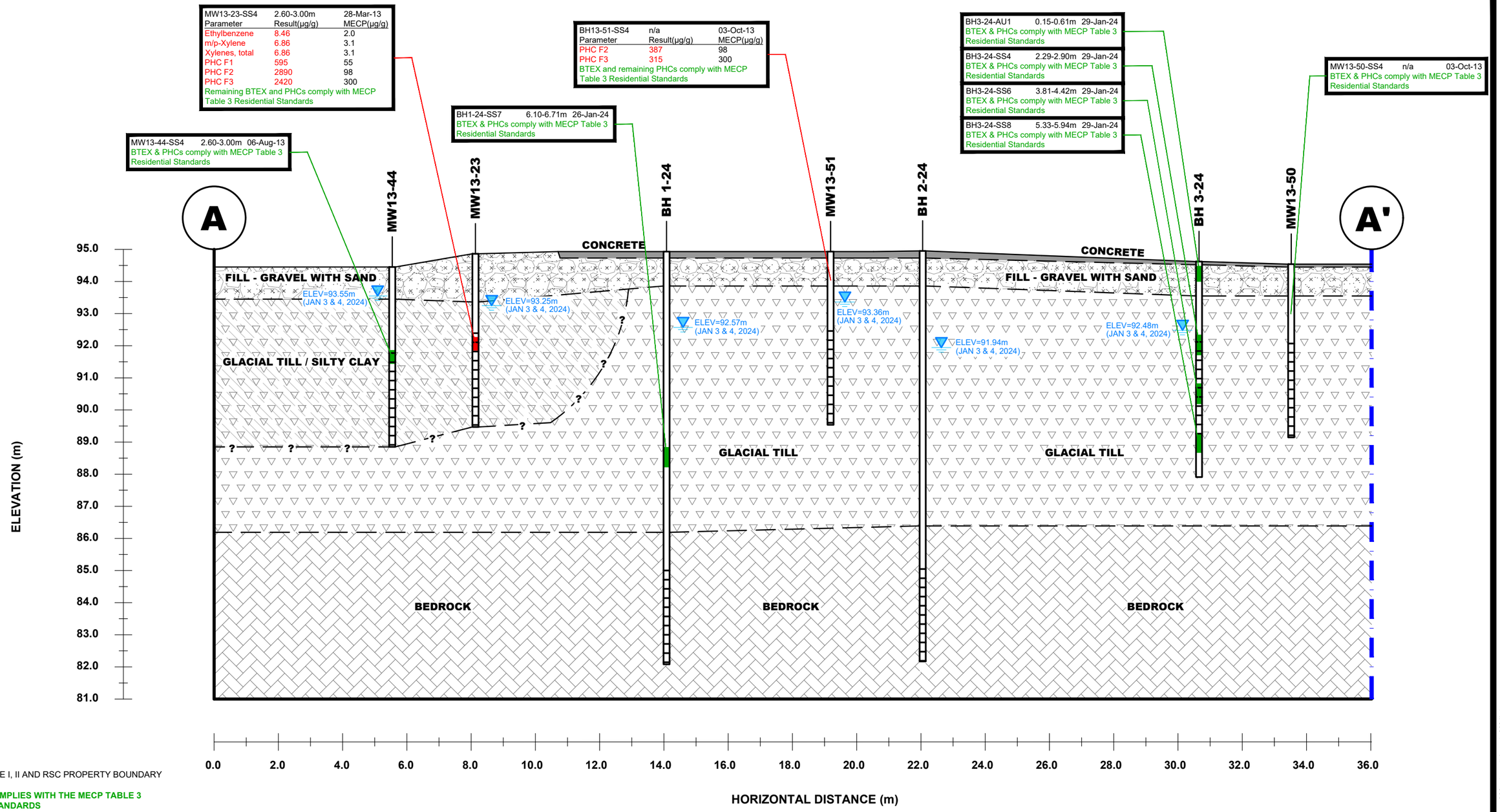
BH3-24-SS6 3.81-4.42m 29-Jan-24
BTEX & PHCs comply with MECP Table 3 Residential Standards

BH3-24-SS8 5.33-5.94m 29-Jan-24
BTEX & PHCs comply with MECP Table 3 Residential Standards

MW13-50-SS4 n/a 03-Oct-13
BTEX & PHCs comply with MECP Table 3 Residential Standards

BH1-24-SS7 6.10-6.71m 26-Jan-24
BTEX & PHCs comply with MECP Table 3 Residential Standards

MW13-44-SS4 2.60-3.00m 06-Aug-13
BTEX & PHCs comply with MECP Table 3 Residential Standards



LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-11A
Approved by: KM	Revision No.:

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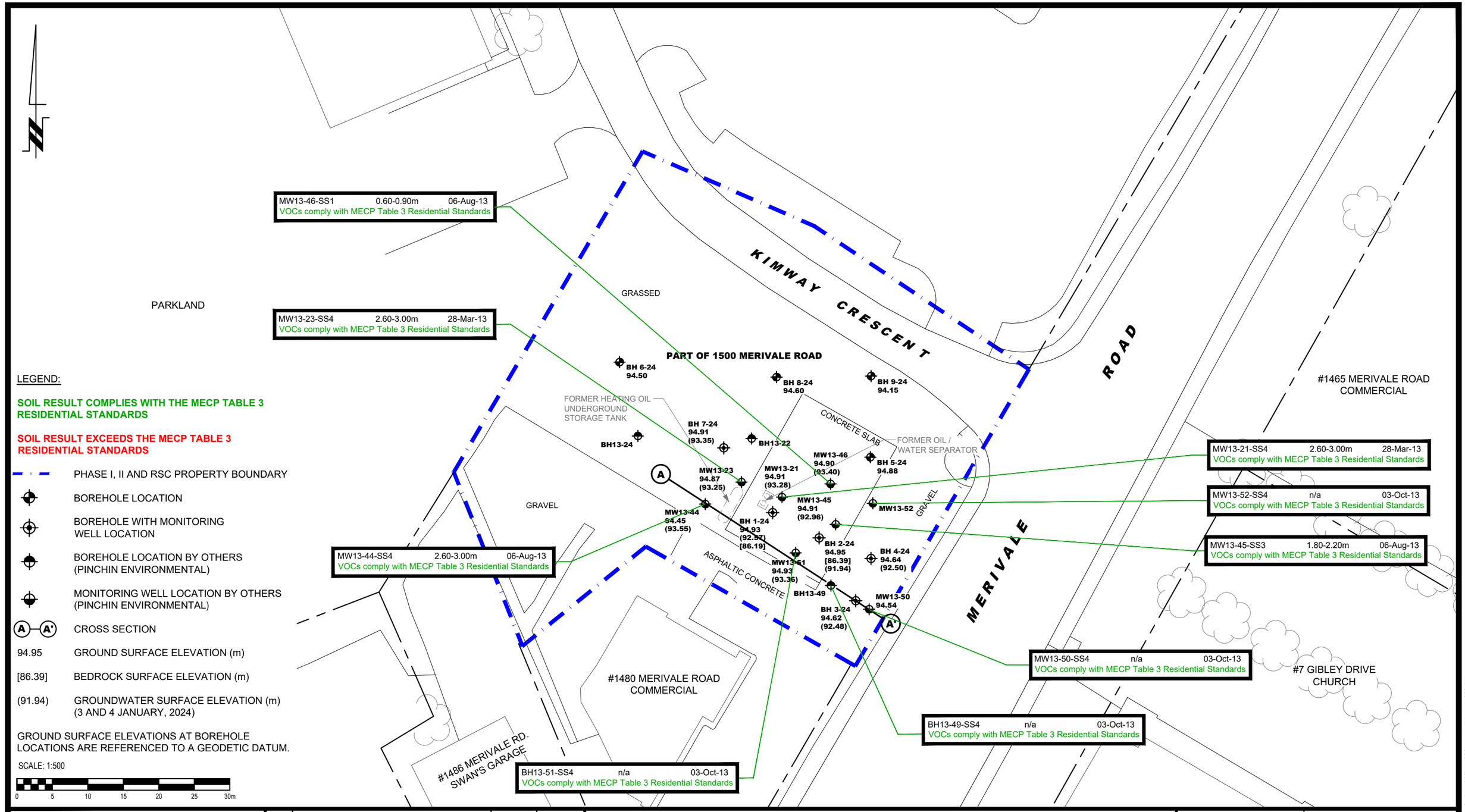

LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

- PHASE I, II AND RSC PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- MONITORING WELL LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- A—A' CROSS SECTION
- 94.95 GROUND SURFACE ELEVATION (m)
- [86.39] BEDROCK SURFACE ELEVATION (m)
- (91.94) GROUNDWATER SURFACE ELEVATION (m) (3 AND 4 JANUARY, 2024)

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

SCALE: 1:500

0 5 10 15 20 25 30m

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, **ONTARIO**

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

Scale: 1:500	**Date:** 03/2024
Drawn by: YA	**Report No.:** PE5066-4
Checked by: JC	**Dwg. No.:** PE5066-12
Approved by: KM	**Revision No.:**

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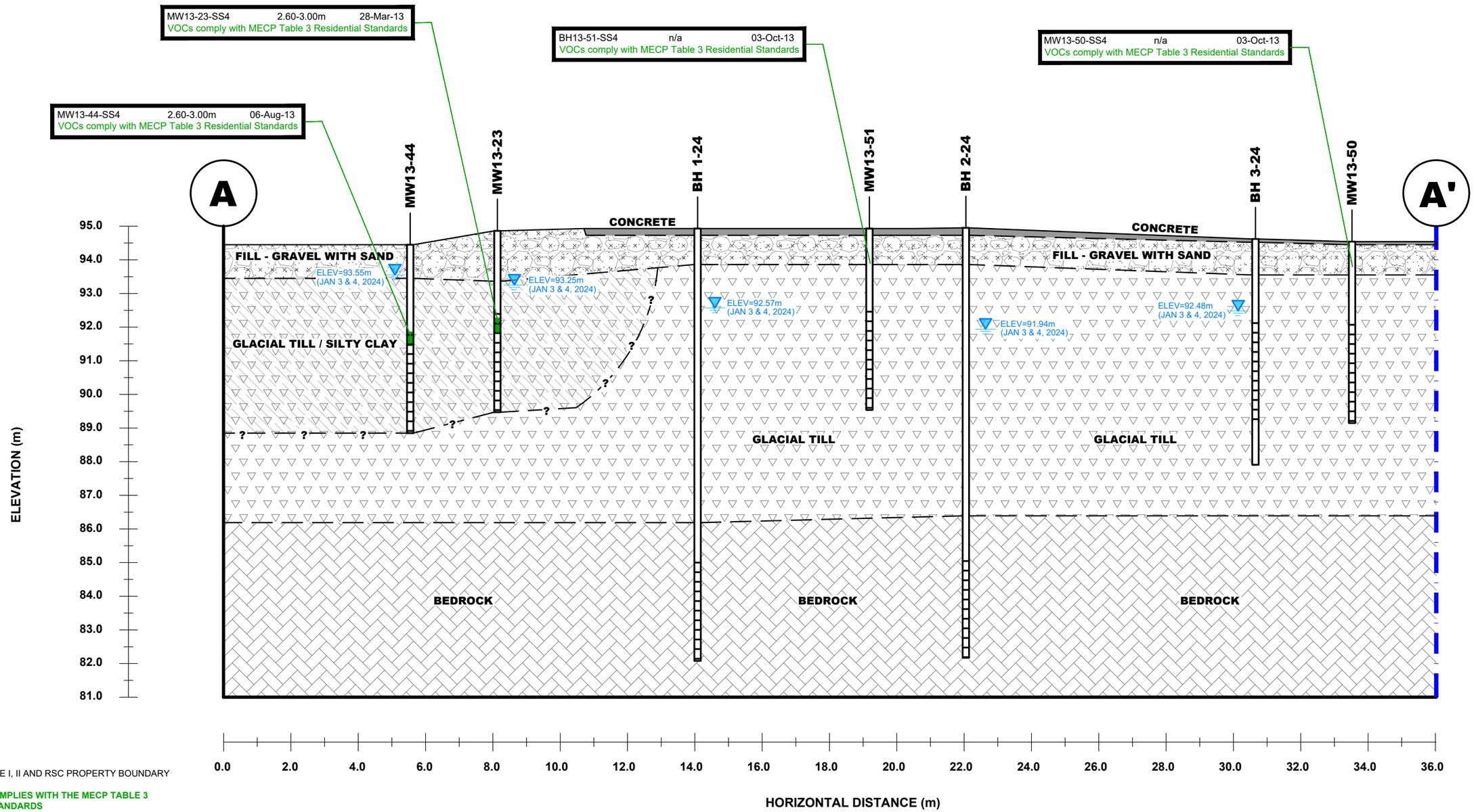
MW13-23-SS4 2.60-3.00m 28-Mar-13
VOCs comply with MECP Table 3 Residential Standards

BH13-51-SS4 n/a 03-Oct-13
VOCs comply with MECP Table 3 Residential Standards

MW13-50-SS4 n/a 03-Oct-13
VOCs comply with MECP Table 3 Residential Standards

MW13-44-SS4 2.60-3.00m 06-Aug-13
VOCs comply with MECP Table 3 Residential Standards



LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-12A
Approved by: KM	Revision No.:

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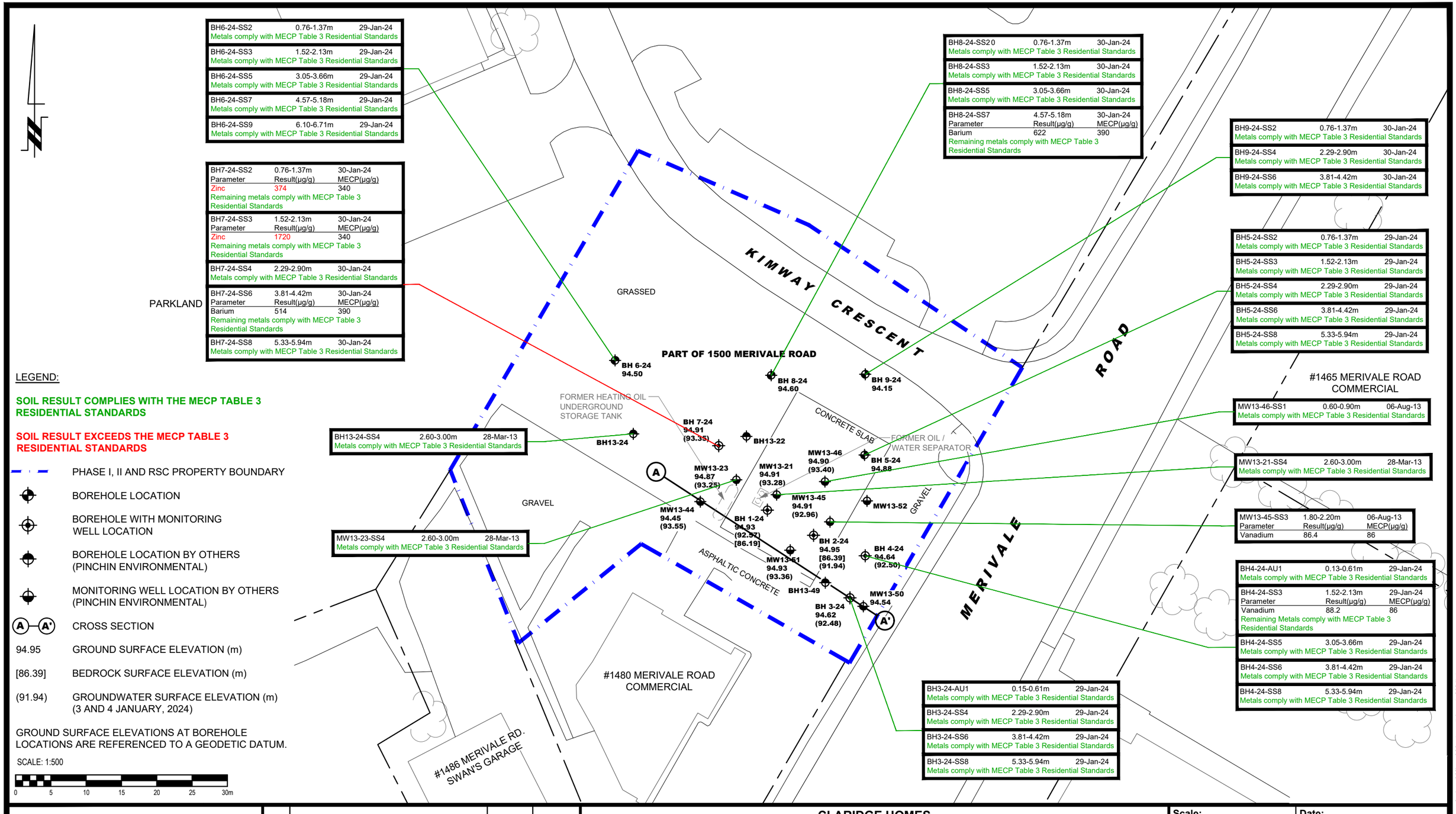

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-13
Approved by: KM	Revision No.:

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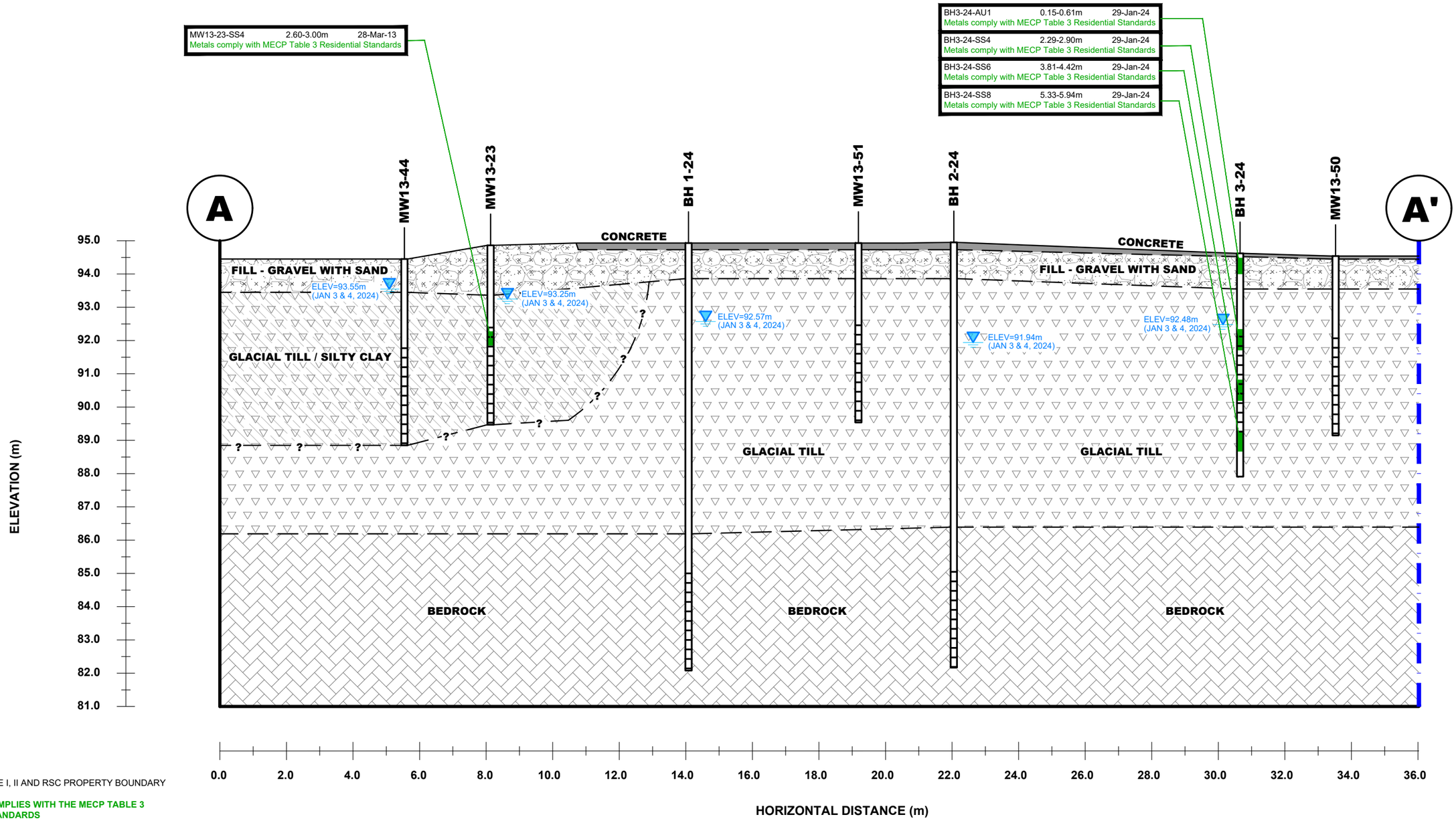

LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-13A
Approved by: KM	Revision No.:

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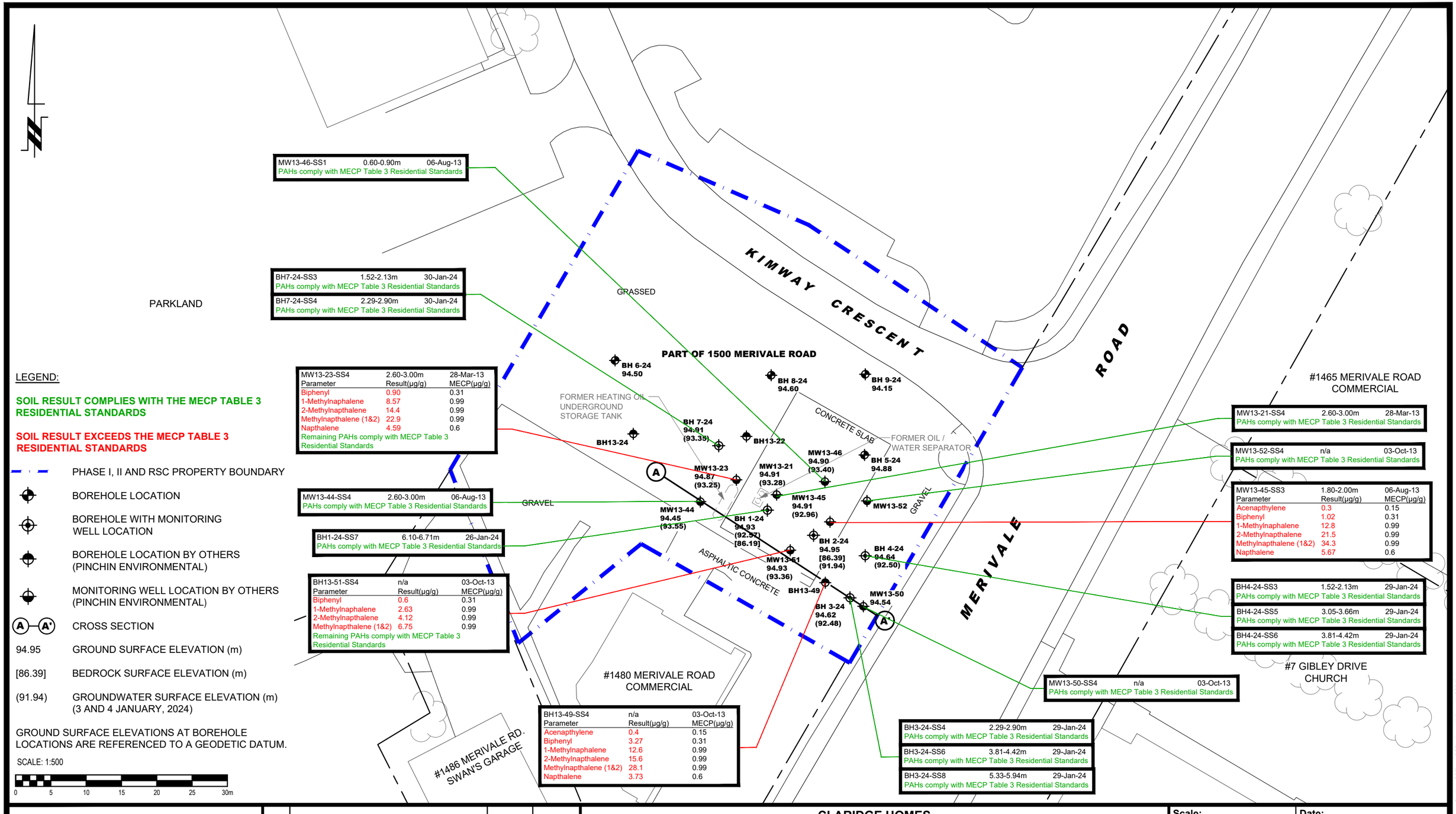

LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

- PHASE I, II AND RSC PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- MONITORING WELL LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- A—A' CROSS SECTION
- 94.95 GROUND SURFACE ELEVATION (m)
- [86.39] BEDROCK SURFACE ELEVATION (m)
- (91.94) GROUNDWATER SURFACE ELEVATION (m) (3 AND 4 JANUARY, 2024)

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

SCALE: 1:500

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - SOIL (PAHs)

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-14
Approved by: KM	Revision No.:

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11x17

MW13-23-SS4	2.60-3.00m	28-Mar-13
Parameter	Result(µg/g)	MECP(µg/g)
Biphenyl	0.90	0.31
1-Methylnaphalene	8.57	0.99
2-Methylnapthalene	14.4	0.99
Methylnapthalene (1&2)	22.9	0.99
Napthalene	4.59	0.6
Remaining PAHs comply with MECP Table 3 Residential Standards		

BH13-51-SS4	n/a	03-Oct-13
Parameter	Result(µg/g)	MECP(µg/g)
Biphenyl	0.6	0.31
1-Methylnaphalene	2.63	0.99
2-Methylnapthalene	4.12	0.99
Methylnapthalene (1&2)	6.75	0.99
Remaining PAHs comply with MECP Table 3 Residential Standards		

MW13-50-SS4 n/a 03-Oct-13
PAHs comply with MECP Table 3 Residential Standards

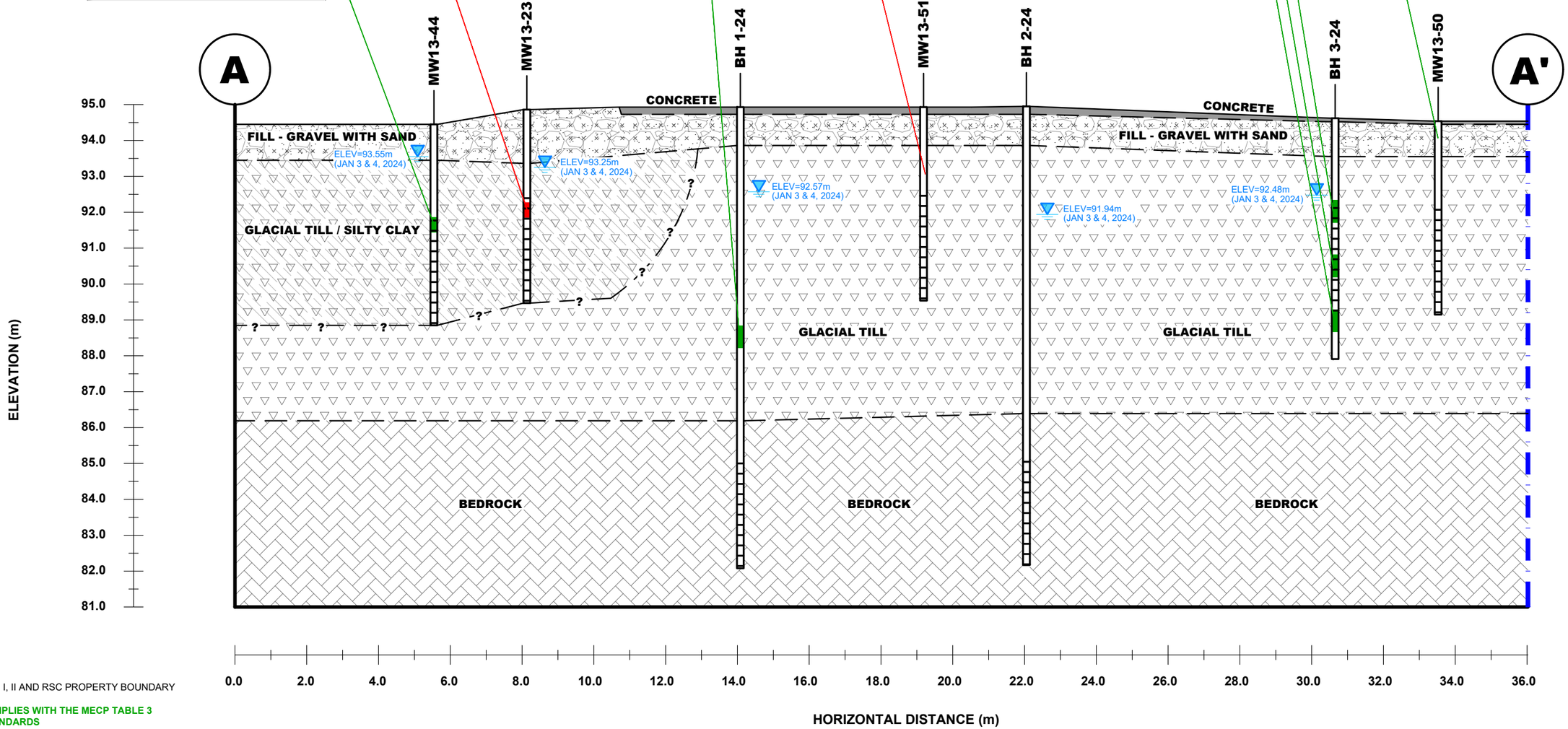
BH3-24-SS4 2.29-2.90m 29-Jan-24
PAHs comply with MECP Table 3 Residential Standards

BH3-24-SS6 3.81-4.42m 29-Jan-24
PAHs comply with MECP Table 3 Residential Standards

BH3-24-SS8 5.33-5.94m 29-Jan-24
PAHs comply with MECP Table 3 Residential Standards

BH1-24-SS7 6.10-6.71m 26-Jan-24
PAHs comply with MECP Table 3 Residential Standards

MW13-44-SS4 2.60-3.00m 06-Aug-13
PAHs comply with MECP Table 3 Residential Standards



LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-14A
Approved by: KM	Revision No.:

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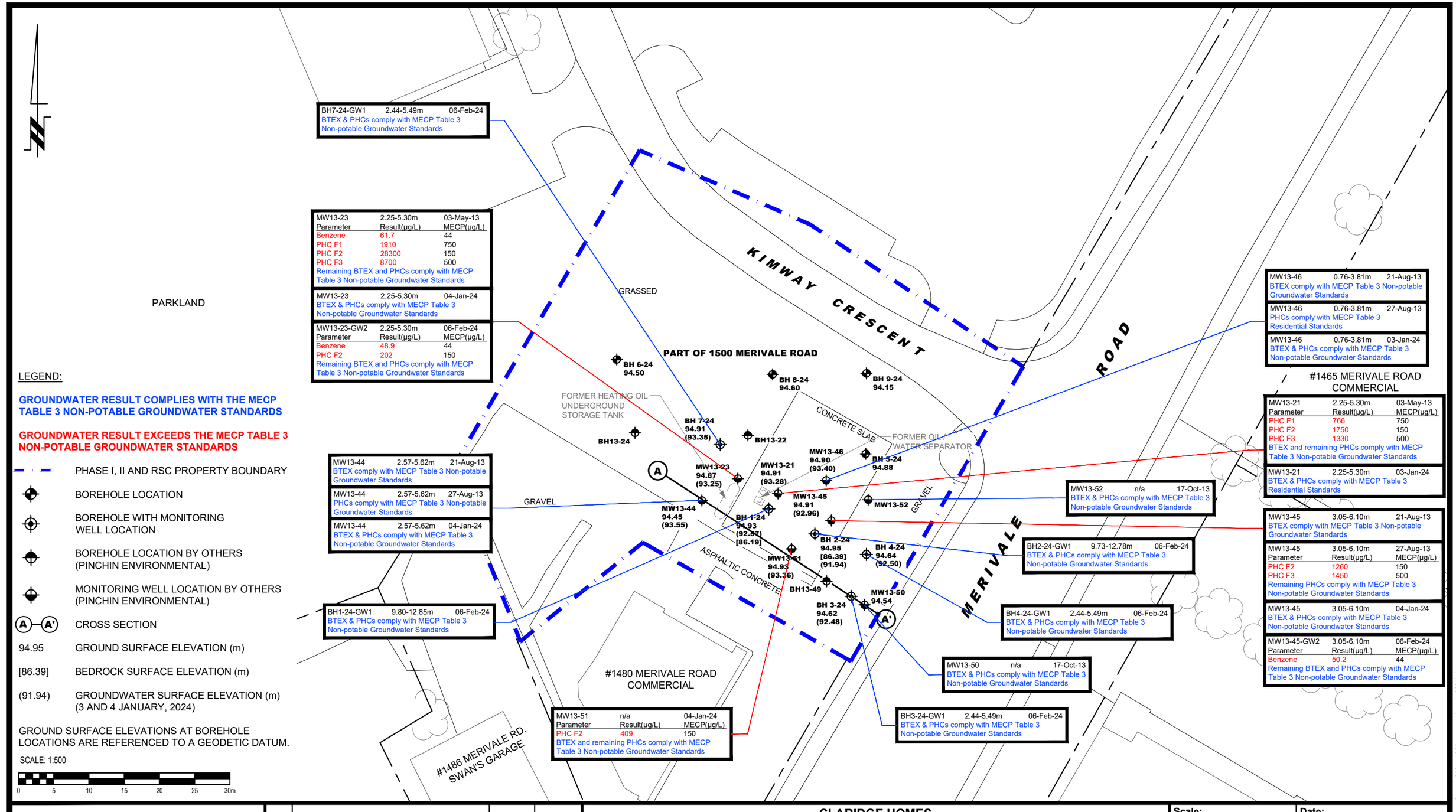

LEGEND:

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

- PHASE I, II AND RSC PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- MONITORING WELL LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- A—A' CROSS SECTION
- 94.95 GROUND SURFACE ELEVATION (m)
- [86.39] BEDROCK SURFACE ELEVATION (m)
- (91.94) GROUNDWATER SURFACE ELEVATION (m) (3 AND 4 JANUARY, 2024)

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

SCALE: 1:500

0 5 10 15 20 25 30m

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5022-4
Checked by: JC	Dwg. No.: PE5066-15
Approved by: KM	Revision No.:

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11x17

MW13-23	2.25-5.30m	03-May-13
Parameter	Result(µg/L)	MECP(µg/L)
Benzene	61.7	44
PHC F1	1910	750
PHC F2	28300	150
PHC F3	8700	500

Remaining BTEX and PHCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-23 2.25-5.30m 04-Jan-24
BTEX & PHCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-23-GW2	2.25-5.30m	06-Feb-24
Parameter	Result(µg/L)	MECP(µg/L)
Benzene	48.9	44
PHC F2	202	150

Remaining BTEX and PHCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-44 2.57-5.62m 21-Aug-13
BTEX comply with MECP Table 3 Non-potable Groundwater Standards

MW13-44 2.57-5.62m 27-Aug-13
PHCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-44 2.57-5.62m 04-Jan-24
BTEX & PHCs comply with MECP Table 3 Non-potable Groundwater Standards

BH1-24-GW1 9.80-12.85m 06-Feb-24
BTEX & PHCs comply with MECP Table 3 Non-potable Groundwater Standards

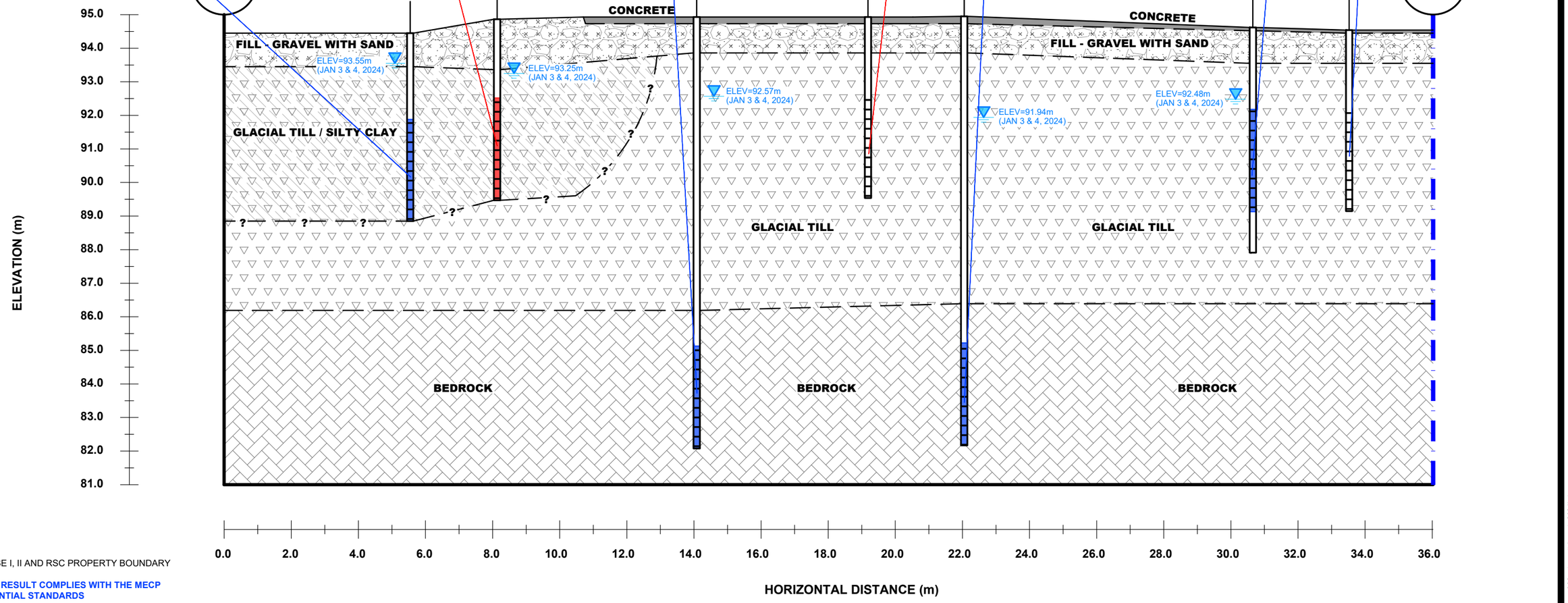
MW13-51	n/a	04-Jan-24
Parameter	Result(µg/L)	MECP(µg/L)
PHC F2	409	150

BTEX and remaining PHCs comply with MECP Table 3 Non-potable Groundwater Standards

BH2-24-GW1 9.73-12.78m 06-Feb-24
BTEX & PHCs comply with MECP Table 3 Non-potable Groundwater Standards

BH3-24-GW1 2.44-5.49m 06-Feb-24
BTEX & PHCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-50 n/a 17-Oct-13
BTEX & PHCs comply with MECP Table 3 Non-potable Groundwater Standards



LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-15A
Approved by: KM	Revision No.:

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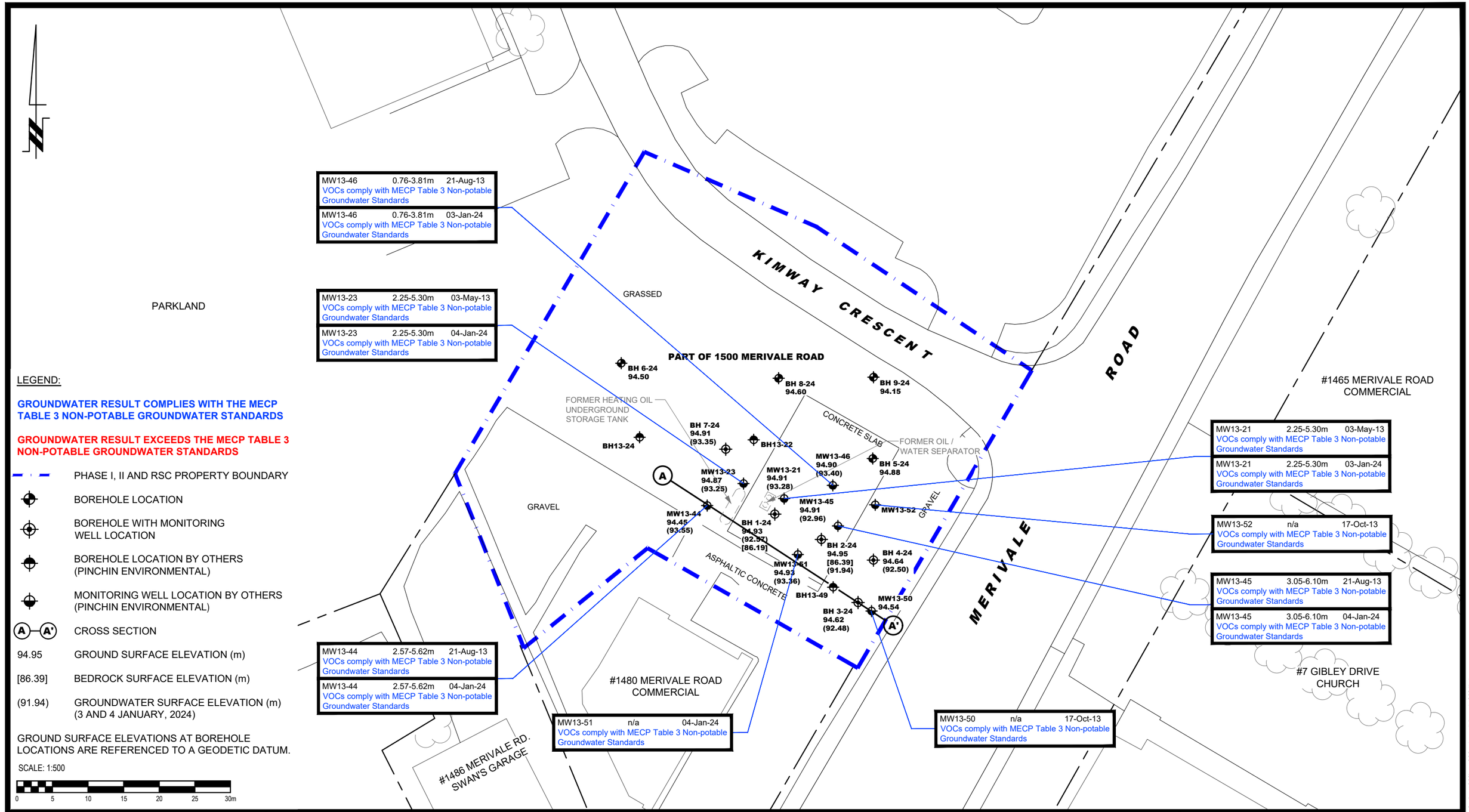

LEGEND:

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

- PHASE I, II AND RSC PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- MONITORING WELL LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- A—A' CROSS SECTION
- 94.95 GROUND SURFACE ELEVATION (m)
- [86.39] BEDROCK SURFACE ELEVATION (m)
- (91.94) GROUNDWATER SURFACE ELEVATION (m) (3 AND 4 JANUARY, 2024)

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

SCALE: 1:500

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - GROUNDWATER (VOCs)

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-16
Approved by: KM	Revision No.:

11x17

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MW13-44 2.57-5.62m 21-Aug-13
VOCs comply with MECP Table 3 Non-potable Groundwater Standards

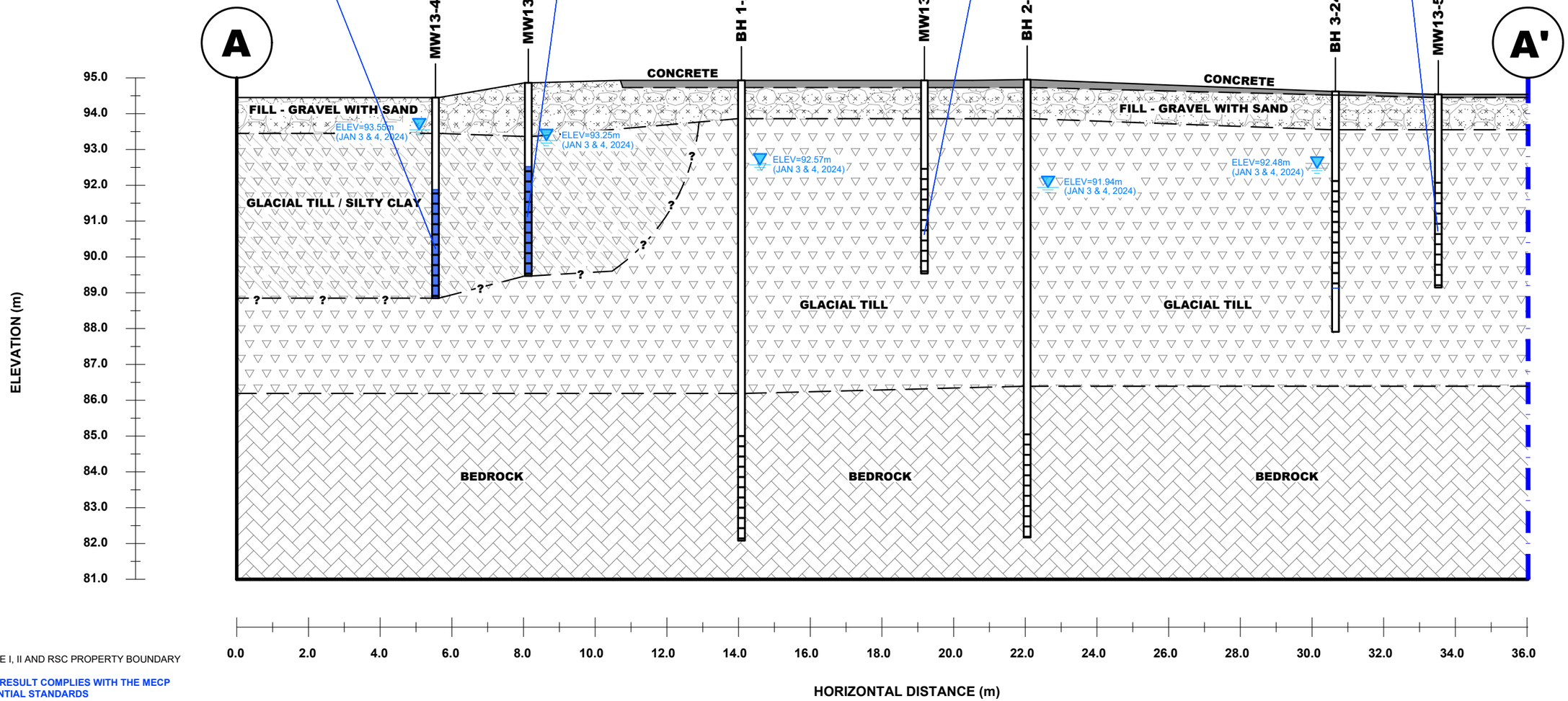
MW13-44 2.57-5.62m 04-Jan-24
VOCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-23 2.25-5.30m 03-May-13
VOCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-23 2.25-5.30m 04-Jan-24
VOCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-51 n/a 04-Jan-24
VOCs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-50 n/a 17-Oct-13
VOCs comply with MECP Table 3 Non-potable Groundwater Standards



LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-16A
Approved by: KM	Revision No.:

11x17

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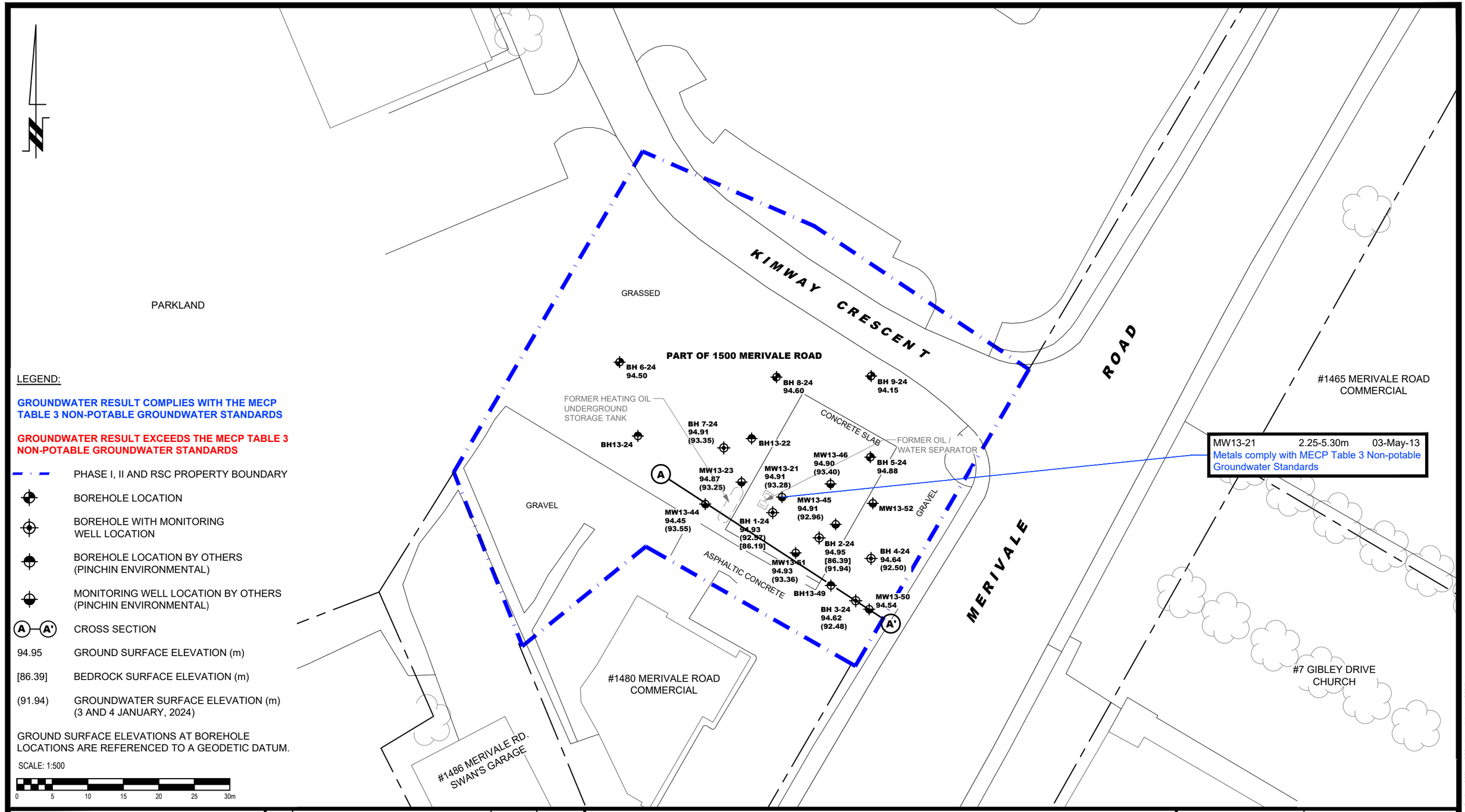

LEGEND:

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

- PHASE I, II AND RSC PROPERTY BOUNDARY
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- MONITORING WELL LOCATION BY OTHERS (PINCHIN ENVIRONMENTAL)
- A—A' CROSS SECTION
- 94.95 GROUND SURFACE ELEVATION (m)
- [86.39] BEDROCK SURFACE ELEVATION (m)
- (91.94) GROUNDWATER SURFACE ELEVATION (m) (3 AND 4 JANUARY, 2024)

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

SCALE: 1:500

0 5 10 15 20 25 30m

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD
OTTAWA, ONTARIO

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

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-17
Approved by: KM	Revision No.:

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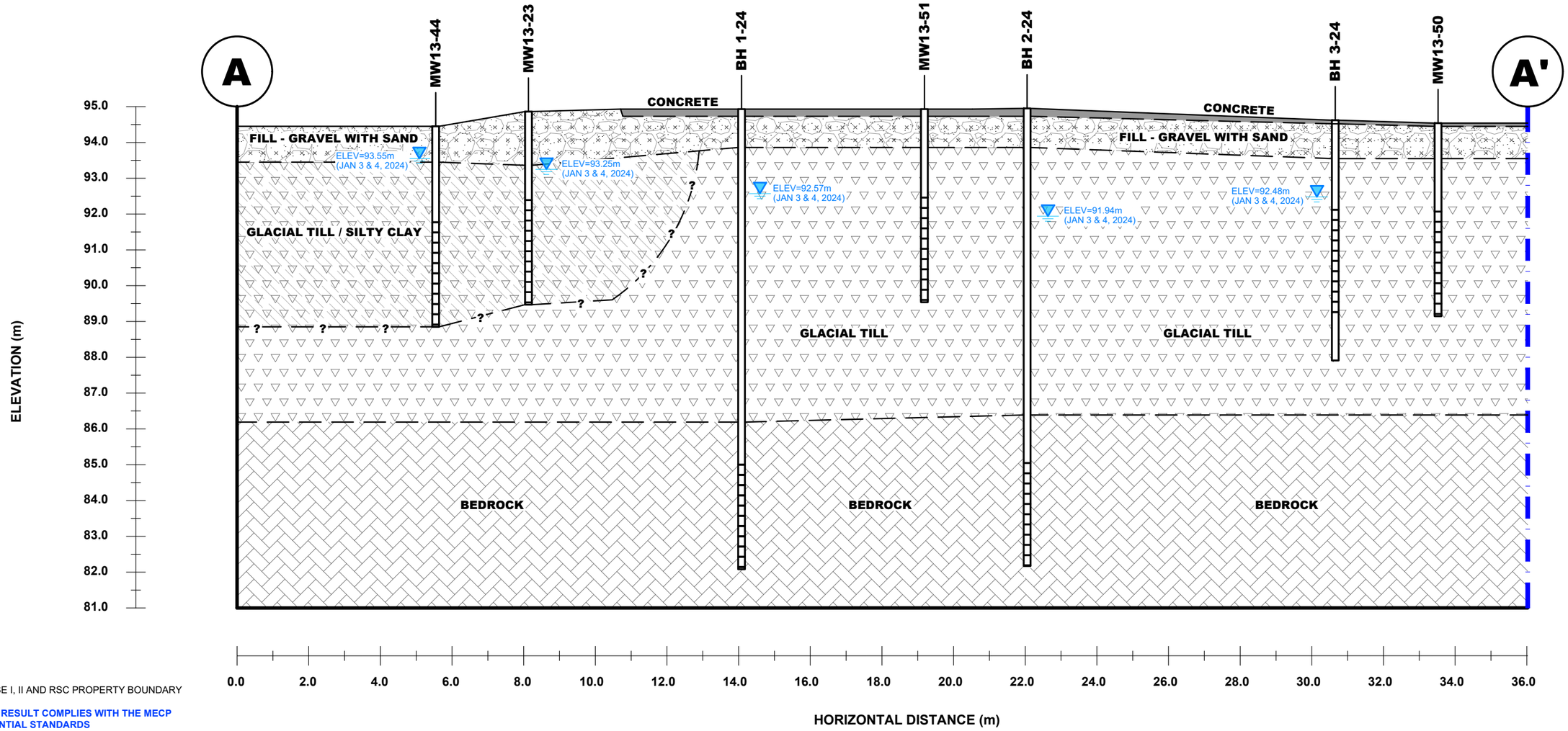

LEGEND:

PHASE I, II AND RSC PROPERTY BOUNDARY

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 RESIDENTIAL STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 RESIDENTIAL STANDARDS

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NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-17A
Approved by: KM	Revision No.:

11x17

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MW13-46 0.76-3.81m 27-Aug-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-23 2.25-5.30m 03-May-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-23 2.25-5.30m 04-Jan-24
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-44 2.57-5.62m 27-Aug-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-21 2.25-5.30m 03-May-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-52 n/a 17-Oct-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-45 3.05-6.10m 27-Aug-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

MW13-50 n/a 17-Oct-13
PAHs comply with MECP Table 3 Non-potable Groundwater Standards

PARKLAND

GRASSED

KIMWAY CRESCENT

PART OF 1500 MERIVALE ROAD

BH 6-24 94.50

BH 8-24 94.60

BH 9-24 94.15

FORMER HEATING OIL UNDERGROUND STORAGE TANK

BH 7-24 94.91 (93.35)

BH13-24

BH13-22

CONCRETE SLAB

FORMER OIL / WATER SEPARATOR

BH 5-24 94.88

MW13-46 94.90 (93.40)

MW13-21 94.91 (93.28)

MW13-23 94.87 (93.25)

MW13-45 94.91 (92.96)

MW13-52

GRAVEL

GRAVEL

MW13-44 94.45 (93.55)

BH 1-24 94.93 (92.57) [86.19]

BH 2-24 94.95 [86.39] (91.94)

BH 4-24 94.64 (92.50)

MW13-51 94.93 (93.36)

ASPHALTIC CONCRETE

MW13-49

MW13-50 94.54

BH 3-24 94.62 (92.48)

A

A'

MERIVALE ROAD

#1465 MERIVALE ROAD
COMMERCIAL

#1480 MERIVALE ROAD
COMMERCIAL

#1486 MERIVALE RD.
SWAN'S GARAGE

#7 GIBLEY DRIVE
CHURCH

LEGEND:

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 3 NON-POTABLE GROUNDWATER STANDARDS

- PHASE I, II AND RSC PROPERTY BOUNDARY
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GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:500

0 5 10 15 20 25 30m

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

NO.	REVISIONS	DATE	INITIAL

CLARIDGE HOMES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1500 MERIVALE ROAD

OTTAWA, ONTARIO

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

Scale: 1:500	Date: 03/2024
Drawn by: YA	Report No.: PE5066-4
Checked by: JC	Dwg. No.: PE5066-18
Approved by: KM	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

PATERSON GROUP

Sampling and Analysis Plan

1440 Blair Towers Place

Ottawa, Ontario

Prepared for Claridge Homes

Report: PE5066-SAP-2
Date: January 23, 2024

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Le Groupe Maurice, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) at 1440 Blair Towers Place, in the City of Ottawa, Ontario.

Based on the findings of the Phase I ESA, the following subsurface investigation program was developed. The Phase II ESA was carried out in conjunction with a geotechnical investigation.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-24	Placed on the southeast portion of the Phase II-ESA Property to assess for potential soil and groundwater impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	11-13 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden.
BH2-24	Placed on the southeast portion of the Phase II-ESA Property to assess for potential soil and groundwater impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	11-13 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden.
BH3-24	Placed on the southeast portion of the Phase II-ESA Property to assess for potential soil and groundwater impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	5-7 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden.
BH4-24	Placed on the southeast portion of the Phase II-ESA Property to assess for potential soil and groundwater impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	5-7 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden.
BH5-24	Placed on the east-central portion of the Phase II-ESA Property to assess for potential soil impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	5-7 m; For delineation purposes.
BH6-24	Placed on the west portion of the Phase II-ESA Property for horizontal and/or vertical delineation purposes.	5-7 m; For delineation purposes.
BH7-24	Placed on the southeast portion of the Phase II-ESA Property to assess for potential soil and groundwater impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	5-7 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden.
BH8-24	Placed on the central portion of the Phase II-ESA Property to assess for potential soil impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	5-7 m; For delineation purposes.
BH9-24	Placed on the northwest portion of the Phase II-ESA Property to assess for potential soil impacts resulting from the identified APECs and for horizontal and/or vertical delineation purposes.	5-7 m; For delineation purposes.

Borehole locations are shown on Drawing PE5066-10 – 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 until practical refusal to augering. 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 boreholes for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

- ❒ At least one sample from each borehole should be submitted, in order to delineate the horizontal extent of contamination across the site.
- ❒ At least one sample from each stratigraphic unit should be submitted, in order to delineate the vertical extent of contamination at the site.
- ❒ In boreholes where there is visual or olfactory evidence of contamination, or where organic vapour meter or photoionization detector readings indicate the presence of contamination, the 'worst-case' sample from each borehole should be submitted for comparison with 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 subject site is based on the following general considerations:

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

After drilling is completed a plan with the borehole locations must be provided. Distances 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 TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364675.668 **NORTHING:** 5024772.885 **ELEVATION:** 94.93
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 26, 2024

FILE NO. PE5066
HOLE NO. BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.93
CONCRETE 0.13							
FILL: Brown silty sand to sandy silt		AU	1				
1.07		SS	2	50	9	1	93.93
GLACIAL TILL: Loose, brown silty clay with gravel and cobbles, trace organics 1.45							
GLACIAL TILL: Stiff to hard, grey silty clay, some gravel, cobbles, boulders - silty sand to sandy silt seams throughout the layer		SS	3	67	9	2	92.93
		SS	4	25	24		
		SS	5	100	19	3	91.93
						4	90.93
		SS	6	83	37	5	89.93
						6	88.93
		SS	7	100	33		
						7	87.93
		SS	8	100	16	8	86.93
8.74							
BEDROCK: Excellent quality, grey limestone bedrock		RC	1	100	100	9	85.93
		RC	2	100	100	10	84.93

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

MONITORING WELL CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364675.668 **NORTHING:** 5024772.885 **ELEVATION:** 94.93
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 26, 2024

FILE NO. PE5066
HOLE NO. BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	MONITORING WELL CONSTRUCTION
GROUND SURFACE									
		RC	3	100	100	10	84.93		
						11	83.93		
		RC	4	100	100	12	82.93		
12.85									
End of Borehole									
(GWL @ 2.36m - Feb. 6, 2024)									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364682.207 **NORTHING:** 5024769.332 **ELEVATION:** 94.95
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 26, 2024

FILE NO. PE5066
HOLE NO. BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.95
OVERBURDEN						1	93.95
						2	92.95
						3	91.95
						4	90.95
						5	89.95
						6	88.95
						7	87.95
						8	86.95
8.56							
BEDROCK: Excellent quality, grey limestone bedrock - fair quality from 8.6 to 8.8m depth		RC	1	100	47	9	85.95
		RC	2	100	100	10	84.95

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

MONITORING WELL CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364682.207 **NORTHING:** 5024769.332 **ELEVATION:** 94.95
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 26, 2024

FILE NO. PE5066
HOLE NO. BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	MONITORING WELL CONSTRUCTION
GROUND SURFACE									
		RC	3	100	100	10	84.95		
						11	83.95		
		RC	4	100	100	12	82.95		
12.78									
End of Borehole									
(GWL @ 3.01m - Feb. 6, 2024)									

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

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364687.365 **NORTHING:** 5024760.478 **ELEVATION:** 94.62
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 29, 2024

FILE NO. PE5066
HOLE NO. BH 3-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.62
CONCRETE 0.03							
FILL: Brown silty sand to sandy silt		AU	1				
- with gravel from 0.03m to 0.15m depth							
1.07		SS	2	50	13	1	93.62
GLACIAL TILL: Firm to stiff, brown silty clay with gravel and boulders, occasional cobbles							
- grey by 1.5m depth		SS	3	83	4	2	92.62
- silty sand to sandy silt seams throughout the layer		SS	4	25	8		
		SS	5	46	9	3	91.62
		SS	6	67	10	4	90.62
- silty sand to sandy silt content increases with depth		SS	7	75	29		
- Very stiff to hard by 4.6m depth						5	89.62
- gravel, cobbles and boulders content increases with depth		SS	8	67	25		
		SS	9	100	33	6	88.62
6.71							
End of Borehole							
(GWL @ 2.14m - Feb. 6, 2024)							

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

MONITORING WELL CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

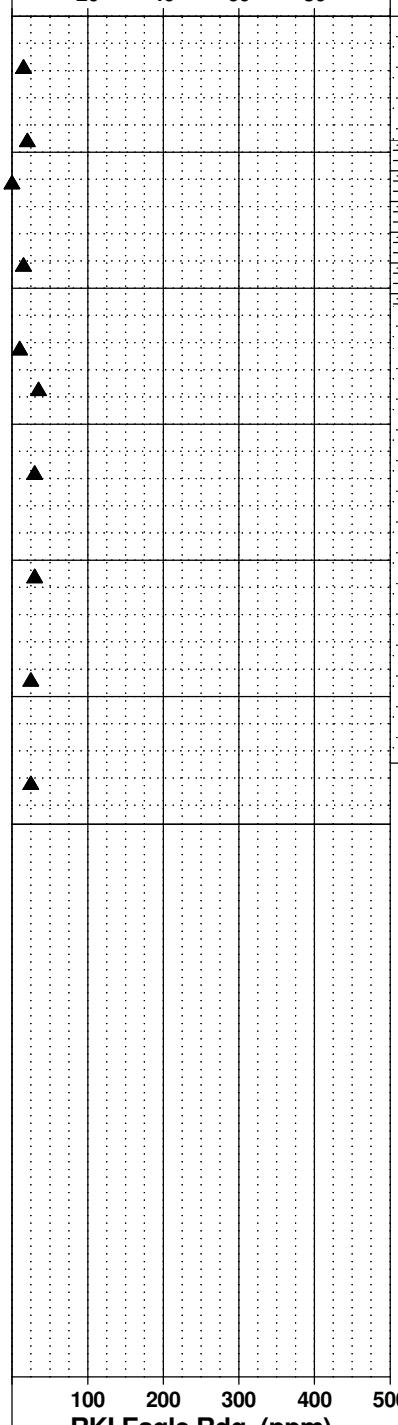
Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364689.517 **NORTHING:** 5024766.428 **ELEVATION:** 94.64
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 29, 2024

FILE NO. PE5066
HOLE NO. BH 4-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.64
ASPHALTIC CONCRETE 0.03							
FILL: Brown silty sand to sandy silt with gravel 0.69		AU	1				
FILL: Brown silty clay to clayey silt with sand		SS	2	63	12	1	93.64
- gravel, cobbles and boulders from 1.1m to 2.2m depth		SS	3	83	5	2	92.64
2.21							
TOPSOIL with peat and wood 2.74		SS	4	100	4		
GLACIAL TILL: Stiff to very stiff, grey silty clay to clayey silt with sand, gravel and boulders, occasional cobbles		SS	5	58	8	3	91.64
		SS	6	100	5	4	90.64
		SS	7	100	21	5	89.64
- silt content increases with depth		SS	8	75	14		
5.94							
End of Borehole							
(GWL @ 2.14m - Feb. 6, 2024)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ **Lower Explosive Limit %**



MONITORING WELL CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

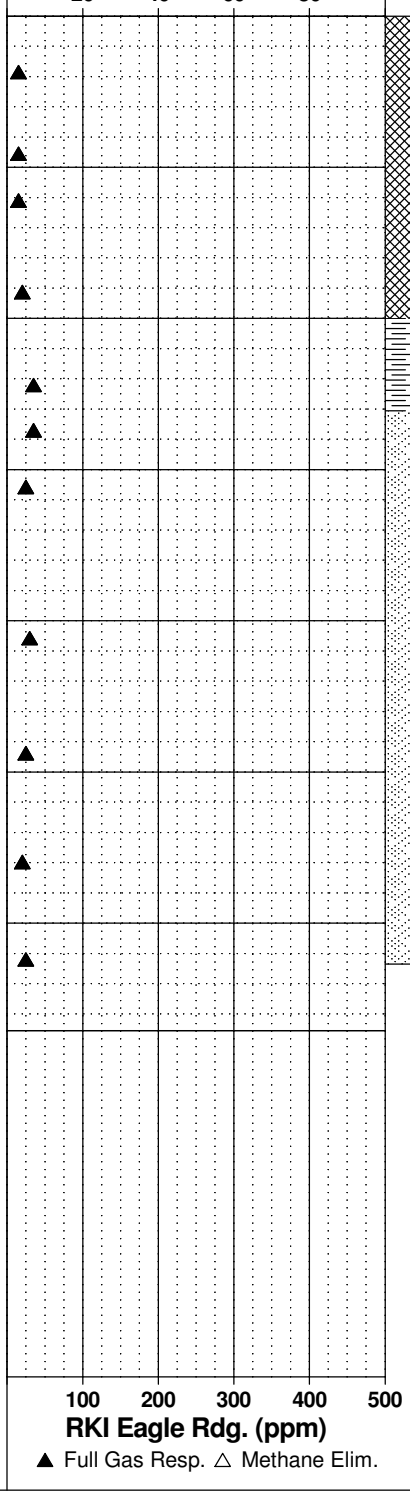
Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364689.427 **NORTHING:** 5024780.704 **ELEVATION:** 94.88
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 29, 2024

FILE NO. PE5066
HOLE NO. BH 5-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.88
CONCRETE 0.13							
FILL: Brown silty sand to sandy silt with gravel		AU	1				
0.81						1	93.88
FILL: Brown silty clay with sand, gravel, cobbles, topsoil and organics		SS	2	83	4		
		SS	3	75	4	2	92.88
2.59		SS	4	75	7		
TOPSOIL with peat 2.97						3	91.88
GLACIAL TILL: Very stiff to hard, grey silty clay to clayey silt with silty sand, gravel and boulders, occasional cobbles		SS	5	100	+50		
		SS	6	75	12	4	90.88
		SS	7	100	32	5	89.88
		SS	8	100	37		
		SS	9	100	+50	6	88.88
6.71							
End of Borehole							
(Borehole Dry - Feb. 6, 2024)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %



PIEZOMETER CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364654.102 **NORTHING:** 5024794.092 **ELEVATION:** 94.50
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 29, 2024

FILE NO. PE5066
HOLE NO. BH 6-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	PIEZOMETER CONSTRUCTION
GROUND SURFACE									
TOPSOIL with organics and gravel		AU	1			0	94.50		
0.46									
GLACIAL TILL: Loose to compact, brown silty sand, some gravel and boulders, occasional cobbles		SS	2	83	8	1	93.50		
		SS	3	100	24	2	92.50		
2.21									
GLACIAL TILL: Compact to very dense, grey clayey silt and sandy silt with gravel, cobbles and boulders		SS	4	100	25	3	91.50		
		SS	5	100	15				
		SS	6	100	18	4	90.50		
		SS	7	100	32	5	89.50		
		SS	8	8	30				
		SS	9	93	+50	6	88.50		
		SS	10	100	+50	7	87.50		
7.11									
End of Borehole									
Practical refusal to augering at 7.11m depth									
(GWL @ 1.53m - Feb. 6, 2024)									

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

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364668.774 **NORTHING:** 5024782.01 **ELEVATION:** 94.91
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 30, 2024

FILE NO. PE5066
HOLE NO. BH 7-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.91
FILL: Topsoil with organics and gravel, some clay		AU	1				
0.69							
FILL: Brown silty sand to sandy silt with gravel		SS	2	42	4	1	93.91
1.07							
FILL: Brown silty clay to clayey silt, trace gravel and cobbles							
1.45							
FILL: Brown silty sand to sandy silt, some clay, gravel, cobbles and organics		SS	3	25	25	2	92.91
2.21							
GLACIAL TILL: Very stiff to hard, brown silty clay to clayey silt, some sand, gravel, cobbles and boulders		SS	4	83	16		
- grey by 3.3m depth		SS	5	100	19	3	91.91
		SS	6	100	32	4	90.91
		SS	7	75	29	5	89.91
		SS	8	75	27		
5.99							
End of Borehole							
Practical refusal to augering at 5.99m depth							
(GWL @ 1.56m - Feb. 6, 2024)							

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

MONITORING WELL CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364676.209 **NORTHING:** 5024791.983 **ELEVATION:** 94.60
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 30, 2024

FILE NO. PE5066
HOLE NO. BH 8-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.60
TOPSOIL with organics 0.08							
FILL: Brown silty sand to sandy silt with gravel, debris, cobbles and boulders 1.22		SS	2	83	3	1	93.60
FILL: Grey silty clay with sand, gravel and cobbles 1.45							
FILL: Topsoil with peat and organics 1.83		SS	3	83	11	2	92.60
FILL: Grey silty sand to sandy silt 2.21							
GLACIAL TILL: Compact, brown silty sand to sandy silt, some gravel, cobbles and boulders 2.97		SS	4	83	30	3	91.60
GLACIAL TILL: Very stiff to hard, grey silty clay to clayey silt, some sand, gravel, cobbles and boulders		SS	5	100	37		
		SS	6	59	+50	4	90.60
		SS	7	100	27	5	89.60
		SS	8	100	+50		
6.02						6	88.60
End of Borehole							
Practical refusal to augering at 6.02m depth							
(GWL @ 1.43m - Feb. 6, 2024)							

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

PIEZOMETER CONSTRUCTION

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II ESA
Proposed Developments - 1500 Merivale Road
Ottawa, Ontario

EASTING: 364689.527 **NORTHING:** 5024792.128 **ELEVATION:** 94.15
DATUM: Geodetic
REMARKS:
BORINGS BY: CME 55 Low Clearance Power Auger **DATE:** January 30, 2024

FILE NO. PE5066
HOLE NO. BH 9-24

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.15
FILL: Topsoil with organics, some gravel and clay		AU	1				
0.69							
FILL: Brown silty sand to sandy silt, some gravel		SS	2	100	3	1	93.15
1.22							
FILL: Brown silty clay, some gravel, organics and sand							
1.63							
GLACIAL TILL: Firm, brown silty clay to clayey silt with sand, gravel, cobbles and boulders		SS	3	92	6	2	92.15
2.21							
GLACIAL TILL: Loose to dense, grey silty sand to sandy silt, trace clay, some gravel, cobbles and boulders		SS	4	100	6		
		SS	5	50	44	3	91.15
		SS	6	75	15	4	90.15
		SS	7	100	37	5	89.15
5.31							
End of Borehole							
Practical refusal to augering at 5.31m depth							
(GWL @ 1.46m - Feb. 6, 2024)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

PIEZOMETER CONSTRUCTION

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 = $(D30)^2 / (D10 \times D60)$
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

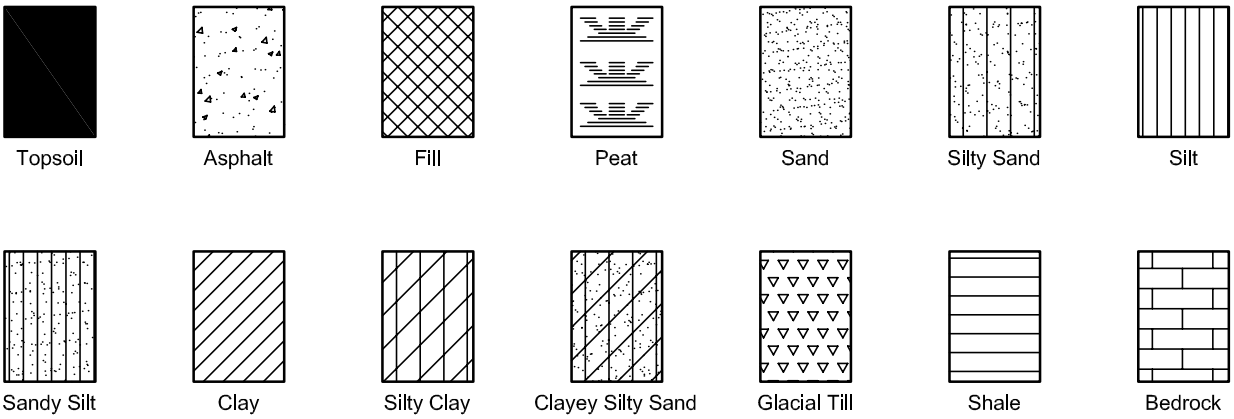
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void 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.

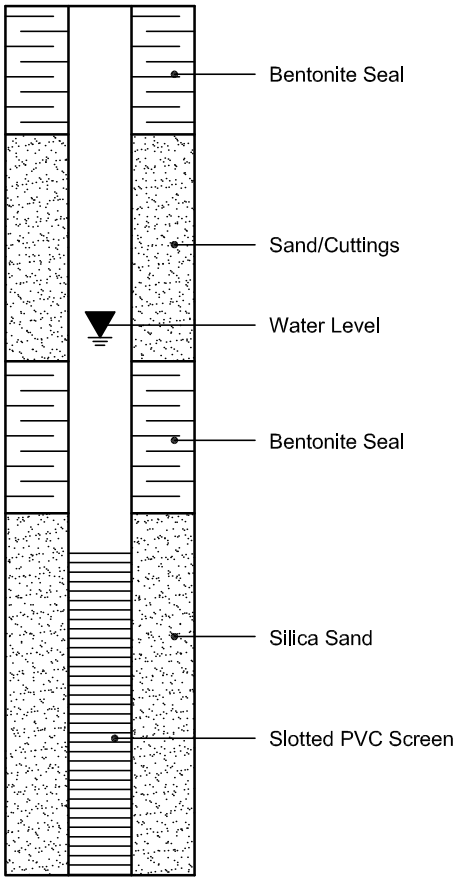
SYMBOLS AND TERMS (continued)

STRATA PLOT

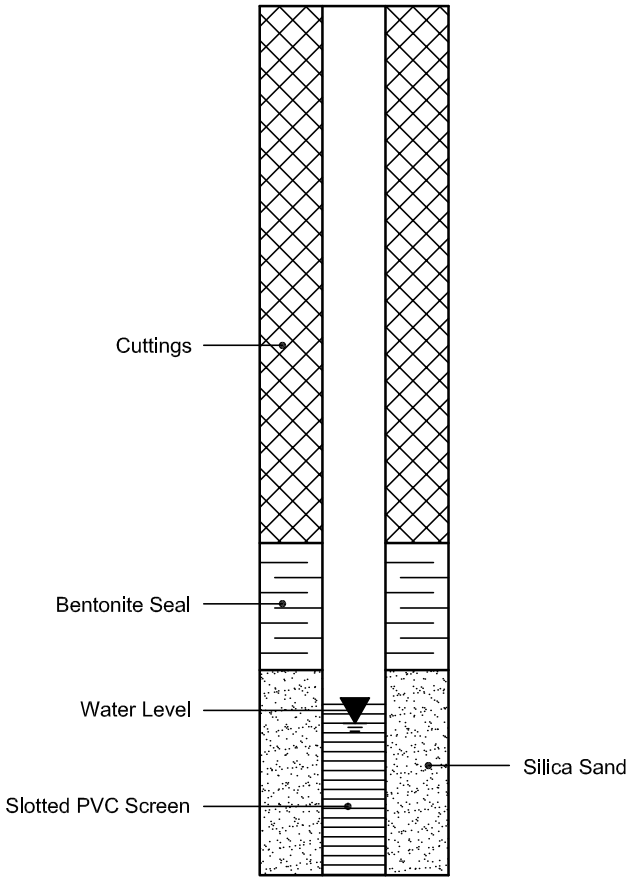


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: Karyn Munch

Client PO: 59187
Project: PE5066
Custody:

Report Date: 15-Jan-2024
Order Date: 9-Jan-2024

Order #: 2402107

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

Paracel ID	Client ID
2402107-01	MW13-21
2402107-02	MW13-23
2402107-03	MW13-44
2402107-04	MW13-45
2402107-05	MW13-46
2402107-06	Dup 2
2402107-07	MW13-51
2402107-08	Dup 1
2402107-09	MW13-13
2402107-10	MW13-47
2402107-11	MW13-48
2402107-12	TRIP BLANK

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	9-Jan-24	9-Jan-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	12-Jan-24	12-Jan-24
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	11-Jan-24	11-Jan-24
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	9-Jan-24	9-Jan-24

Certificate of Analysis

Report Date: 15-Jan-2024

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

Order Date: 9-Jan-2024

Client PO: **59187**

Project Description: **PE5066**

	Client ID:	MW13-21	MW13-23	MW13-44	MW13-45	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00		
	Sample ID:	2402107-01	2402107-02	2402107-03	2402107-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Benzene	0.5 ug/L	18.9	40.9	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethane,	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	-	-
Ethylbenzene	0.5 ug/L	0.8	4.4	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-

Certificate of Analysis

Report Date: 15-Jan-2024

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

Order Date: 9-Jan-2024

Client PO: **59187**

Project Description: **PE5066**

	Client ID:	MW13-21	MW13-23	MW13-44	MW13-45	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00		
	Sample ID:	2402107-01	2402107-02	2402107-03	2402107-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Toluene	0.5 ug/L	0.5	1.5	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	0.9	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	3.9	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	4.8	<0.5	<0.5	-	-
Dibromofluoromethane	Surrogate	116%	131%	85.5%	82.6%	-	-
4-Bromofluorobenzene	Surrogate	106%	110%	105%	105%	-	-
Toluene-d8	Surrogate	104%	104%	104%	102%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	62	404	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100	-	-

	Client ID:	MW13-21	MW13-23	MW13-44	MW13-45	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00		
	Sample ID:	2402107-01	2402107-02	2402107-03	2402107-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Semi-Volatiles							
Acenaphthene	0.05 ug/L	-	2.43	-	-	-	-
Acenaphthylene	0.05 ug/L	-	0.27	-	-	-	-
Anthracene	0.01 ug/L	-	<0.01	-	-	-	-
Benzo [a] anthracene	0.01 ug/L	-	<0.01	-	-	-	-
Benzo [a] pyrene	0.01 ug/L	-	<0.01	-	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	-	<0.05	-	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	-	<0.05	-	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	-	<0.05	-	-	-	-
Chrysene	0.05 ug/L	-	<0.05	-	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	-	<0.05	-	-	-	-
Fluoranthene	0.01 ug/L	-	0.04	-	-	-	-
Fluorene	0.05 ug/L	-	3.48	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	<0.05	-	-	-	-
1-Methylnaphthalene	0.05 ug/L	-	45.7	-	-	-	-
2-Methylnaphthalene	0.05 ug/L	-	0.30	-	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	-	46.0	-	-	-	-
Naphthalene	0.05 ug/L	-	6.38	-	-	-	-
Phenanthrene	0.05 ug/L	-	5.96	-	-	-	-
Pyrene	0.01 ug/L	-	0.09	-	-	-	-
2-Fluorobiphenyl	Surrogate	-	59.8%	-	-	-	-
Terphenyl-d14	Surrogate	-	79.6%	-	-	-	-

Certificate of Analysis

Report Date: 15-Jan-2024

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

Order Date: 9-Jan-2024

Client PO: 59187

Project Description: PE5066

	Client ID:	MW13-46	Dup 2	MW13-51	Dup 1	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00		
	Sample ID:	2402107-05	2402107-06	2402107-07	2402107-08		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	3.0	3.4	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethane,	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-

Certificate of Analysis

Report Date: 15-Jan-2024

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

Order Date: 9-Jan-2024

Client PO: **59187**

Project Description: **PE5066**

	Client ID:	MW13-46	Dup 2	MW13-51	Dup 1	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00	04-Jan-24 09:00		
	Sample ID:	2402107-05	2402107-06	2402107-07	2402107-08		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Toluene-d8	Surrogate	104%	103%	103%	102%	-	-
4-Bromofluorobenzene	Surrogate	106%	105%	107%	106%	-	-
Dibromofluoromethane	Surrogate	83.2%	85.4%	110%	88.6%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	409	1140	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	479	1180	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100	-	-

Certificate of Analysis

Report Date: 15-Jan-2024

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

Order Date: 9-Jan-2024

Client PO: **59187**

Project Description: **PE5066**

	Client ID:	MW13-13	MW13-47	MW13-48	TRIP BLANK	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	03-Jan-24 09:00	03-Jan-24 09:00		
	Sample ID:	2402107-09	2402107-10	2402107-11	2402107-12		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethane,	0.2 ug/L	<0.2	<0.2	<0.2	<0.2	-	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-

Certificate of Analysis

Report Date: 15-Jan-2024

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

Order Date: 9-Jan-2024

Client PO: **59187**

Project Description: **PE5066**

	Client ID:	MW13-13	MW13-47	MW13-48	TRIP BLANK	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	03-Jan-24 09:00	03-Jan-24 09:00		
	Sample ID:	2402107-09	2402107-10	2402107-11	2402107-12		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	5.1	-	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	3.0	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	2.0	<0.5	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Dibromofluoromethane	Surrogate	82.7%	86.6%	97.0%	98.0%	-	-
Toluene-d8	Surrogate	103%	102%	105%	104%	-	-
4-Bromofluorobenzene	Surrogate	107%	106%	115%	113%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-	-	-

	Client ID:	MW13-13	MW13-47	MW13-48	TRIP BLANK	-	-
	Sample Date:	03-Jan-24 09:00	04-Jan-24 09:00	03-Jan-24 09:00	03-Jan-24 09:00		
	Sample ID:	2402107-09	2402107-10	2402107-11	2402107-12		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Semi-Volatiles							
Acenaphthene	0.05 ug/L	<0.05	-	-	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	-	-	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	-	-	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-	-	-
Fluoranthene	0.01 ug/L	<0.01	-	-	-	-	-
Fluorene	0.05 ug/L	<0.05	-	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	-	-	-	-
Naphthalene	0.05 ug/L	<0.05	-	-	-	-	-
Phenanthrene	0.05 ug/L	<0.05	-	-	-	-	-
Pyrene	0.01 ug/L	<0.01	-	-	-	-	-
2-Fluorobiphenyl	Surrogate	63.1%	-	-	-	-	-
Terphenyl-d14	Surrogate	113%	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	25	ug/L					
F2 PHCs (C10-C16)	ND	100	ug/L					
F3 PHCs (C16-C34)	ND	100	ug/L					
F4 PHCs (C34-C50)	ND	100	ug/L					
Semi-Volatiles								
Acenaphthene	ND	0.05	ug/L					
Acenaphthylene	ND	0.05	ug/L					
Anthracene	ND	0.01	ug/L					
Benzo [a] anthracene	ND	0.01	ug/L					
Benzo [a] pyrene	ND	0.01	ug/L					
Benzo [b] fluoranthene	ND	0.05	ug/L					
Benzo [g,h,i] perylene	ND	0.05	ug/L					
Benzo [k] fluoranthene	ND	0.05	ug/L					
Chrysene	ND	0.05	ug/L					
Dibenzo [a,h] anthracene	ND	0.05	ug/L					
Fluoranthene	ND	0.01	ug/L					
Fluorene	ND	0.05	ug/L					
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L					
1-Methylnaphthalene	ND	0.05	ug/L					
2-Methylnaphthalene	ND	0.05	ug/L					
Methylnaphthalene (1&2)	ND	0.10	ug/L					
Naphthalene	ND	0.05	ug/L					
Phenanthrene	ND	0.05	ug/L					
Pyrene	ND	0.01	ug/L					
Surrogate: 2-Fluorobiphenyl	*12.7*		*%*	*63.3*	*50-140*			
Surrogate: Terphenyl-d14	*21.2*		*%*	*106*	*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					

Method Quality Control: Blank

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

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L					
Vinyl chloride	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: 4-Bromofluorobenzene	*83.8*		*%*	*105*	*50-140*			
Surrogate: Dibromofluoromethane	*70.8*		*%*	*88.4*	*50-140*			
Surrogate: Toluene-d8	*84.0*		*%*	*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	115	5.0	ug/L	112			2.2	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	3.37	0.5	ug/L	3.32			1.5	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	6.43	0.5	ug/L	7.14			10.5	30	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	136	0.5	ug/L	140			2.7	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	3.65	0.5	ug/L	3.69			1.1	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*87.2*		*%*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*75.0*		*%*		*93.7*	*50-140*			
Surrogate: Toluene-d8	*83.7*		*%*		*105*	*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)	1930	25	ug/L	ND	96.5	85-115			
F2 PHCs (C10-C16)	1450	100	ug/L	ND	90.5	60-140			
F3 PHCs (C16-C34)	3930	100	ug/L	ND	100	60-140			
F4 PHCs (C34-C50)	2340	100	ug/L	ND	94.3	60-140			
Semi-Volatiles									
Acenaphthene	4.18	0.05	ug/L	ND	83.7	50-140			
Acenaphthylene	4.38	0.05	ug/L	ND	87.6	50-140			
Anthracene	4.89	0.01	ug/L	ND	97.8	50-140			
Benzo [a] anthracene	3.94	0.01	ug/L	ND	78.8	50-140			
Benzo [a] pyrene	4.13	0.01	ug/L	ND	82.5	50-140			
Benzo [b] fluoranthene	3.59	0.05	ug/L	ND	71.7	50-140			
Benzo [g,h,i] perylene	3.89	0.05	ug/L	ND	77.7	50-140			
Benzo [k] fluoranthene	3.87	0.05	ug/L	ND	77.4	50-140			
Chrysene	4.51	0.05	ug/L	ND	90.3	50-140			
Dibenzo [a,h] anthracene	3.57	0.05	ug/L	ND	71.5	50-140			
Fluoranthene	4.51	0.01	ug/L	ND	90.3	50-140			
Fluorene	3.91	0.05	ug/L	ND	78.3	50-140			
Indeno [1,2,3-cd] pyrene	4.00	0.05	ug/L	ND	79.9	50-140			
1-Methylnaphthalene	3.26	0.05	ug/L	ND	65.3	50-140			
2-Methylnaphthalene	3.44	0.05	ug/L	ND	68.8	50-140			
Naphthalene	4.00	0.05	ug/L	ND	79.9	50-140			
Phenanthrene	4.65	0.05	ug/L	ND	92.9	50-140			
Pyrene	4.75	0.01	ug/L	ND	95.0	50-140			
Surrogate: 2-Fluorobiphenyl	*13.1*		*%*		*65.5*	*50-140*			
Surrogate: Terphenyl-d14	*23.7*		*%*		*118*	*50-140*			
Volatiles									
Acetone	109	5.0	ug/L	ND	109	50-140			
Benzene	35.0	0.5	ug/L	ND	87.4	60-130			
Bromodichloromethane	43.1	0.5	ug/L	ND	108	60-130			
Bromoform	41.2	0.5	ug/L	ND	103	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	39.7	0.5	ug/L	ND	99.2	50-140			
Carbon Tetrachloride	38.8	0.2	ug/L	ND	97.0	60-130			
Chlorobenzene	34.7	0.5	ug/L	ND	86.7	60-130			
Chloroform	32.0	0.5	ug/L	ND	80.0	60-130			
Dibromochloromethane	35.2	0.5	ug/L	ND	88.1	60-130			
Dichlorodifluoromethane	46.6	1.0	ug/L	ND	116	50-140			
1,2-Dichlorobenzene	32.5	0.5	ug/L	ND	81.3	60-130			
1,3-Dichlorobenzene	32.4	0.5	ug/L	ND	80.9	60-130			
1,4-Dichlorobenzene	32.4	0.5	ug/L	ND	81.0	60-130			
1,1-Dichloroethane	33.1	0.5	ug/L	ND	82.7	60-130			
1,2-Dichloroethane	34.8	0.5	ug/L	ND	87.0	60-130			
1,1-Dichloroethylene	44.9	0.5	ug/L	ND	112	60-130			
cis-1,2-Dichloroethylene	32.0	0.5	ug/L	ND	80.0	60-130			
trans-1,2-Dichloroethylene	31.9	0.5	ug/L	ND	79.7	60-130			
1,2-Dichloropropane	34.0	0.5	ug/L	ND	85.0	60-130			
cis-1,3-Dichloropropylene	39.5	0.5	ug/L	ND	98.7	60-130			
trans-1,3-Dichloropropylene	44.8	0.5	ug/L	ND	112	60-130			
Ethylbenzene	42.0	0.5	ug/L	ND	105	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	31.8	0.2	ug/L	ND	79.5	60-130			
Hexane	48.8	1.0	ug/L	ND	122	60-130			
Methyl Ethyl Ketone (2-Butanone)	102	5.0	ug/L	ND	102	50-140			
Methyl Isobutyl Ketone	100	5.0	ug/L	ND	100	50-140			
Methyl tert-butyl ether	78.3	2.0	ug/L	ND	78.3	50-140			
Methylene Chloride	37.5	5.0	ug/L	ND	93.6	60-130			
Styrene	40.8	0.5	ug/L	ND	102	60-130			
1,1,1,2-Tetrachloroethane	35.4	0.5	ug/L	ND	88.5	60-130			
1,1,2,2-Tetrachloroethane	44.6	0.5	ug/L	ND	112	60-130			
Tetrachloroethylene	34.2	0.5	ug/L	ND	85.6	60-130			
Toluene	35.8	0.5	ug/L	ND	89.5	60-130			
1,1,1-Trichloroethane	34.6	0.5	ug/L	ND	86.4	60-130			
1,1,2-Trichloroethane	37.0	0.5	ug/L	ND	92.4	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	36.3	0.5	ug/L	ND	90.8	60-130			
Trichlorofluoromethane	50.1	1.0	ug/L	ND	125	60-130			
Vinyl chloride	50.7	0.5	ug/L	ND	127	50-140			
m,p-Xylenes	76.1	0.5	ug/L	ND	95.1	60-130			
o-Xylene	43.1	0.5	ug/L	ND	108	60-130			
Surrogate: 4-Bromofluorobenzene	*86.2*		*%*		*108*	*50-140*			
Surrogate: Dibromofluoromethane	*82.0*		*%*		*103*	*50-140*			
Surrogate: Toluene-d8	*87.4*		*%*		*109*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container(s) - Broken/cracked cap - PAH

Applies to Samples: MW13-13

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.

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Paracel ID: 2402107

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2402107	

Client Name: Paterson Group Inc.	Project Ref: PE5066	Page 1 of 2
Contact Name: Karyn Munch	Quote #:	Turnaround Time
Address: 9 Auriga Drive	PO #: 59187	☐ 1 day ☐ 3 day
	E-mail:	☐ 2 day ☑ ~~Regular~~
Telephone: 613-226-7381	Kmunch@patersongroup.ca	Date Required:

☑ REG 153/04 ☐ REG 406/19	Other Regulation	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO	
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA	
☑ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm	
☐ Table ___	Mun:	
For RSC: ☐ Yes ☐ No	☐ Other:	

	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	MW13-21	GW		3	Jan 3.24		✓	✓										
2	MW13-23	GW		4	Jan 4/24		✓	✓	✓									
3	MW13-44	GW		3	Jan 4/24		✓	✓										
4	MW13-45	GW		3	Jan 4/24		✓	✓										
5	MW13-46	GW		3	Jan 3/24		✓	✓										
6	Dup 2	GW		3	Jan 4/24		✓	✓										
7	MW13-51	GW		3	Jan 4/24		✓	✓										
8	Dup 1	GW		3	Jan 4/24		✓	✓										
9	MW13-13	GW		4	Jan 3/24		✓	✓	✓									
10	MW13-47	GW		3	Jan 4/24		✓	✓										

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign):	Received at Depot:	Received at Lab: HP	Verified By: SS
Relinquished By (Print): Samuel Benbé	Date/Time:	Date/Time: Jan 09, 24 10:55	Date/Time: Jan 9 24 1132
Date/Time:	Temperature: °C	Temperature: 6.7°C	pH Verified: ☐ By:

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Paracel ID: 2402107

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2402107	

Client Name: Paterson Group Inc.	Project Ref: PE 5066	Page 2 of 2
Contact Name: Karyn Munch	Quote #:	**Turnaround Time**
Address: 9 Auriga Drive	PO #: 59187	☐ 1 day ☐ 3 day
	E-mail: Kmunch@patersongroup.ca	☐ 2 day ☑ Regular
Telephone: 613-226-7381		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) (circled)
SW (Surface Water) **SS** (Storm/Sanitary Sewer)
P (Paint) **A** (Air) **O** (Other)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	MW13-48	GW			Jan 3/24		✓	✓										
2	TRIP BLANK	↓			↓			✓										
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): [signature]	Received at Depot:	Received at Lab: HP	Verified By: SS
Relinquished By (Print): Samuel Bolicke	Date/Time:	Date/Time: Jan 09, 24 10:55	Date/Time: Jan 9 24 1132
Date/Time:	Temperature: °C	Temperature: 6.7 °C	pH Verified: ☐ By:

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Certificate of Analysis

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

Client PO: 59303
Project: PE5066
Custody:

Report Date: 2-Feb-2024
Order Date: 29-Jan-2024

Order #: 2405082

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

Paracel ID	Client ID
2405082-01	BH1-24-SS7

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	30-Jan-24	30-Jan-24
PHC F1	CWS Tier 1 - P&T GC-FID	30-Jan-24	30-Jan-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	30-Jan-24	1-Feb-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	30-Jan-24	2-Feb-24
Solids, %	CWS Tier 1 - Gravimetric	1-Feb-24	2-Feb-24

	Client ID:	BH1-24-SS7	-	-	-		
	Sample Date:	26-Jan-24 09:00	-	-	-	-	-
	Sample ID:	2405082-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	91.8	-	-	-	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	-	-	-	-	-
Ethylbenzene	0.05 ug/g	<0.05	-	-	-	-	-
Toluene	0.05 ug/g	<0.05	-	-	-	-	-
m,p-Xylenes	0.05 ug/g	<0.05	-	-	-	-	-
o-Xylene	0.05 ug/g	<0.05	-	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	-	-	-	-	-
Toluene-d8	Surrogate	86.2%	-	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	-	-	-	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	-	-	-	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	-	-	-	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	-	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	<0.02	-	-	-	-	-
Acenaphthylene	0.02 ug/g	<0.02	-	-	-	-	-
Anthracene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [a] anthracene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [a] pyrene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [b] fluoranthene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g	<0.02	-	-	-	-	-
Benzo [k] fluoranthene	0.02 ug/g	<0.02	-	-	-	-	-
Chrysene	0.02 ug/g	<0.02	-	-	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	<0.02	-	-	-	-	-

	Client ID:	BH1-24-SS7	-	-	-		
	Sample Date:	26-Jan-24 09:00	-	-	-	-	-
	Sample ID:	2405082-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Semi-Volatiles							
Fluoranthene	0.02 ug/g	<0.02	-	-	-	-	-
Fluorene	0.02 ug/g	<0.02	-	-	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	<0.02	-	-	-	-	-
1-Methylnaphthalene	0.02 ug/g	0.04	-	-	-	-	-
2-Methylnaphthalene	0.02 ug/g	0.07	-	-	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g	0.10	-	-	-	-	-
Naphthalene	0.01 ug/g	0.03	-	-	-	-	-
Phenanthrene	0.02 ug/g	0.02	-	-	-	-	-
Pyrene	0.02 ug/g	<0.02	-	-	-	-	-
2-Fluorobiphenyl	Surrogate	66.1%	-	-	-	-	-
Terphenyl-d14	Surrogate	86.1%	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	*1.39*		*%*	*105*	*50-140*			
Surrogate: Terphenyl-d14	*1.43*		*%*	*107*	*50-140*			
Volatiles								
Benzene	ND	0.02	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
m,p-Xylenes	ND	0.05	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: Toluene-d8	*6.50*		*%*	*81.3*	*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	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	9	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Physical Characteristics									
% Solids	94.9	0.1	% by Wt.	95.0			0.2	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	0.062	0.02	ug/g	0.032			NC	40	
Anthracene	0.067	0.02	ug/g	0.045			38.7	40	
Benzo [a] anthracene	0.087	0.02	ug/g	0.059			39.1	40	
Benzo [a] pyrene	0.079	0.02	ug/g	0.050			NC	40	
Benzo [b] fluoranthene	0.078	0.02	ug/g	0.059			27.8	40	
Benzo [g,h,i] perylene	0.069	0.02	ug/g	0.043			NC	40	
Benzo [k] fluoranthene	0.053	0.02	ug/g	0.034			NC	40	
Chrysene	0.100	0.02	ug/g	0.056			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	0.402	0.02	ug/g	0.186			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.054	0.02	ug/g	0.032			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	0.019	0.01	ug/g	ND			NC	40	
Phenanthrene	0.318	0.02	ug/g	0.115			NC	40	
Pyrene	0.348	0.02	ug/g	0.162			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.38*		*%*		*91.4*	*50-140*			
Surrogate: Terphenyl-d14	*1.66*		*%*		*110*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*6.51*		*%*		*81.3*	*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)	189	7	ug/g	ND	94.4	85-115			
F2 PHCs (C10-C16)	77	4	ug/g	ND	96.2	80-120			
F3 PHCs (C16-C34)	222	8	ug/g	ND	113	80-120			
F4 PHCs (C34-C50)	143	6	ug/g	ND	115	80-120			
Semi-Volatiles									
Acenaphthene	0.149	0.02	ug/g	ND	79.0	50-140			
Acenaphthylene	0.161	0.02	ug/g	0.032	68.9	50-140			
Anthracene	0.206	0.02	ug/g	0.045	85.5	50-140			
Benzo [a] anthracene	0.163	0.02	ug/g	0.059	55.6	50-140			
Benzo [a] pyrene	0.124	0.02	ug/g	0.050	39.6	50-140			QM-06
Benzo [b] fluoranthene	0.170	0.02	ug/g	0.059	59.1	50-140			
Benzo [g,h,i] perylene	0.150	0.02	ug/g	0.043	56.7	50-140			
Benzo [k] fluoranthene	0.156	0.02	ug/g	0.034	64.5	50-140			
Chrysene	0.171	0.02	ug/g	0.056	60.7	50-140			
Dibenzo [a,h] anthracene	0.109	0.02	ug/g	ND	57.8	50-140			
Fluoranthene	0.382	0.02	ug/g	0.186	104	50-140			
Fluorene	0.144	0.02	ug/g	ND	76.4	50-140			
Indeno [1,2,3-cd] pyrene	0.131	0.02	ug/g	0.032	52.4	50-140			
1-Methylnaphthalene	0.156	0.02	ug/g	ND	82.6	50-140			
2-Methylnaphthalene	0.168	0.02	ug/g	ND	89.1	50-140			
Naphthalene	0.174	0.01	ug/g	ND	92.6	50-140			
Phenanthrene	0.298	0.02	ug/g	0.115	97.2	50-140			
Pyrene	0.346	0.02	ug/g	0.162	97.8	50-140			
Surrogate: 2-Fluorobiphenyl	*1.14*		*%*		*75.5*	*50-140*			
Surrogate: Terphenyl-d14	*2.05*		*%*		*136*	*50-140*			
Volatiles									
Benzene	2.93	0.02	ug/g	ND	73.3	60-130			
Ethylbenzene	3.35	0.05	ug/g	ND	83.8	60-130			
Toluene	3.43	0.05	ug/g	ND	85.7	60-130			
m,p-Xylenes	6.59	0.05	ug/g	ND	82.4	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	3.09	0.05	ug/g	ND	77.3	60-130			
Surrogate: Toluene-d8	*6.16*		*%*		*77.0*	*50-140*			

Qualifier Notes:

QC Qualifiers:

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

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis 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.

PARACEL LABORATORIES LTD.

Paracel ID: 2405082

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2405082	

Client Name: Paterson Group Inc.
Contact Name: Karyn Munch
Address: 9 Auriga Dr.
Telephone: 613-726-7383

Project Ref: PE5066
Quote #:
PO #: 59303
E-mail: kmunch@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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	BH1-24-SS7	S		2	Jan 26, 2024	/	X		X									
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): V. Naufal	Received at Depot:	Received at Lab: SD	Verified By: SS
Relinquished By (Print): V. Naufal	Date/Time:	Date/Time: Jan 29, 2024 4:05p	Date/Time: Jan 29, 24 1637
Date/Time: Jan 29/24	Temperature: °C	Temperature: 14.2	pH Verified: ☐ By:

Chain of Custody (Fro) xlsx

Revision 5.0

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Certificate of Analysis

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

Client PO: 59327
Project: PE5066
Custody:

Report Date: 6-Feb-2024
Order Date: 31-Jan-2024

Order #: 2405351

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

Paracel ID	Client ID	Paracel ID	Client ID
2405351-01	BH7-24-SS2		
2405351-02	BH7-24-SS3		
2405351-03	BH7-24-SS4		
2405351-04	BH7-24-SS6		
2405351-05	BH7-24-SS8		
2405351-06	BH8-24-SS2		
2405351-07	BH8-24-SS3		
2405351-08	BH8-24-SS5		
2405351-09	BH8-24-SS7		
2405351-10	BH9-24-SS2		
2405351-11	BH9-24-SS4		
2405351-12	BH9-24-SS6		
2405351-13	DUP3-24		
2405351-14	DUP4-24		

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	5-Feb-24	5-Feb-24
Conductivity	MOE E3138 - probe @25 °C, water ext	2-Feb-24	5-Feb-24
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	2-Feb-24	2-Feb-24
PHC F1	CWS Tier 1 - P&T GC-FID	5-Feb-24	5-Feb-24
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	5-Feb-24	6-Feb-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	1-Feb-24	3-Feb-24
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	2-Feb-24	5-Feb-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	1-Feb-24	3-Feb-24
SAR	Calculated	2-Feb-24	5-Feb-24
Solids, %	CWS Tier 1 - Gravimetric	5-Feb-24	5-Feb-24

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59327**

Project Description: PE5066

	Client ID:	BH7-24-SS2	BH7-24-SS3	BH7-24-SS4	BH7-24-SS6	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-01	2405351-02	2405351-03	2405351-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	81.6	85.5	91.2	93.3	-	-
General Inorganics							
SAR	0.01 N/A	0.88	0.87	0.58	0.66	-	-
Conductivity	5 uS/cm	462	716	229	219	-	-
pH	0.05 pH Units	7.38	-	-	-	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	4.8	4.4	2.6	1.7	-	-
Barium	1.0 ug/g	172	132	82.7	514	-	-
Beryllium	0.5 ug/g	0.5	<0.5	<0.5	<0.5	-	-
Boron	5.0 ug/g	10.5	10.8	8.2	11.5	-	-
Cadmium	0.5 ug/g	<0.5	0.6	<0.5	<0.5	-	-
Chromium	5.0 ug/g	52.6	24.7	16.3	16.7	-	-
Cobalt	1.0 ug/g	11.2	6.7	6.6	5.5	-	-
Copper	5.0 ug/g	24.8	12.7	11.8	9.7	-	-
Lead	1.0 ug/g	10.1	16.8	4.0	4.8	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	29.7	14.4	12.1	11.5	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	54.5	29.2	22.8	21.5	-	-
Zinc	20.0 ug/g	374	1720	23.9	<20.0	-	-
Volatiles							

	Client ID:	BH7-24-SS2	BH7-24-SS3	BH7-24-SS4	BH7-24-SS6	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-01	2405351-02	2405351-03	2405351-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	89.7%	90.8%	87.0%	86.8%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	12	12	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	82	158	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	277 [1]	361 [1]	<6	<6	-	-
F4G PHCs (gravimetric)	50 ug/g	355	561	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Acenaphthylene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Anthracene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Benzo [a] anthracene	0.02 ug/g	-	0.03	<0.02	-	-	-
Benzo [a] pyrene	0.02 ug/g	-	0.03	<0.02	-	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	0.03	<0.02	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	0.04	<0.02	-	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Chrysene	0.02 ug/g	-	0.03	<0.02	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Fluoranthene	0.02 ug/g	-	0.05	<0.02	-	-	-

	Client ID:	BH7-24-SS2	BH7-24-SS3	BH7-24-SS4	BH7-24-SS6	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-01	2405351-02	2405351-03	2405351-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Fluorene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	0.02	<0.02	-	-	-
1-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	-	-	-
2-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g	-	<0.04	<0.04	-	-	-
Naphthalene	0.01 ug/g	-	<0.01	<0.01	-	-	-
Phenanthrene	0.02 ug/g	-	0.02	<0.02	-	-	-
Pyrene	0.02 ug/g	-	0.05	<0.02	-	-	-
2-Fluorobiphenyl	Surrogate	-	73.2%	60.9%	-	-	-
Terphenyl-d14	Surrogate	-	82.0%	86.2%	-	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59327**

Project Description: PE5066

	Client ID:	BH7-24-SS8	BH8-24-SS2	BH8-24-SS3	BH8-24-SS5	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-05	2405351-06	2405351-07	2405351-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	85.9	78.3	71.2	94.2	-	-
General Inorganics							
SAR	0.01 N/A	1.20	0.29	0.56	0.38	-	-
Conductivity	5 uS/cm	289	279	372	250	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	6.4	4.4	2.3	-	-
Barium	1.0 ug/g	320	161	151	270	-	-
Beryllium	0.5 ug/g	0.5	0.6	<0.5	0.5	-	-
Boron	5.0 ug/g	12.2	8.9	9.8	11.1	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	26.0	42.4	24.6	35.0	-	-
Cobalt	1.0 ug/g	7.9	10.7	5.3	8.4	-	-
Copper	5.0 ug/g	14.2	22.2	21.5	14.0	-	-
Lead	1.0 ug/g	6.1	12.6	14.8	5.3	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	16.3	24.1	13.2	20.0	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	1.7	-	-
Vanadium	10.0 ug/g	35.9	46.8	27.5	35.3	-	-
Zinc	20.0 ug/g	30.3	222	53.1	28.9	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-

	Client ID:	BH7-24-SS8	BH8-24-SS2	BH8-24-SS3	BH8-24-SS5	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-05	2405351-06	2405351-07	2405351-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	91.6%	94.2%	93.7%	85.4%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	58	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	42	<6	-	-

	Client ID:	BH8-24-SS7	BH9-24-SS2	BH9-24-SS4	BH9-24-SS6	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-09	2405351-10	2405351-11	2405351-12		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	92.8	78.5	90.0	91.4	-	-
General Inorganics							
SAR	0.01 N/A	0.44	0.91	0.36	0.36	-	-
Conductivity	5 uS/cm	251	153	170	232	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	8.7	2.5	2.0	-	-
Barium	1.0 ug/g	622	126	81.2	191	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	0.5	-	-
Boron	5.0 ug/g	10.7	7.4	10.1	12.6	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	19.5	29.6	14.1	30.4	-	-
Cobalt	1.0 ug/g	6.2	8.7	4.8	7.4	-	-
Copper	5.0 ug/g	10.2	14.8	8.1	13.8	-	-
Lead	1.0 ug/g	5.1	11.3	3.5	5.0	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	13.0	17.1	8.8	17.6	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	25.9	37.0	21.7	34.3	-	-
Zinc	20.0 ug/g	21.2	46.1	<20.0	29.6	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-

	Client ID:	BH8-24-SS7	BH9-24-SS2	BH9-24-SS4	BH9-24-SS6	-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00	30-Jan-24 09:00		
	Sample ID:	2405351-09	2405351-10	2405351-11	2405351-12		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	86.9%	94.5%	90.0%	86.7%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	22	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	10	<6	<6	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59327**

Project Description: PE5066

	Client ID:	DUP3-24	DUP4-24			-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00				
	Sample ID:	2405351-13	2405351-14				
	Matrix:	Soil	Soil				
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	92.2	90.9	-	-	-	-
General Inorganics							
SAR	0.01 N/A	0.32	0.34	-	-	-	-
Conductivity	5 uS/cm	235	219	-	-	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	-	-	-	-
Arsenic	1.0 ug/g	2.2	2.3	-	-	-	-
Barium	1.0 ug/g	297	204	-	-	-	-
Beryllium	0.5 ug/g	<0.5	0.5	-	-	-	-
Boron	5.0 ug/g	8.9	12.0	-	-	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	-	-	-	-
Chromium	5.0 ug/g	30.1	28.8	-	-	-	-
Cobalt	1.0 ug/g	7.1	7.5	-	-	-	-
Copper	5.0 ug/g	12.7	20.7	-	-	-	-
Lead	1.0 ug/g	4.3	5.0	-	-	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	-	-	-	-
Nickel	5.0 ug/g	17.0	17.3	-	-	-	-
Selenium	1.0 ug/g	<1.0	<1.0	-	-	-	-
Silver	0.3 ug/g	<0.3	<0.3	-	-	-	-
Thallium	1.0 ug/g	<1.0	<1.0	-	-	-	-
Uranium	1.0 ug/g	<1.0	<1.0	-	-	-	-
Vanadium	10.0 ug/g	29.2	33.6	-	-	-	-
Zinc	20.0 ug/g	22.1	26.9	-	-	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	-	-	-	-

	Client ID:	DUP3-24	DUP4-24			-	-
	Sample Date:	30-Jan-24 09:00	30-Jan-24 09:00				
	Sample ID:	2405351-13	2405351-14				
	Matrix:	Soil	Soil				
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	<0.05	-	-	-	-
Toluene	0.05 ug/g	<0.05	<0.05	-	-	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	-	-	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	-	-	-	-
Toluene-d8	Surrogate	87.4%	88.2%	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	-	-	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	-	-	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	-	-	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	-	-	-	-

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	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
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	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	*0.870*		*%*	*65.3*	*50-140*			
Surrogate: Terphenyl-d14	*1.14*		*%*	*85.4*	*50-140*			
Volatiles								
Benzene	ND	0.02	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: Toluene-d8	*6.32*		*%*	*79.0*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	4.56	0.01	N/A	4.77			4.5	30	
Conductivity	358	5	uS/cm	351			2.0	5	
pH	8.01	0.05	pH Units	7.98			0.4	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	2.3	1.0	ug/g	2.4			3.6	30	
Barium	104	1.0	ug/g	109			5.1	30	
Beryllium	0.5	0.5	ug/g	0.5			1.9	30	
Boron	8.5	5.0	ug/g	8.3			1.8	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	19.9	5.0	ug/g	21.2			6.4	30	
Cobalt	6.5	1.0	ug/g	7.0			7.8	30	
Copper	11.3	5.0	ug/g	12.1			6.9	30	
Lead	33.0	1.0	ug/g	31.9			3.3	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	11.0	5.0	ug/g	11.7			6.3	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	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	29.2	10.0	ug/g	31.1			6.4	30	
Zinc	51.1	20.0	ug/g	53.0			3.6	30	
Physical Characteristics									
% Solids	94.1	0.1	% by Wt.	93.8			0.2	25	
Semi-Volatiles									

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*0.857*		*%*		*57.7*	*50-140*			
Surrogate: Terphenyl-d14	*1.26*		*%*		*84.8*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*8.06*		*%*		*86.1*	*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)	189	7	ug/g	ND	94.7	85-115			
F2 PHCs (C10-C16)	103	4	ug/g	ND	112	60-140			
F3 PHCs (C16-C34)	278	8	ug/g	ND	123	60-140			
F4 PHCs (C34-C50)	151	6	ug/g	ND	106	60-140			
F4G PHCs (gravimetric)	1000	50	ug/g	ND	100	80-120			
Metals									
Arsenic	48.5	1.0	ug/g	1.0	95.0	70-130			
Barium	93.0	1.0	ug/g	43.8	98.5	70-130			
Beryllium	46.7	0.5	ug/g	ND	93.0	70-130			
Boron	46.7	5.0	ug/g	ND	86.6	70-130			
Cadmium	47.3	0.5	ug/g	ND	94.5	70-130			
Chromium	54.7	5.0	ug/g	8.5	92.4	70-130			
Cobalt	48.0	1.0	ug/g	2.8	90.5	70-130			
Copper	48.3	5.0	ug/g	ND	86.9	70-130			
Lead	57.1	1.0	ug/g	12.8	88.7	70-130			
Molybdenum	44.3	1.0	ug/g	ND	88.0	70-130			
Nickel	49.4	5.0	ug/g	ND	89.5	70-130			
Selenium	43.7	1.0	ug/g	ND	86.7	70-130			
Silver	44.1	0.3	ug/g	ND	88.1	70-130			
Thallium	46.4	1.0	ug/g	ND	92.7	70-130			
Uranium	47.8	1.0	ug/g	ND	95.2	70-130			
Vanadium	58.8	10.0	ug/g	12.5	92.6	70-130			
Zinc	64.3	20.0	ug/g	21.2	86.2	70-130			
Semi-Volatiles									
Acenaphthene	0.111	0.02	ug/g	ND	59.7	50-140			
Acenaphthylene	0.109	0.02	ug/g	ND	58.8	50-140			
Anthracene	0.136	0.02	ug/g	ND	73.2	50-140			
Benzo [a] anthracene	0.130	0.02	ug/g	ND	69.8	50-140			
Benzo [a] pyrene	0.126	0.02	ug/g	ND	68.0	50-140			
Benzo [b] fluoranthene	0.126	0.02	ug/g	ND	68.1	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [g,h,i] perylene	0.104	0.02	ug/g	ND	55.8	50-140			
Benzo [k] fluoranthene	0.127	0.02	ug/g	ND	68.6	50-140			
Chrysene	0.149	0.02	ug/g	ND	80.4	50-140			
Dibenzo [a,h] anthracene	0.115	0.02	ug/g	ND	61.9	50-140			
Fluoranthene	0.148	0.02	ug/g	ND	79.9	50-140			
Fluorene	0.111	0.02	ug/g	ND	59.8	50-140			
Indeno [1,2,3-cd] pyrene	0.117	0.02	ug/g	ND	63.1	50-140			
1-Methylnaphthalene	0.113	0.02	ug/g	ND	60.8	50-140			
2-Methylnaphthalene	0.120	0.02	ug/g	ND	64.8	50-140			
Naphthalene	0.145	0.01	ug/g	ND	78.4	50-140			
Phenanthrene	0.153	0.02	ug/g	ND	82.4	50-140			
Pyrene	0.152	0.02	ug/g	ND	82.1	50-140			
Surrogate: 2-Fluorobiphenyl	*0.949*		*%*		*64.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.70*		*%*		*114*	*50-140*			
Volatiles									
Benzene	2.97	0.02	ug/g	ND	74.1	60-130			
Ethylbenzene	3.01	0.05	ug/g	ND	75.4	60-130			
Toluene	2.97	0.05	ug/g	ND	74.3	60-130			
m,p-Xylenes	7.29	0.05	ug/g	ND	91.1	60-130			
o-Xylene	2.93	0.05	ug/g	ND	73.2	60-130			
Surrogate: Toluene-d8	*6.24*		*%*		*77.9*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis 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.

PARACEL LABORATORIES LTD.

Paracel ID: 2405351

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2405351	

Client Name: Paterson	Project Ref: PE5066
Contact Name: Karyn Munch	Quote #:
Address: 9 Auriga	PO #: 59327
Telephone: 613 226 7381	E-mail: GPaterson@Patersongroup.ca KMunch@Patersongroup.ca

Page 1 of 2

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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR	pH			
1	BH7-24-SS2	S		2	Jan 30 2024										X			
2	BH7-24-SS3								X									
3	BH7-24-SS4								X									
4	BH7-24-SS6																	
5	BH7-24-SS8																	
6	BH8-24-SS2																	
7	BH8-24-SS3																	
8	BH8-24-SS5																	
9	BH8-24-SS7																	
10																		

Comments:

Method of Delivery: Swift

Relinquished By (Sign): GPat	Received By Driver/Depot:	Received at Lab: SO	Verified By:
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: Jan 31, 2024 4:15p	Date/Time: Feb 1 2024 8:56
Date/Time: Jan 31 2024	Temperature: °C	Temperature: 10.1	pH Verified: ☐ By: NM

PARACE LABORATORIES L

Paracel ID: 2405351

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

Client Name: Paterson
Project Ref: PE5066
Page 2 of 2

Contact Name: Karyn Munch
Quote #:

Address: 9 Auriga
PO #: 59327

E-mail: kmunch@patersongroup.ca
Gpaterson@patersongroup.ca

Telephone: 613 226 7381

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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR
1	BH9-24-SS2	S		2	Jan 30 2024									
2	BH9-24-SS4													
3	BH9-24-SS6													
4	DUP3-24													
5	DUP4-24													
6														
7														
8														
9														
10														

Comments:

Method of Delivery: Swift

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
GPat		SD	
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: Jan 31 2024 4:15p	Date/Time: Feb 1 2024 8:56
Date/Time: Jan 31 2024	Temperature: °C	Temperature: 10.1	pH Verified: ☐ By: NH

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Certificate of Analysis

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

Client PO: 59325
Project: PE5066
Custody:

Report Date: 6-Feb-2024
Order Date: 31-Jan-2024

Order #: 2405346

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

Paracel ID	Client ID	Paracel ID	Client ID
2405346-01	BH3-24-AU1	2405346-17	BH6-24-SS5
2405346-02	BH3-24-SS4	2405346-18	BH6-24-SS7
2405346-03	BH3-24-SS6	2405346-19	BH6-24-SS9
2405346-04	BH3-24-SS8	2405346-20	DUP1-24
2405346-05	BH4-24-AU1	2405346-21	DUP2-24
2405346-06	BH4-24-SS3		
2405346-07	BH4-24-SS5		
2405346-08	BH4-24-SS6		
2405346-09	BH4-24-SS8		
2405346-10	BH5-24-SS2		
2405346-11	BH5-24-SS3		
2405346-12	BH5-24-SS4		
2405346-13	BH5-24-SS6		
2405346-14	BH5-24-SS8		
2405346-15	BH6-24-SS2		
2405346-16	BH6-24-SS3		

Approved By:

Mark Foto

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	5-Feb-24	6-Feb-24
Conductivity	MOE E3138 - probe @25 °C, water ext	2-Feb-24	5-Feb-24
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	2-Feb-24	2-Feb-24
PHC F1	CWS Tier 1 - P&T GC-FID	5-Feb-24	6-Feb-24
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	5-Feb-24	6-Feb-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	1-Feb-24	5-Feb-24
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	2-Feb-24	5-Feb-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	1-Feb-24	3-Feb-24
SAR	Calculated	2-Feb-24	5-Feb-24
Solids, %	CWS Tier 1 - Gravimetric	5-Feb-24	5-Feb-24

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: 59325

Project Description: PE5066

	Client ID:	BH3-24-AU1	BH3-24-SS4	BH3-24-SS6	BH3-24-SS8	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-01	2405346-02	2405346-03	2405346-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	89.1	79.9	91.5	90.7	-	-
General Inorganics							
SAR	0.01 N/A	4.77	5.24	0.53	0.36	-	-
Conductivity	5 uS/cm	351	713	224	238	-	-
pH	0.05 pH Units	7.50	-	-	7.58	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	2.7	2.5	2.1	-	-
Barium	1.0 ug/g	25.4	64.7	141	183	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Boron	5.0 ug/g	<5.0	<5.0	10.2	10.5	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	9.1	24.4	14.4	24.4	-	-
Cobalt	1.0 ug/g	3.4	5.9	5.1	6.7	-	-
Copper	5.0 ug/g	7.0	14.7	9.9	11.9	-	-
Lead	1.0 ug/g	4.3	2.6	4.0	4.7	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	5.1	13.7	9.5	14.3	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	21.2	25.6	21.1	30.9	-	-
Zinc	20.0 ug/g	<20.0	27.6	<20.0	26.1	-	-
Volatiles							

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: PE5066

	Client ID:	BH3-24-AU1	BH3-24-SS4	BH3-24-SS6	BH3-24-SS8	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-01	2405346-02	2405346-03	2405346-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	116%	121%	86.6%	86.8%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	<6	<6	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Chrysene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Fluorene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-

	Client ID:	BH3-24-AU1	BH3-24-SS4	BH3-24-SS6	BH3-24-SS8	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-01	2405346-02	2405346-03	2405346-04		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g	-	<0.04	<0.04	<0.04	-	-
Naphthalene	0.01 ug/g	-	<0.01	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	-	58.2%	73.2%	70.4%	-	-
Terphenyl-d14	Surrogate	-	84.8%	106%	95.1%	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: PE5066

	Client ID:	BH4-24-AU1	BH4-24-SS3	BH4-24-SS5	BH4-24-SS6	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-05	2405346-06	2405346-07	2405346-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	88.1	79.9	75.2	86.4	-	-
General Inorganics							
SAR	0.01 N/A	3.54	8.80	0.82	0.91	-	-
Conductivity	5 uS/cm	358	910	336	211	-	-
pH	0.05 pH Units	7.53	-	-	7.45	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	3.4	4.9	2.6	2.8	-	-
Barium	1.0 ug/g	53.6	290	89.5	129	-	-
Beryllium	0.5 ug/g	<0.5	0.7	<0.5	<0.5	-	-
Boron	5.0 ug/g	<5.0	7.6	<5.0	10.3	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	15.2	84.5	31.9	17.7	-	-
Cobalt	1.0 ug/g	4.8	17.4	7.3	5.6	-	-
Copper	5.0 ug/g	26.9	38.3	15.4	10.9	-	-
Lead	1.0 ug/g	18.9	8.7	2.9	3.9	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	8.6	45.8	17.5	10.8	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	25.1	88.2	33.0	25.5	-	-
Zinc	20.0 ug/g	25.3	99.0	33.9	40.0	-	-
Volatiles							

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: **PE5066**

	Client ID:	BH4-24-AU1	BH4-24-SS3	BH4-24-SS5	BH4-24-SS6	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-05	2405346-06	2405346-07	2405346-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	88.9%	91.3%	93.5%	89.8%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	23	<8	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	118 [1]	<6	<6	<6	-	-
F4G PHCs (gravimetric)	50 ug/g	375	-	-	-	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Chrysene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-

	Client ID:	BH4-24-AU1	BH4-24-SS3	BH4-24-SS5	BH4-24-SS6	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-05	2405346-06	2405346-07	2405346-08		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
Fluorene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g	-	<0.04	<0.04	<0.04	-	-
Naphthalene	0.01 ug/g	-	<0.01	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
Pyrene	0.02 ug/g	-	<0.02	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	-	61.5%	59.7%	60.3%	-	-
Terphenyl-d14	Surrogate	-	81.3%	79.6%	83.1%	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: PE5066

	Client ID:	BH4-24-SS8	BH5-24-SS2	BH5-24-SS3	BH5-24-SS4	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-09	2405346-10	2405346-11	2405346-12		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	89.5	86.7	75.9	58.1	-	-
General Inorganics							
SAR	0.01 N/A	0.15	0.34	0.70	1.00	-	-
Conductivity	5 uS/cm	232	195	241	675	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	4.2	4.5	3.8	-	-
Barium	1.0 ug/g	196	122	226	177	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	0.7	<0.5	-	-
Boron	5.0 ug/g	10.5	5.5	7.6	12.2	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	0.6	-	-
Chromium	5.0 ug/g	24.8	31.0	72.3	40.2	-	-
Cobalt	1.0 ug/g	7.0	7.9	14.8	8.4	-	-
Copper	5.0 ug/g	12.7	19.2	30.7	36.3	-	-
Lead	1.0 ug/g	4.8	5.4	7.0	12.7	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	1.3	1.3	-	-
Nickel	5.0 ug/g	15.0	18.6	39.0	24.6	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	1.7	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	1.2	<1.0	3.9	-	-
Vanadium	10.0 ug/g	32.1	38.9	71.6	47.9	-	-
Zinc	20.0 ug/g	26.8	43.5	84.3	94.9	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-

	Client ID:	BH4-24-SS8	BH5-24-SS2	BH5-24-SS3	BH5-24-SS4	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-09	2405346-10	2405346-11	2405346-12		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	87.5%	91.9%	92.9%	109%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	16	<8	19	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	23	<6	12	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: PE5066

	Client ID:	BH5-24-SS6	BH5-24-SS8	BH6-24-SS2	BH6-24-SS3	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-13	2405346-14	2405346-15	2405346-16		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	91.2	91.0	86.8	90.2	-	-
General Inorganics							
SAR	0.01 N/A	0.26	0.12	0.36	0.55	-	-
Conductivity	5 uS/cm	216	214	286	275	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.1	2.1	3.8	2.7	-	-
Barium	1.0 ug/g	179	170	68.9	153	-	-
Beryllium	0.5 ug/g	<0.5	0.5	<0.5	<0.5	-	-
Boron	5.0 ug/g	11.3	12.8	9.9	9.4	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	19.4	26.1	16.8	23.9	-	-
Cobalt	1.0 ug/g	5.7	6.8	6.2	8.4	-	-
Copper	5.0 ug/g	10.3	12.9	12.2	13.5	-	-
Lead	1.0 ug/g	4.2	4.9	6.6	5.9	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	11.7	15.2	12.3	16.3	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	26.3	32.3	23.4	31.8	-	-
Zinc	20.0 ug/g	<20.0	27.9	56.9	30.9	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-

	Client ID:	BH5-24-SS6	BH5-24-SS8	BH6-24-SS2	BH6-24-SS3	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-13	2405346-14	2405346-15	2405346-16		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	87.1%	87.3%	119%	113%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	14	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	<6	<6	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: **PE5066**

	Client ID:	BH6-24-SS5	BH6-24-SS7	BH6-24-SS9	DUP1-24	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-17	2405346-18	2405346-19	2405346-20		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	90.4	91.3	90.5	91.0	-	-
General Inorganics							
SAR	0.01 N/A	1.06	1.27	0.26	0.49	-	-
Conductivity	5 uS/cm	251	255	295	190	-	-
Metals							
Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	2.2	2.3	2.1	2.4	-	-
Barium	1.0 ug/g	212	198	246	118	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	0.5	<0.5	-	-
Boron	5.0 ug/g	10.6	11.1	11.2	9.8	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	22.4	24.1	22.8	12.6	-	-
Cobalt	1.0 ug/g	6.5	7.1	6.8	4.2	-	-
Copper	5.0 ug/g	11.6	12.6	11.9	8.5	-	-
Lead	1.0 ug/g	4.7	5.1	5.0	3.8	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Nickel	5.0 ug/g	14.0	14.9	13.9	8.2	-	-
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	-	-
Uranium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	29.9	32.7	30.6	17.8	-	-
Zinc	20.0 ug/g	25.4	27.2	26.2	<20.0	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: PE5066

	Client ID:	BH6-24-SS5	BH6-24-SS7	BH6-24-SS9	DUP1-24	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-17	2405346-18	2405346-19	2405346-20		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	87.2%	89.5%	90.3%	89.7%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	<6	<6	-	-
Semi-Volatiles							
Acenaphthene	0.02 ug/g	-	-	-	<0.02	-	-
Acenaphthylene	0.02 ug/g	-	-	-	<0.02	-	-
Anthracene	0.02 ug/g	-	-	-	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g	-	-	-	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g	-	-	-	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	-	-	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	-	-	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	-	-	<0.02	-	-
Chrysene	0.02 ug/g	-	-	-	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	-	-	<0.02	-	-
Fluoranthene	0.02 ug/g	-	-	-	<0.02	-	-
Fluorene	0.02 ug/g	-	-	-	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	-	-	<0.02	-	-

	Client ID:	BH6-24-SS5	BH6-24-SS7	BH6-24-SS9	DUP1-24	-	-
	Sample Date:	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00	29-Jan-24 09:00		
	Sample ID:	2405346-17	2405346-18	2405346-19	2405346-20		
	Matrix:	Soil	Soil	Soil	Soil		
	MDL/Units						
Semi-Volatiles							
1-Methylnaphthalene	0.02 ug/g	-	-	-	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g	-	-	-	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g	-	-	-	<0.04	-	-
Naphthalene	0.01 ug/g	-	-	-	<0.01	-	-
Phenanthrene	0.02 ug/g	-	-	-	<0.02	-	-
Pyrene	0.02 ug/g	-	-	-	<0.02	-	-
2-Fluorobiphenyl	Surrogate	-	-	-	52.6%	-	-
Terphenyl-d14	Surrogate	-	-	-	75.2%	-	-

Certificate of Analysis

Report Date: 06-Feb-2024

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

Order Date: 31-Jan-2024

Client PO: **59325**

Project Description: **PE5066**

	Client ID:	DUP2-24				-	-
	Sample Date:	29-Jan-24 09:00					
	Sample ID:	2405346-21					
	Matrix:	Soil					
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	89.1	-	-	-	-	-
General Inorganics							
SAR	0.01 N/A	0.25	-	-	-	-	-
Conductivity	5 uS/cm	213	-	-	-	-	-
Metals							
Antimony	1.0 ug/g	<1.0	-	-	-	-	-
Arsenic	1.0 ug/g	2.4	-	-	-	-	-
Barium	1.0 ug/g	182	-	-	-	-	-
Beryllium	0.5 ug/g	<0.5	-	-	-	-	-
Boron	5.0 ug/g	11.2	-	-	-	-	-
Cadmium	0.5 ug/g	<0.5	-	-	-	-	-
Chromium	5.0 ug/g	24.5	-	-	-	-	-
Cobalt	1.0 ug/g	6.8	-	-	-	-	-
Copper	5.0 ug/g	12.1	-	-	-	-	-
Lead	1.0 ug/g	5.1	-	-	-	-	-
Molybdenum	1.0 ug/g	<1.0	-	-	-	-	-
Nickel	5.0 ug/g	15.1	-	-	-	-	-
Selenium	1.0 ug/g	<1.0	-	-	-	-	-
Silver	0.3 ug/g	<0.3	-	-	-	-	-
Thallium	1.0 ug/g	<1.0	-	-	-	-	-
Uranium	1.0 ug/g	<1.0	-	-	-	-	-
Vanadium	10.0 ug/g	31.8	-	-	-	-	-
Zinc	20.0 ug/g	27.8	-	-	-	-	-
Volatiles							
Benzene	0.02 ug/g	<0.02	-	-	-	-	-

	Client ID:	DUP2-24				-	-
	Sample Date:	29-Jan-24 09:00					
	Sample ID:	2405346-21					
	Matrix:	Soil					
	MDL/Units						
Volatiles							
Ethylbenzene	0.05 ug/g	<0.05	-	-	-	-	-
Toluene	0.05 ug/g	<0.05	-	-	-	-	-
m,p-Xylenes	0.05 ug/g	<0.05	-	-	-	-	-
o-Xylene	0.05 ug/g	<0.05	-	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	-	-	-	-	-
Toluene-d8	Surrogate	89.4%	-	-	-	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	7 ug/g	<7	-	-	-	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	-	-	-	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	-	-	-	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	-	-	-	-	-

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	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
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	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	*0.870*		*%*	*65.3*	*50-140*			
Surrogate: Terphenyl-d14	*1.14*		*%*	*85.4*	*50-140*			
Volatiles								
Benzene	ND	0.02	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: Toluene-d8	*9.02*		*%*	*113*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	4.56	0.01	N/A	4.77			4.5	30	
Conductivity	358	5	uS/cm	351			2.0	5	
pH	8.01	0.05	pH Units	7.98			0.4	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	1.2	1.0	ug/g	ND			NC	30	
Arsenic	1.9	1.0	ug/g	2.2			11.3	30	
Barium	25.7	1.0	ug/g	25.4			1.4	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	ND	5.0	ug/g	ND			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	8.8	5.0	ug/g	9.1			3.4	30	
Cobalt	3.4	1.0	ug/g	3.4			1.0	30	
Copper	6.9	5.0	ug/g	7.0			1.6	30	
Lead	4.2	1.0	ug/g	4.3			0.7	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	5.2	5.0	ug/g	5.1			1.7	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	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	18.6	10.0	ug/g	21.2			13.5	30	
Zinc	ND	20.0	ug/g	ND			NC	30	
Physical Characteristics									
% Solids	89.5	0.1	% by Wt.	89.1			0.4	25	
Semi-Volatiles									

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*0.857*		*%*		*57.7*	*50-140*			
Surrogate: Terphenyl-d14	*1.26*		*%*		*84.8*	*50-140*			
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*8.97*		*%*		*89.6*	*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)	179	7	ug/g	ND	89.3	85-115			
F2 PHCs (C10-C16)	111	4	ug/g	ND	131	60-140			
F3 PHCs (C16-C34)	279	8	ug/g	ND	135	60-140			
F4 PHCs (C34-C50)	165	6	ug/g	ND	121	60-140			
F4G PHCs (gravimetric)	1000	50	ug/g	ND	100	80-120			
Metals									
Arsenic	56.8	1.0	ug/g	ND	112	70-130			
Barium	67.7	1.0	ug/g	10.1	115	70-130			
Beryllium	54.2	0.5	ug/g	ND	108	70-130			
Boron	51.7	5.0	ug/g	ND	101	70-130			
Cadmium	53.2	0.5	ug/g	ND	106	70-130			
Chromium	58.6	5.0	ug/g	ND	110	70-130			
Cobalt	55.4	1.0	ug/g	1.4	108	70-130			
Copper	54.2	5.0	ug/g	ND	103	70-130			
Lead	52.0	1.0	ug/g	1.7	101	70-130			
Molybdenum	51.5	1.0	ug/g	ND	103	70-130			
Nickel	54.9	5.0	ug/g	ND	106	70-130			
Selenium	50.2	1.0	ug/g	ND	100	70-130			
Silver	52.0	0.3	ug/g	ND	104	70-130			
Thallium	51.1	1.0	ug/g	ND	102	70-130			
Uranium	52.4	1.0	ug/g	ND	104	70-130			
Vanadium	64.4	10.0	ug/g	ND	112	70-130			
Zinc	56.3	20.0	ug/g	ND	103	70-130			
Semi-Volatiles									
Acenaphthene	0.111	0.02	ug/g	ND	59.7	50-140			
Acenaphthylene	0.109	0.02	ug/g	ND	58.8	50-140			
Anthracene	0.136	0.02	ug/g	ND	73.2	50-140			
Benzo [a] anthracene	0.130	0.02	ug/g	ND	69.8	50-140			
Benzo [a] pyrene	0.126	0.02	ug/g	ND	68.0	50-140			
Benzo [b] fluoranthene	0.126	0.02	ug/g	ND	68.1	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [g,h,i] perylene	0.104	0.02	ug/g	ND	55.8	50-140			
Benzo [k] fluoranthene	0.127	0.02	ug/g	ND	68.6	50-140			
Chrysene	0.149	0.02	ug/g	ND	80.4	50-140			
Dibenzo [a,h] anthracene	0.115	0.02	ug/g	ND	61.9	50-140			
Fluoranthene	0.148	0.02	ug/g	ND	79.9	50-140			
Fluorene	0.111	0.02	ug/g	ND	59.8	50-140			
Indeno [1,2,3-cd] pyrene	0.117	0.02	ug/g	ND	63.1	50-140			
1-Methylnaphthalene	0.113	0.02	ug/g	ND	60.8	50-140			
2-Methylnaphthalene	0.120	0.02	ug/g	ND	64.8	50-140			
Naphthalene	0.145	0.01	ug/g	ND	78.4	50-140			
Phenanthrene	0.153	0.02	ug/g	ND	82.4	50-140			
Pyrene	0.152	0.02	ug/g	ND	82.1	50-140			
Surrogate: 2-Fluorobiphenyl	*0.949*		*%*		*64.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.70*		*%*		*114*	*50-140*			
Volatiles									
Benzene	4.29	0.02	ug/g	ND	107	60-130			
Ethylbenzene	4.87	0.05	ug/g	ND	122	60-130			
Toluene	4.57	0.05	ug/g	ND	114	60-130			
m,p-Xylenes	7.65	0.05	ug/g	ND	95.6	60-130			
o-Xylene	3.90	0.05	ug/g	ND	97.5	60-130			
Surrogate: Toluene-d8	*8.07*		*%*		*101*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis 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.

PARACEL LABORATORIES LTD

Paracel ID: 2405346

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2405346	

Client Name: Paterson
Contact Name: Karyn Munch
Address: 9 Auriga
Telephone: 613 226 7381

Project Ref: PE5066
Quote #:
PO #: 54325
E-mail: KMunch@Patersongroup.ca
GPaterson@Patersongroup.ca

Page 1 of 3

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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR	pH				
1	BH3-24-AU1	S		2	Jan 29 2024		X			X				X	X				
2	BH3-24-SS4	↓		↓	↓		X		X	X				X					
3	BH3-24-SS6						X		X	X				X					
4	BH3-24-SS8						X		X	X				X	X				
5	BH4-24-AU1						X			X				X	X				
6	BH4-24-SS3						X		X	X				X					
7	BH4-24-SS5						X		X	X				X					
8	BH4-24-SS6						X		X	X				X	X				
9	BH4-24-SS8	↓		↓	↓		X			X				X					
10																			

Comments:

Method of Delivery: Swift

Relinquished By (Sign): GPat	Received By Driver/Depot:	Received at Lab: SO	Verified By:
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: Jan 31, 2024 4:15pm	Date/Time: Feb 1 2024 8:38
Date/Time: Jan 31 2024	Temperature: °C	Temperature: 5.3	pH Verified: ☐ By: NA

PARACEL LABORATORIES LTD.

Paracel ID: 2405346

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

Client Name: Paterson
Contact Name: Karyn Munch
Address: 9 Auriga
Telephone: 613 226 7381

Project Ref: PE5066
Quote #:
PO #: 54325
E-mail: KMunch@Patersongroup.ca
GPaterson@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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR	pH				
1	BH5-24-552	S		2	Jan 29 2024														
2	BH5-24-553																		
3	BH5-24-554																		
4	BH5-24-556																		
5	BH5-24-558																		
6	BH6-24-562																		
7	BH6-24-553																		
8	BH6-24-555																		
9	BH6-24-557																		
10	BH6-24-559																		

Comments:

Method of Delivery: Swift

Relinquished By (Sign): GPat	Received By Driver/Depot:	Received at Lab: SO	Verified By:
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: Jan 31 2024 4:15pm	Date/Time: Feb 1 2024 8:38
Date/Time: Jan 31 2024	Temperature: °C	Temperature: 5.3	pH Verified: ☐ By:

PARACEL LABORATORIES LTD.

Paracel ID: 2405346

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

Client Name: Paterson
Contact Name: Karyn Munch
Address: 9 Auriga
Telephone: 613 226 7381

Project Ref: PE5066
Quote #:
PO #: 59324
E-mail: KMunch@Patersongroup.ca
GPaterson@Patersongroup.ca

Page 3 of 3

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)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR				
1	DUP1-24	S		2	Jan 29 2024		X		X	X				X				
2	DUP2-24	S		2	↓		X			X				X				
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Swift

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:
GPat		SO
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: Jan 31 2024 4:15pm
Date/Time: Jan 31 2024	Temperature: °C	Temperature: 5.3

Verified By:
Date/Time: Feb 1 2024 8:38
pH Verified: ☐ By:

PARACEL LABORATORIES LTD.

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Certificate of Analysis

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

Client PO: 59382
Project: PE5066
Custody:

Report Date: 9-Feb-2024
Order Date: 7-Feb-2024

Order #: 2406314

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

Paracel ID	Client ID
2406314-01	BH1-24-GW1
2406314-02	BH2-24-GW1
2406314-03	BH3-24-GW1
2406314-04	BH4-24-GW1
2406314-05	BH7-24-GW1
2406314-06	MW13-23-GW2
2406314-07	MW13-45-GW2
2406314-08	DUP1-24-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	9-Feb-24	9-Feb-24
PHC F1	CWS Tier 1 - P&T GC-FID	8-Feb-24	9-Feb-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	8-Feb-24	9-Feb-24

	Client ID:	BH1-24-GW1	BH2-24-GW1	BH3-24-GW1	BH4-24-GW1	-	-
	Sample Date:	06-Feb-24 09:00	06-Feb-24 09:00	06-Feb-24 09:00	06-Feb-24 09:00		
	Sample ID:	2406314-01	2406314-02	2406314-03	2406314-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Toluene-d8	Surrogate	107%	106%	106%	105%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100	-	-

Certificate of Analysis

Report Date: 09-Feb-2024

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

Order Date: 7-Feb-2024

Client PO: **59382**

Project Description: PE5066

	Client ID:	BH7-24-GW1	MW13-23-GW2	MW13-45-GW2	DUP1-24-GW	-	-
	Sample Date:	06-Feb-24 09:00	06-Feb-24 09:00	06-Feb-24 09:00	06-Feb-24 09:00		
	Sample ID:	2406314-05	2406314-06	2406314-07	2406314-08		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
Benzene	0.5 ug/L	<0.5	48.9	50.2	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	5.2	5.2	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	0.7	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	1.3	1.3	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	4.5	4.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	5.8	5.8	<0.5	-	-
Toluene-d8	Surrogate	105%	105%	105%	104%	-	-
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	216	639	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	202	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	137	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	25	ug/L					
F2 PHCs (C10-C16)	ND	100	ug/L					
F3 PHCs (C16-C34)	ND	100	ug/L					
F4 PHCs (C34-C50)	ND	100	ug/L					
Volatiles								
Benzene	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: Toluene-d8	*84.9*		*%*	*106*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*84.0*		*%*		*105*	*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)	1840	25	ug/L	ND	107	85-115			
F2 PHCs (C10-C16)	1510	100	ug/L	ND	94.1	60-140			
F3 PHCs (C16-C34)	3930	100	ug/L	ND	100	60-140			
F4 PHCs (C34-C50)	2140	100	ug/L	ND	86.5	60-140			
Volatiles									
Benzene	40.8	0.5	ug/L	ND	102	60-130			
Ethylbenzene	39.3	0.5	ug/L	ND	98.4	60-130			
Toluene	39.2	0.5	ug/L	ND	98.0	60-130			
m,p-Xylenes	78.4	0.5	ug/L	ND	98.0	60-130			
o-Xylene	39.6	0.5	ug/L	ND	98.9	60-130			
Surrogate: Toluene-d8	*83.1*		*%*		*104*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container and COC sample IDs don't match - VOC vials are labelled as MW13-23-GW1; chain of custody reads MW13-23-GW2.

Applies to Samples: MW13-23-GW2

Container and COC sample IDs don't match - VOC vials are labelled as MW13-45-GW1; chain of custody reads MW13-45-GW2.

Applies to Samples: MW13-45-GW2

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: 2406314

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2406314	

Client Name: Paterson Group Inc.
Contact Name: Karyn Munch
Address: 9 Auriga Dr.
Telephone: 613-226-7381

Project Ref: PE5066
Quote #:
PO #: 59382
E-mail: kmunch@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	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	BH1-24-GW1	GW		3	Feb 6, 2024		X											
2	BH2-24-GW1						X											
3	BH3-24-GW1						X											
4	BH4-24-GW1						X											
5	BH7-24-GW1						X											
6	MW13-23-GW2						X											
7	MW13-45-GW2						X											
8	DUP1-24-GW						X											
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): V. Naufal	Received at Depot:	Received at Lab: SS	Verified By:
Relinquished By (Print): Vanessa Naufal	Date/Time:	Date/Time: Feb 7 24 1538	Date/Time: Feb 7 2024/15
Date/Time: Feb 7, 2024	Temperature: °C	Temperature: 6.8	pH Verified: ☐ By:

Chain of Custody (Env).xlsx
Revision 5.0