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Phase Two Environmental Site Assessment

109-129 Park Place Boulevard
Barrie, Ontario

Prepared for:

North American Development Group
2851 John Street, Suite One
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1.0 EXECUTIVE SUMMARY

Pinchin Ltd. (Pinchin) was retained by North American Development Group (the Client), to complete a Phase Two Environmental Site Assessment (Phase Two ESA) of the property located at 109-129 Park Place Boulevard in Barrie, Ontario (Site or Phase Two Property). The Phase Two Property is presently developed with a two-storey commercial building (Site Building) and is part of the larger 'Park Place' commercial plaza.

The Phase Two ESA was conducted at the request of the Client in relation to the future redevelopment of the Phase Two Property from commercial to mixed commercial/residential land use. A Record of Site Condition (RSC) submittal to the Ontario Ministry of Environment, Conservation and Parks (MECP) is a mandatory requirement when a land use changes to a more sensitive land use and as such, to support the RSC submission, the Phase Two ESA was conducted in accordance with the Province of Ontario's *Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act*, as amended (O. Reg. 153/04).

The objectives of this Phase Two ESA were to assess the soil quality in relation to three areas of potential environmental concern (APECs) and related potentially contaminating activities (PCAs) and contaminants of potential concern (COPCs) identified in a Phase One ESA completed by Pinchin in accordance with O. Reg. 153/04. The identified APECs, PCAs and COPCs are summarized in Tables 1 and 2 (all Tables are provided within Section 9.0).

The Phase Two ESA was completed by Pinchin between January 13, 2022 and January 31, 2022 and included the advancement of three boreholes at the Phase Two Property. The boreholes were all advanced to a depth of 4.57 metres below ground surface (mbgs). Select soil samples collected from each of the borehole locations were submitted for laboratory analysis of volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs) fractions 1 through 4 (F1-F4) and polychlorinated biphenyls (PCBs).

Based on Site-specific information, the applicable regulatory standards for the Phase Two Property were determined to be the *"Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition",* provided in the MECP document entitled, *"Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act"* dated April 15, 2011 *(Table 2 Standards)* for coarse-textured soils and residential/parkland/institutional property use.

The laboratory results for the submitted soil samples indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 2 Standards*.

It is the opinion of the Qualified Person (QP) who supervised the Phase Two ESA that the applicable *Table 2 Standards* for soil at the Phase Two Property have been met as of the Certification Date of January 13, 2022 and that no further subsurface investigation is required in relation to assessing the environmental quality of soil at the Phase Two Property.

This Executive Summary is subject to the same standard limitations as contained in the report and must be read in conjunction with the entire report.

2.0 INTRODUCTION

A Phase Two ESA is defined as an "assessment of property conducted in accordance with the regulations by or under the supervision of a QP to determine the location and concentration of one or more contaminants in the land or water on, in or under the property". Under O. Reg. 153/04, the purpose of a Phase Two ESA is as follows:

- To determine the location and concentration of contaminants in the land or water on, in or under the Phase Two Property;
- To obtain information about environmental conditions in the land or water on, in or under the Phase Two Property necessary to undertake a Risk Assessment, in accordance with O. Reg. 153/04, with respect to one or more contaminants of concern; and
- To determine if applicable Site Condition Standards and standards specified in a Risk Assessment for contaminants on, in or under the Phase Two Property were met as of the certification date by developing an understanding of the geological and hydrogeological conditions at the Phase Two Property and conducting one or more rounds of field sampling for all contaminants associated with any APEC identified in the Phase Two ESA sampling and analysis plan (SAP) and for any such contaminants identified during subsequent Phase Two ESA activities and analyses of environmental conditions at the Phase Two Property.

This Phase Two ESA was conducted at the request of the Client in relation to the future redevelopment of the Phase Two Property from commercial to mixed commercial/residential land use. An RSC submittal to the MECP is a mandatory requirement when a land use changes to a more sensitive land use and as such, to support the RSC submission, the Phase Two ESA was conducted in accordance with O. Reg. 153/04.

The overall objective of this Phase Two ESA was to assess the soil quality in relation to APECs and related COPCs identified in a Phase One ESA completed by Pinchin, the findings of which were summarized in the report entitled "*Phase One Environmental Site Assessment*,*109-129 Park Place Boulevard, Barrie, Ontario*", completed by Pinchin for the Client and dated December 23, 2021. The property assessed by the Pinchin Phase One ESA is referred to herein as the Phase One Property. The Phase Two ESA was conducted on the whole Phase One Property, at specific APECs identified during the Phase One ESA, and the Phase One Property and Phase Two Property have the same boundaries.

2.1 Site Description

The Phase Two Property is 6.0 acres (2.4 hectares) in area and is located within the larger 'Park Place' commercial plaza. A Key Map showing the Phase Two Property location is provided on Figure 1 and a detailed plan of the Phase Two Property and surrounding lands is provided on Figure 2 (all Figures are provided within Section 9.0).

The Site Building, located in the southwestern portion of the Phase Two Property, is occupied by a restaurant. The remaining areas of the Phase Two Property are occupied by parking lots, access routes, and a hydro vault in the south-central portion.

A summary of the pertinent details of the Phase Two Property is provided in the following table:

Detail	Source/Reference	Information
Legal Description	Legal Survey Plan	PART OF LOTS 7, 8 & 9, CONCESSION 12 PART 8, 51R-41367 (GEOGRAPHIC TOWNSHIP OF INNISFIL) CITY OF BARRIE, COUNTY OF SIMCOE
Municipal Address	City of Barrie Online Map, https://discover.barrie.ca/pages/apps	109-129 Park Place Boulevard, Barrie, Ontario L4N 6P1
Parcel Identification Number (PIN)	Service Ontario Parcel Register	58734-0313 (LT)
Current Owner	Service Ontario Parcel Register	9613714 Canada Inc. and North American (Park Place) Corporation
Owner Contact Information	Client	Marisa Kay c/o North American Development Group, 2851 John Street, Suite One, Markham, ON L3R 5R7 mkay@nadg.com
Current Occupant	Site reconnaissance	Canadian Brewhouse
Client Contact Information	Authorization to Proceed Form for Pinchin Proposal	Marisa Kay c/o North American Development Group, 2851 John Street, Suite One, Markham, ON L3R 5R7 mkay@nadg.com
Site Area	GeoWarehouse™	24,400 m^2 (2.44 hectares)
Current Zoning	City of Barrie Online Map, https://discover.barrie.ca/pages/apps per Zoning By-law 054-04 Innisfil	C4 – General Commercial

Detail	Source/Reference	Information
Centroid UTM Co-ordinate	Google Earth™	605144 Easting
		4910351 Northing
		Zone 17T

A legal survey showing the Phase Two Property is provided in Appendix A (all Appendices are provided in Section 10.0).

2.2 Property Ownership

The entirety of the Phase Two Property is currently owned by 9613714 Canada Inc. and North American (Park Place South D) Corporation. Contact information for the Phase Two Property owner is provided in the preceding section.

Pinchin was retained by Ms. Marisa Kay of the Client to conduct the Phase Two ESA of the Site. Contact information for Ms. Kay is provided in the preceding section.

2.3 Current and Proposed Future Uses

The Phase Two Property is presently utilized for commercial purposes, and it is Pinchin's understanding that the Client intends to redevelop the Phase Two Property for mixed commercial/residential land use.

Given that the future land use is changing to a more sensitive land use, there is a mandatory requirement that an RSC be filed as per Section 168.3.1 of the Province of Ontario's *Environmental Protection Act.*

2.4 Applicable Site Condition Standards

The Phase Two Property is a commercial property located within the City of Barrie and the proposed future land use is mixed commercial/residential. It is Pinchin's understanding that the Phase Two Property is located within a well head protection area.

Bedrock was not encountered at any of the boreholes completed at the Phase Two Property during the Phase Two ESA, which were advanced to a maximum depth of approximately 4.6 mbgs and, as such, the Phase Two Property is not a shallow soil property as defined in Section 43.1 of O. Reg. 153/04.

The Phase Two Property does not contain a water body, nor is it located within 30 metres of a water body and the use of standards for properties situated within 30 metres of a water body is not required.

Section 41 of O. Reg. 153/04 states that a property is classified as an "environmentally sensitive area" if the pH of the surface soil (less than or equal to 1.5 mbgs) is less than 5 or greater than 9, if the pH of the subsurface soil (greater than 1.5 mbgs) is less than 5 or greater than 11, or if the property is an area of natural significance or is adjacent to or contains land within 30 metres of an area of natural significance.

A total of six representative soil samples (including one field duplicate sample) collected from the boreholes advanced at the Phase Two Property were submitted for pH analysis. The pH analytical results are summarized in Table 3. The pH values measured in the submitted soil samples were within the limits for non-sensitive sites. The Phase Two Property is also not an area of natural significance, and it is not adjacent to, nor does it contain land within 30 metres of, an area of natural significance. As such, the Phase Two Property is not an environmentally sensitive area.

As discussed further in Section 6.4, based on the results of grain size analysis completed on representative soil samples collected during the Phase Two ESA and the observed stratigraphy at the borehole locations at the Phase Two Property, it is the QP's opinion that over two-thirds of the overburden at the Phase Two Property is coarse-textured as defined by O. Reg. 153/04. Therefore, the soil at the Phase Two Property has been considered coarse-textured for the purpose of establishing the applicable MECP Site Condition Standards.

Based on the above, the appropriate Site Condition Standards for the Phase Two Property are the Table 2 Standards for:

- Coarse-textured soils; and
- Residential/parkland/institutional property use.

As such, all analytical results have been compared to these *Table 2 Standards*.

3.0 BACKGROUND INFORMATION

3.1 Physical Setting

The Phase Two Property is located in the southern portion of the City of Barrie at an elevation of approximately 291 metres above mean sea level (mamsl). The topography of the Phase Two Property is generally flat with little relief. The properties surrounding the Phase Two Property are at an equivalent grade with a gradual decrease in elevation towards the east. There are no drainage features (e.g., open ditches or swales) present on-Site. Surface water (e.g., storm runoff) is inferred to run overland and drain into the on-Site municipal storm sewer catch basins.

There are no open water bodies or areas of natural significance located on-Site or within the area assessed by the Pinchin Phase One ESA (the Phase One Study Area). A plan showing the Phase One Study Area is presented on Figure 3. The nearest surface water body is an unnamed tributary to Lovers Creek, located approximately 275 m east of the Phase Two Property at an elevation of approximately 276 mamsl.

A review of the MECP Source Protection Information Atlas indicated that the Phase One Study Area is located within well head protection area Q2.

Based on information provided by the MECP, the Phase Two Property and all other properties within the Phase One Study Area are serviced by a municipal drinking water system.

The records review did not identify the presence of wells within the Phase One Property or within the Phase One Study Area that supply water for human consumption or for agricultural purposes.

3.2 Past Investigations

3.2.1 Summary of Previous Environmental Investigations by Others

Reports summarizing the following environmental investigations completed by others and by Pinchin and pertaining to the Phase Two Property were reviewed as part of the Pinchin Phase One ESA:

- Report entitled "*Tank Removal, Remedial Excavation and Limited Designated Substances Survey Molson Park, 100 Molson Park Drive, Barrie, Ontario*" prepared for Molson Canada, by Terrapex Environmental Ltd. (Terrapex), and dated March 2001 (2001 Terrapex Remedial Excavation Report).
- Report entitled "*Phase II Subsurface Investigation Molson Park 100 Molson Park Drive, Barrie, Ontario*" prepared for Centrecorp Management Services Ltd., Jacques, Whitford and Associates Limited (JWL), and dated May 31, 2002 (2002 JWL Phase II ESA Report).
- Report entitled "*North American Acquisition Corporation Geotechnical Investigation Proposed Park Place Development Molson Park Barrie, Ontario*" prepared for North American Acquisition Corporation, by JWL, and dated May 27, 2003 (2003 JWL Geotechnical Investigation Report).
- Report entitled "*Update Geotechnical Investigation Proposed Park Place Development (Formerly Molson Park)*" prepared for North American, by JWL, and dated July 18, 2008 (2008 JWL Update Geotechnical Investigation Report).
- Report entitled "*Modified Phase I Environmental Assessment Proposed Target Building Footprint Mapleview Drive East Barrie, Ontario*" prepared for Centrecorp Management Services, by Paterson Group (Paterson), and dated February 5, 2010 (2010 Paterson Modified Phase I ESA Report).
- Report entitled "*Phase I Environmental Assessment Proposed Target Building Footprint Mapleview Drive East Barrie, Ontario*" prepared for the Client, by Paterson, and dated November 1, 2012 (2012 Paterson Phase I ESA Report).
- Report entitled "*Phase I Environmental Assessment Update Park Place Commercial Development Mapleview Drive East Barrie, Ontario*" prepared for Park Place Master LP, by Paterson, and dated November 3, 2015 (2015 Paterson Phase I ESA Update Report).

- Report entitled "*Phase I Environmental Site Assessment Park Place Barrie 100 Mapleview Drive East, Barrie, Ontario*" prepared for the Client, by Pinchin, and dated June 16, 2017 (2017 Pinchin Phase I ESA Report).
- Report entitled "*Phase I Environmental Site Assessment Park Place 30 North Village Way, Barrie, Ontario*" prepared for the Client, by Pinchin, and dated March 8, 2021 (2021 Pinchin Phase I ESA Report).

A summary of the salient information identified in the above-referenced reports prepared by others is provided below.

2001 Terrapex Remedial Excavation Report

The following is summarized from the 2001 Terrapex Remedial Excavation Report:

- The environmental investigation work was completed in relation to a former 4,550-L underground storage tank (UST) located within the western portion of the current Park Place commercial plaza, approximately 180 m west and inferred to be hydraulically upgradient relative to the Phase One Property.
- The UST contained gasoline for fueling maintenance vehicles. The UST, and approximately 40 tonnes of impacted soil, were removed for off-Site disposal. The resulting excavation had an area of approximately 23 square metres and was advanced to a depth of approximately 5.3 metres below ground surface (mbgs).
- The soil stratigraphy was noted to be granular fill within the vicinity of the UST, underlain by sand and gravel to 5.3 mbgs. Groundwater was encountered within the excavation at an approximate depth of 5.0 mbgs. Evidence of petroleum impacts was observed in soil within the vicinity of the UST and was removed. No evidence of impacts (e.g., sheen) was reportedly observed in the encountered groundwater.
- Two confirmatory soil samples were collected from the floor, and one sample was collected from the north, south and west excavation walls. The samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene and total xylenes (collectively known as BTEX) and total petroleum hydrocarbons (TPH) (in the gas/diesel range).
- Approximately 80 tonnes of apparently unimpacted soil was segregated for re-use as backfill. Field screening samples were collected from the segregated material, and one sample was submitted for laboratory analysis of BTEX and TPH. The excavation area was backfilled with a combination of unimpacted segregated material and approximately 50 tonnes of imported sand.

- A groundwater monitoring well was installed within the excavation area. A groundwater sample was collected from the monitoring well and submitted for laboratory analysis of BTEX and TPH (gas/diesel).
- The reported concentrations in all submitted soil and groundwater samples were reportedly below then applicable criteria (i.e., MOE Guideline Table A). Pinchin notes that although TPH analysis is not directly equivalent to the current analytical methods, all analyzed samples did not report concentrations above laboratory detection limits.

2002 JWL Phase II ESA Report

The 2002 JWL Phase II investigation was completed for the current Park Place commercial plaza, as well as properties adjacent to the north and northeast, of which the Phase One Property is a part. The following is summarized from the 2002 JWL Phase II ESA Report:

- The assessed area was occupied by an outdoor concert venue, including associated administrative offices, stages, banquet halls and maintenance buildings. All of these buildings were located at least 100 m from the Phase One Property, except for one feature located in the south-central portion of the Phase One Property. The purpose of this specific feature is not described by JWL.

  As outlined in Section 4.3.1, this historical structure may have been a concert stage.
- Based on previous investigations, the following environmental concerns were identified:
  - The historical presence of a UST located south of a maintenance building in the southwestern portion of the property.
  - Pinchin notes this is the same UST that was removed as part of the 2001 Terrapex Remedial Excavation work.
  - The historical presence of three USTs within the former Molson Brewery, located adjacent to the north of the property.

    Pinchin notes that the former Molson Brewery was located at least 500 m northwest of the Phase One Property and as such is outside the Phase One Study Area.
  - A historical wrecking yard located in the northeastern portion of the property.

    Pinchin notes that this historical wrecking yard was located at least 500 m north of the Phase One Property and as such is outside the Phase One Study Area.
  - The historical presence of a construction staging yard in the southeastern portion of the property.

Based on a review of aerial photographs from this approximate period, no significant storage of materials was observed. As such this construction staging yard is inferred to have been temporary. Furthermore, this area was investigated as part of the 2002 JWL Phase II ESA Report and a construction staging yard is not listed as a PCA under O. Reg. 153/04. As such this reported former staging yard is not considered a PCA.

- JWL completed three boreholes (BH1-BH3) in the vicinity of the former UST, located approximately 150 metres west of the Phase One property boundary, and one borehole (BH4) and six test pits (TP1-TP6) within the former construction staging area, located approximately 80 metres southeast of the Phase One property boundary. A monitoring well was installed within borehole BH2. The boreholes were advanced to a depth of 6.1 mbgs. The test pits were advanced to a depth of 3.1 mbgs. Stratigraphy was observed to consist of sand, sand and gravel or clayey silt fill with some debris to a maximum depth of 1.5 mbgs, underlain by native sand. Groundwater was encountered within monitoring well BH2 at an approximate depth of 4.9 mbgs.
- Soil and groundwater samples were collected from the boreholes, test pits and monitoring well BH2 and submitted for laboratory analysis of volatile organic compounds (VOCs), BTEX, TPH (gas/diesel and heavy oils), polycyclic aromatic hydrocarbons (PAHs) and/or metals.
- All reported concentrations within the soil and groundwater samples met the applicable criteria, except for soil samples collected from boreholes BH1 and BH3, which exceeded the MOE Guideline Table A for TPH (heavy oils) and toluene, respectively. Pinchin notes that the reported toluene concentration exceeds the *Table 2 Standards;* and that although TPH analysis is not directly equivalent to the current analytical methods, the reported concentration of TPH (heavy oils) is suggestive of possible elevated concentrations of petroleum hydrocarbon fraction 3 (F3) or F4 above the *Table 2 Standards*. However, given the distance from the Phase One property boundary (greater than 150 m), the former UST is not considered to represent a PCA contributing to an APEC at the Phase One Property.

2003 JWL Geotechnical Investigation Report

The 2003 JWL Geotechnical Investigation was completed for the current Park Place commercial plaza, as well as areas to the north, in advance of proposed redevelopment. The following is summarized from the 2003 JWL Geotechnical Investigation Report:

- 75 boreholes were advanced to a maximum depth of 11.1 mbgs. Some of the boreholes were advanced outside of the Phase One Study Area. Monitoring wells were installed within several of the boreholes.
- Stratigraphy within the boreholes was observed to be fill, composed of sand and gravel, sand, silty sand or silty clay to depths between 0.8 and 1.5 mbgs. Native stratigraphy underlying the fill was generally observed to consist of sand. Water levels within the completed boreholes were measured between 1.5 and 5.5 mbgs.
- In particular, three boreholes (BH53, BH55 and BH57) were advanced at the Phase One Property. Stratigraphy was noted to be topsoil, overlying sand or silty sand fill, underlain by native sand. No deleterious material (i.e., debris) or reported evidence of impacts (e.g., odours) were noted within the observed “fill” and as such it is inferred to be disturbed native soil, and not imported fill per O. Reg. 153/04. The boreholes were observed to be dry upon completion of drilling.

2008 JWL Update Geotechnical Investigation Report

The 2008 JWL Update Geotechnical Investigation Report served to incorporate an additional geotechnical investigation completed in 2007, for areas outside of the Park Place commercial plaza, as well as to meet updated reporting requirements.

2010 Paterson Modified Phase I ESA Report

The 2010 Paterson Modified Phase I ESA investigation was completed for the Park Place commercial plaza, of which the Phase One Property is a part. The following is summarized from the 2010 Paterson Modified Phase I ESA Report:

- The Park Place commercial plaza was undergoing redevelopment as a commercial plaza and had historically been occupied by an outdoor concert venue. Particular observations at the Phase One Property were not detailed.
- Properties adjacent to the Park Place commercial plaza, and within the Phase One Study Area, included a roadway and sports arena to the east and a roadway and commercial (i.e., retail) properties to the south. Of note, a retail fuel outlet (RFO) was identified to the southeast at 99 Mapleview Drive East, approximately 200 m southeast and inferred to be hydraulically transgradient of the Phase One Property relative to the inferred groundwater flow direction.

An RFO was also identified at 41 Mapleview Drive East, located approximately 190 m southwest and inferred to be hydraulically transgradient of the Phase One Property relative to the inferred groundwater flow direction.

- Paterson reported that a UST was removed from the western portion of the Park Place commercial plaza in 2009 (i.e., a separate UST from the one removed as part of the 2001 Terrapex Remedial Excavation investigation). The contents of the former UST were unknown but it was reportedly not used to contain fuel. No apparent evidence of impacts was reportedly present in the vicinity of the tank during its removal.
- Several test pits were advanced in the vicinity of the UST, and one test pit was reportedly advanced in the southeastern portion of the Park Place commercial plaza, across from the RFO at 99 Mapleview Drive East. No evidence of apparent impacts was reportedly observed in the soil during test pitting activities.

2012 Paterson Phase I ESA Report

The 2010 Paterson Phase I ESA was completed for an undeveloped part of the larger Park Place commercial plaza. The following is summarized from the 2012 Paterson Phase I ESA Report:

- The assessed area was located within the northeastern portion of the Park Place commercial plaza. The area was vacant and proposed for redevelopment with a commercial building.
- Adjacent to the north, east, south and west was undeveloped land. The assessed area had historically been vacant until a building was constructed in the 1990s. The building was associated with the former Molson Park concert complex.

2015 Paterson Phase I ESA Update Report

The 2015 Paterson Phase I ESA Update was completed for the Park Place commercial plaza, of which the Phase One Property is a part. The findings were similar to the 2010 Paterson Modified Phase I ESA Report, except that additional commercial buildings had been constructed across the Park Place commercial plaza. Of note, an RFO had been constructed in the southeastern portion as part of a land lease agreement. This RFO is located approximately 60 m southeast and inferred to be transgradient of the Phase One Property relative to the inferred groundwater flow direction.

2017 Pinchin Phase I ESA Report

The 2017 Pinchin Phase I ESA was completed for the Park Place commercial plaza, of which the Phase One Property is a part. The findings were similar to the 2015 Paterson Phase I ESA Update Report, except that:

- A diesel AST, associated with an emergency generator, was observed in the northwestern portion of the Park Place commercial plaza.

  Pinchin notes that this AST is outside of the Phase One Study Area.
- A UST containing soap for use in a car wash was document in the southeastern portion of the Park Place commercial plaza. The exact location of this UST was not provided, but it is understood be located at least 60 m southeast and inferred to be hydraulically transgradient of the Phase One Property relative to the inferred groundwater flow direction.
- An abandoned well was observed in the northern portion of the Park Place commercial plaza. The purpose of the well was not determined.

2021 Pinchin Phase I ESA Report

The 2021 Pinchin Phase I ESA was completed for a parcel of land within the northeastern portion of the Park Place commercial plaza (i.e., 30 North Village Way). The following is summarized from the 2021 Pinchin Phase I ESA Report:

- 30 North Village Way was occupied by a multi-tenant commercial building. The building was occupied by retail stores.
- Adjacent to the north was undeveloped land; to the east, south and west was the larger Park Place commercial plaza. The assessed area had historically been vacant until a building was constructed in the 1990s. The building was associated with the former Molson Park concert complex.

As a result of the 2021 Pinchin Phase I ESA, nothing was identified that was considered likely to result in potential subsurface impacts within the assessed lands.

3.2.2 Pinchin Phase One ESA Summary

From November 2021 through December 2021, Pinchin conducted a Phase One ESA in support of the future filing of an RSC for the Phase Two Property. The Phase One ESA consisted of a Site visit, interviews with Site personnel, records review, evaluation of information, and preparation of a written report which was completed under the supervision of a QP. A plan showing the Phase One Study Area is attached as Figure 3.

The Phase One ESA was completed recently (i.e., within one month of the start of the Phase Two ESA) and in accordance with the requirements of O. Reg. 153/04. Therefore, the information provided within the Phase One ESA Report is considered adequate such that it can be relied upon for the purpose of this Phase Two ESA and future filing of an RSC.

Based on information obtained during the Phase One ESA, a total of three APECs and corresponding potentially contaminating activities (PCAs) and COPCs were identified that could potentially affect the environmental condition of the subsurface media on, in or under the Phase Two Property. The COPCs associated with each APEC were determined based on a review of the PCAs and substances associated with the related activities, and on several sources of information, including but not limited to, Pinchin's experience with environmental contamination and hazardous substances, common industry practices for analysis of such contaminants and point sources, literature reviews of COPCs and associated hazardous substances, and evaluations of contaminant mobility and susceptibility for migration in the subsurface.

Table 1 presents the APECs and their associated PCAs and COPCs. Identified on-Site and off-Site PCAs are summarized in Table 2 and their locations are shown on Figure 4. APECs at the Phase Two Property are illustrated on Figure 5.

3.2.3 Use of Previous Analytical Data

None of the previous investigations documented in the above-referenced reports included subsurface investigations at the Phase Two Property. As such, no soil quality data from these previous environmental investigations were relied upon in preparing this Phase Two ESA report.

4.0 SCOPE OF INVESTIGATION

4.1 Overview of Site Investigation

The scope of work for this Phase Two ESA was prepared to address the APECs identified at the Phase Two Property and consisted of the following:

- Prepared a health and safety plan and arranged for the completion of underground utility locates prior to the commencement of drilling activities.
- Developed a detailed SAP prior to the advancement of the boreholes and the installation of the monitoring wells. The SAP was outlined in the document entitled "*Sampling and Analysis Plan for Phase Two Environmental Site Assessment, 109-129 Park Place Boulevard, Barrie, Ontario*", dated December 21, 2021, which is provided in Appendix B. Based on Pinchin's knowledge of the surrounding properties and known hydrogeological conditions, boreholes were advanced at the Phase Two Property to a maximum depth of approximately 4.6 mbgs.

- Retained Strata Drilling Group Inc. (Strata) to advance boreholes using a Geoprobe 7822DT™ drill rig. Strata is licensed by the MECP in accordance with Ontario Regulation 903 (as amended) (O. Reg. 903) to undertake borehole drilling. Strata advanced three boreholes at the Phase Two Property to investigate the potential for soil contaminants associated with the APECs identified in the Phase One ESA.
- Collected soil samples at regular intervals within each borehole.
- Field screened soil samples for visual/olfactory evidence of impacts as well as for petroleum-derived vapours in soil headspace using a combustible gas indicator (CGI) calibrated to hexane and VOC-derived vapours in soil headspace using a photoionization detector (PID).
- Submitted a minimum of one "worst case" soil sample from each borehole for chemical analysis of:
  - Volatile organic compounds (VOCs);
  - Petroleum hydrocarbons (PHCs) fractions 1 through 4 (F1-F4); and
  - Polychlorinated biphenyls (PCBs).
- Submitted two duplicate soil samples for chemical analysis of the above-noted parameters for quality assurance/quality control (QA/QC) purposes.
- Submitted one trip blank for the soil sampling program for the chemical analysis of PHC F1 and VOCs for QA/QC purposes.
- Submitted three representative soil samples for the laboratory analysis of grain size (including one field duplicate soil sample) and six representative soil samples (including two field duplicate soil samples) for the laboratory analysis of pH in order to confirm the appropriate MECP Site Condition Standards.
- Completed an elevation survey to establish the elevations of the boreholes.
- Compared the soil analytical results to the applicable criteria stipulated in the *Table 2 Standards*.
- Prepared a report (this report) documenting the findings of the Phase Two ESA which meets the reporting requirements listed in *Schedule E* and *Table 1 – Mandatory Requirements for Phase Two Environmental Site Assessment Reports* of O. Reg. 153/04.

4.2 Media Investigated

The scope of work for this Phase Two ESA was prepared to address the APECs and corresponding media at the Phase Two Property as identified through completion of the Phase One ESA.

The media of concern for the Phase Two ESA was soil. The assessment of groundwater quality was not included in the Phase Two ESA because the APECs were related to PCAs located at the ground surface (i.e., hydro vault (APEC-1) and pad-mounted electrical transformers (APECs-2 and 3) and the results of soil samples collected and analyzed from these APECs showed no evidence of soil impacts and groundwater impacts were considered unlikely. Pinchin did not conduct sediment sampling as part of this Phase Two ESA as there are no surface water bodies and, therefore no sources of sediment, present on-Site.

For assessing the soil at the Phase Two Property for the presence of COPCs, a total of three boreholes were advanced at the Phase Two Property for the purpose of collecting soil samples. Select “worst case” samples collected from each of the boreholes, were submitted for laboratory analysis of the COPCs.

4.3 Phase One Conceptual Site Model

A conceptual site model (CSM) has been created to provide a summary of the findings of the Phase One ESA. The Phase One CSM is summarized in Figures 1 through Figure 5, which illustrate the following features within the Phase One Study Area, where present:

- Existing buildings and structures.
- Water bodies located in whole or in part within the Phase One Study Area.
- Areas of natural significance located in whole or in part within the Phase One Study Area.
- Drinking water wells located at the Phase One Property.
- Land use of adjacent properties.
- Roads within the Phase One Study Area.
- PCAs within the Phase One Study Area, including the locations of tanks.
- APECs at the Phase One Property.

The following provides a narrative summary of the Phase One CSM:

- The Phase One Property is an irregularly shaped parcel of land approximately 6.0 acres (2.4 hectares) in size, located in the central portion of the Park Place commercial plaza, west of the intersection of private roadways Live Eight Way and South Village Way in the City of Barrie. The Phase One Property is improved with a commercial building (Site Building) located in the southwestern portion of the Phase One Property, operating as a restaurant. The Phase One Property was historically part of a larger outdoor concert venue. There is no record of industrial use or of a commercial use (e.g., garage, bulk liquid dispensing facility or dry cleaner) that would require classifying the Phase One Property as an Enhanced Investigation Property.

- No water bodies were identified within the Phase One Study Area. The nearest surface water body is an unnamed tributary to Lovers Creek, located approximately 275 m east of the Phase One Property at an elevation of approximately 276 mamsl.
- No areas of natural significance were identified within the Phase One Study Area.
- No drinking water wells were located on the Phase One Property.
- A total of 18 PCAs were identified within the Phase One Study Area, consisting of four PCAs at the Phase One Property and 14 PCAs within the Phase One Study Area, outside of the Phase One Property. As shown on Figure 4, none of the off-Site PCAs are considered to result in APECs at the Phase One Property given the distance from the PCAs to the Phase One Property, their downgradient or transgradient locations relative to the inferred groundwater flow direction in the Phase One Study Area and/or the nature of operations and potential contaminants related to these operations. Three of the four PCAs are considered to represent APECs at the Phase One Property. One PCA is related to the application of road salt for de-icing purposes, which is not considered to be an APEC. Figure 5 provides a detailed summary of the APECs and associated PCAs and COPCs.
- A number of underground utilities are understood to be present at the Phase One Property, including natural gas, communication, electrical, municipal water and storm and sanitary sewer lines. Natural gas and municipal water service are understood to run east from Live Eight Way to the eastern elevation of the Site Building. The locations of the remaining underground utilities could not be confirmed. Plans were not available to confirm the depths of these utilities, but they are estimated to be located approximately 0.75 to 2 mbgs. The depth to groundwater at the Phase One Property is estimated to be between approximately 1.5 and 5.5 mbgs, which coincides with the approximate depth to the water table. As such, it is possible that select utility corridors (sewer and water) may act as preferential pathways for contaminant distribution and transport in the event that shallow subsurface contaminants exist at the Phase One Property.
- The Phase One Property and the surrounding properties located within the Phase One Study Area are located within stratified ice-contact glaciofluvial deposits as the dominant landform with the primary native material consisting of sand and gravel. Bedrock consists of limestone, dolostone, shale, arkose and sandstone of the Shadow Lake Formation at depths below 141 mbgs. During a previous geotechnical investigation, the native soil stratigraphy was observed to consist of sand and bedrock was not encountered.

- The Phase One Property is relatively flat with little relief. The area surrounding the Phase One Property slopes gradually to the east. Local groundwater flow is inferred to be to the east, based on the topography of the area surrounding the Phase One Property and the location of the nearest water body (unnamed tributary to Lovers Creek).

The Phase One Property has paved roadways, access routes and parking areas in the eastern portion. It is Pinchin's understanding that salt is applied to the paved areas for safety reasons during winter conditions to remove snow and ice, which represents a PCA; however, does not result in an APEC at the Phase One Property. It is the opinion of the QP supervising the Phase One ESA that, although salt-related parameters such as sodium adsorption ratio and electrical conductivity in soil and sodium and chloride in groundwater may be present at concentrations exceeding the applicable Site Condition Standards, the exemption provided in Section 49.1 of O. Reg. 153/04 can been applied. As such, these parameters would be deemed to meet the Site Condition Standards and do not need to be assessed as part of a Phase Two ESA.

There were no deviations from the Phase One ESA requirements specified in O. Reg. 153/04 or absence of information that have resulted in uncertainty that would affect the validity of the Phase One CSM

4.4 Deviations from Sampling and Analysis Plan

The following deviations from the SAP occurred during the completion of the Phase Two ESA investigation activities:

- Boreholes BH201 and BH202 had to be advanced in different locations than those proposed due to the presence of impediments. The presence of these impediments is discussed below in Section 4.5.

It is the QP's opinion that the above-noted deviation from the SAP did not affect the investigation of the APECs for COPCs and had no impact on the overall findings and conclusions of the Phase Two ESA.

4.5 Impediments

Pinchin had full access to the Phase Two Property throughout the completion of the Phase Two ESA, with the following exception:

- Boreholes BH201 and BH202 could not be advanced in their proposed locations as provided in Pinchin's SAP due to the presence of buried utilities (e.g., electrical lines). Boreholes BH201 and BH202 were advanced at the closest safe locations to those proposed.

It is the QP's opinion that the impediments to full access to the Phase Two Property did not affect the investigation of the APECs for COPCs and had no impact on the overall findings and conclusions of the Phase Two ESA.

5.0 INVESTIGATION METHOD

5.1 General

The Phase Two ESA field work was conducted in accordance with Pinchin's standard operating procedures (SOPs) as provided in the SAP, which have been developed in accordance with the procedures and protocols provided in the MECP document entitled "*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*", dated December 1996, in the Association of Professional Geoscientists of Ontario document entitled *"Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)"*, dated April 2011, and in O. Reg. 153/04.

No deviations from Pinchin's SOPs occurred during the Phase Two ESA.

5.2 Drilling

Pinchin retained Strata to advance a total of three boreholes (BH201 through BH203) at the Phase Two Property on January 13, 2022 to investigate the potential presence of COPCs associated with the APECs identified in the Phase One ESA. The boreholes were drilled to a maximum depth of 4.6 mbgs using a Geoprobe 7822DT™ drill rig.

The locations of the boreholes are provided on Figure 6. Section 6.10.2 includes a table summarizing the boreholes completed to investigate each of the APECs. A description of the subsurface stratigraphy encountered during the drilling program is documented in the borehole logs included in Appendix C. Elevation data are provided on the borehole logs included in Appendix C.

Measures taken to minimize the potential for cross-contamination during the borehole drilling program included:

- The use of dedicated, disposable PVC soil sample liners for soil sample collection during direct-push drilling.
- The cleaning of all non-dedicated drilling and soil sampling equipment (i.e., spatulas used for sample collection) before initial use and between sample and borehole locations.
- The use of dedicated and disposable nitrile gloves for all soil sample handling.

Soil samples were collected at continuous intervals during direct-push drilling at a general frequency of one soil sample for every 0.75 metres drilled.

No excavating activities (e.g., test pitting) were completed as part of the Phase Two ESA.

5.3 Soil Sampling

Soil samples were collected in the boreholes at continuous intervals using 5.7-centimetre (cm) diameter (OD) direct push soil samplers with dedicated single-use sample liners.

Discrete soil samples were collected from the dedicated sample liners using a stainless-steel spatula. Dedicated and disposable nitrile gloves were worn during the collection of each soil sample. A portion of each sample was placed in a resealable plastic bag for field screening and a portion was containerized in laboratory-supplied glass sampling jars. Following sample collection, the sample jars were placed into dedicated coolers with ice for storage pending transport to Caduceon Environmental Laboratories (Caduceon) in Barrie, Ontario. Formal chain of custody records were maintained between Pinchin and the staff at Caduceon.

Subsurface soil conditions were logged on-Site by Pinchin personnel at the time of borehole drilling. Based on the soil samples recovered during the borehole drilling program, the soil stratigraphy at the drilling locations generally consists of sand and gravel aggregate material to a maximum depth of approximately 0.9 mbgs, followed by sand to silty sand that extended to the maximum investigation depth of 4.6 mbgs.

No odours or staining were observed in the soil samples collected during the borehole drilling program.

A detailed description of the subsurface stratigraphy encountered during the borehole drilling program is documented in the borehole logs included in Appendix C.

5.4 Field Screening Measurements

Soil samples were collected at each of the sampling intervals during the drilling activities and analyzed in the field for VOC-derived and petroleum-derived vapour concentrations in soil headspace with an RKI Eagle 2™ equipped with a PID and a CGI operated in methane elimination mode. The soil samples collected for field-screening purposes were placed in resealable plastic bags. The plastic bags were stored in a warm environment for a minimum of five minutes and agitated in order to release organic vapours within the soil pore space prior to analysis with the PID and CGI.

Based on a review of the operator's manual, the RKI Eagle 2™ PID has an accuracy/precision of up to 1 part per million (ppm). The PID was calibrated prior to field use by the equipment supplier, Spectra Scientific Inc. (Spectra) according to Spectra's standard operating procedures. An in-field re-calibration of the PID was conducted (using the gas standard in accordance with the operator's manual instructions) if the calibration check indicated that the PID's calibration had drifted by more than +/- 10%.

Based on a review of the operator's manual, the RKI Eagle 2™ CGI has an accuracy/precision of up to +/- 25 ppm, or +/- 5% of the reading (whichever is greater). The CGI was calibrated prior to field use by Spectra according to Spectra's standard operating procedures. An in-field re-calibration of the CGI was conducted (using the gas standard in accordance with the operator's manual instructions) if the calibration check indicated that the CGI's calibration had drifted by more than +/- 10%.

Soil samples collected during the drilling activities completed on January 13, 2022, were field screened for VOC-derived and petroleum-derived vapour concentrations using the RKI Eagle 2™ PID/CGI. The organic vapour concentrations measured in the soil samples were relatively low, ranging from 0 ppm by volume (ppm_v) to a maximum of 15 ppm_v, which are generally not indicative of soil VOC or PHC impacts. As such, the primary consideration in selecting soil samples for submission was sample depth, and samples collected from the near surface were considered to represent "worst case" samples with respect to assessing impacts related to a hydro vault and pad-mounted electrical transformers.

5.5 Groundwater Monitoring Well Installation

Groundwater was not considered a potentially impacted media and as such no monitoring wells were installed as part of this Phase Two ESA.

5.6 Groundwater Field Measurements of Water Quality Parameters

Groundwater was not considered a potentially impacted media and as such no groundwater field measurements of water quality parameters were collected as part of this Phase Two ESA.

5.7 Groundwater Sampling

Groundwater was not considered a potentially impacted media and as such no groundwater samples were collected as part of this Phase Two ESA.

5.8 Sediment Sampling

Sediment sampling was not completed as part of this Phase Two ESA.

5.9 Analytical Testing

All collected soil samples were delivered to Caduceon for analysis. Caduceon is an independent laboratory accredited by the Canadian Association for Laboratory Accreditation. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at Caduceon. Caduceon conducted the laboratory analysis in accordance with the MECP document entitled *"Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act"* dated March 9, 2004 and revised on July 1, 2011 (*Analytical Protocol)*.

5.10 Residue Management Procedures

Soil cuttings generated by the borehole drilling program were containerized in 205-L drums that were stored at the Phase Two Property. Pinchin notes the drums also contained soil cuttings generated during concurrent geotechnical and hydrogeological investigations.

One composite soil sample (representative of the excess soil cuttings generated by the borehole drilling program) collected from the boreholes was submitted for the laboratory analysis of the leachate concentrations of inorganics, VOCs, PCBs and benzo(a)pyrene in accordance with the Toxicity Characteristic Leachate Procedure (TCLP) analysis as per Ontario Regulation 347/90 (O. Reg. 347/90) in order to characterize the soil cuttings for off-Site disposal purposes. The TCLP analytical results are provided in Appendix D which illustrate that the excess soil cuttings are classified as non-hazardous waste in accordance with O. Reg. 347/90.

Pinchin notes that at the time of writing, the drums of excess soil cuttings have not been removed from the Phase Two Property. Pinchin will assist the Client in arranging for disposal of these materials by MECP-approved waste haulers at MECP-approved waste management facilities.

5.11 Elevation Surveying

On January 31, 2022, Pinchin completed a vertical elevation survey of all borehole locations using a Sokkia GCX2 GNSS receiver (Sokkia). The Sokkia collected geodetic elevations data for the borehole locations.

A summary of the elevation survey data is provided on the borehole logs in Appendix C.

5.12 Quality Assurance and Quality Control Measures

The QA/QC protocols that were followed during borehole drilling and soil sampling so that representative samples were obtained are described in the following subsections.

5.12.1 Sample Containers, Preservation, Labelling, Handling and Custody of Samples

Soil samples were containerized within laboratory-prepared sample containers in accordance with the *Analytical Protocol*.

The following soil sample containers and preservatives were used:

- VOCs and PHCs F1: 40 millilitre (mL) glass vials with septum-lids, pre-charged with methanol preservative.
- PHCs F2-F4, PCBs, pH and grain size: 120 or 250 mL unpreserved clear glass wide-mouth jars with a Teflon™–lined lid.

The soil sampling trip blank for PHC F1 and VOC analysis consisted of two 40 mL clear glass vials that were pre-charged with methanol preservative.

Each soil and QA/QC sample was labelled with a unique sample identifier along with the company name, sampling date, Pinchin project number and analysis required.

Each sample was placed in a cooler on ice immediately upon collection and prior to submission to Caduceon for analysis. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at Caduceon.

5.12.2 Equipment Cleaning Procedures

Dedicated, single-use PVC sample liners were used for each soil sample collected, which precluded the need for drilling equipment cleaning during soil sample collection. Equipment utilized in soil sample collection and handling (i.e., spatulas used to remove soil from the sample liners) was cleaned with a solution of Alconox™ detergent and potable water followed by a distilled water rinse prior to initial use and between samples.

5.12.3 Field Quality Control Measures

A total of two field duplicate soil samples were collected by Pinchin during the Phase Two ESA for analysis of one or more of the COPCs. The frequency of field duplicate soil sample analysis complied with the requirement that one field duplicate soil sample is analyzed for every ten regular soil samples submitted for analysis of the COPCs. The soil sample field duplicate pairings and corresponding analytical schedules are summarized as follows:

- Soil sample “BH201 S1” and its corresponding field duplicate “DUP 1” were submitted for laboratory analysis of VOCs, PHCs and PCBs.
- Soil sample “BH201 S2” and its corresponding field duplicate “DUP 2” were submitted for laboratory analysis of pH.

In addition, one soil sample trip blank was analyzed for PHC F1 and VOCs.

The calibrations of the RKI Eagle 2™ CGI used for field screening were checked by the equipment supplier (Spectra) prior to use in the field by Pinchin.

Spectra completed the calibration checks in accordance with the equipment manufacturers’ specifications and/or Spectra’s SOPs. As described in Section 5.4, calibration checks, and recalibration (if required) were completed daily for the RKI Eagle 2™ CGI during the drilling program.

5.12.4 QA/QC Sampling Program Deviations

There were no deviations from the QA/QC sampling program outlined in the SAP.

6.0 REVIEW AND EVALUATION

6.1 Geology

Based on the stratigraphic information obtained from the soil samples recovered during the drilling activities completed as part of the Phase Two ESA, the asphalt or grass-covered ground surface at the Phase Two Property is underlain by granular aggregate materials to a maximum depth of approximately 0.9 mbgs. The native soil underlying the surficial aggregate material is generally comprised of sand to silty sand to the maximum investigation depth of approximately 4.6 mbgs.

Since groundwater was not identified as a potentially impacted media, monitoring wells were not installed within any of the boreholes. As such, the depth to water table was not determined during this Phase Two ESA.

The following table provides a summary of the primary geologic units observed during borehole drilling at the Phase Two Property:

Geologic Unit	Estimated Thickness (metres)	Top Elevation (mamsl)	Bottom Elevation (mamsl)	Properties
Aggregate	0.0 – 0.9	292.05 – 292.98	291.14 – 292.22	Depth to water table not assessed as part of Phase Two ESA
Native Soil	3.7 – 4.6	291.14 – 292.22	<288.41	Depth to water table not assessed as part of Phase Two ESA

The overburden/bedrock interface was not encountered during the drilling activities. Based on information provided in the Water Well Information System database, bedrock is located at depths below at least 141 mbgs within the Phase One Study Area.

Cross-sections summarizing the subsurface geological conditions have been provided as Figures 7A to 7C.

6.2 Groundwater Elevations and Flow Direction

Groundwater was not considered a potentially impacted media and as such no monitoring wells were installed as part of this Phase Two ESA. As such, Pinchin is unable to comment on groundwater elevations, temporal variability, inferred groundwater flow direction or interaction with buried utilities.

6.3 Groundwater Hydraulic Gradients

6.3.1 Groundwater Horizontal Hydraulic Gradients

Monitoring wells were not installed at the Phase Two Property as part of the Phase Two ESA. As such, horizontal hydraulic gradients were not determined.

6.3.2 Groundwater Vertical Hydraulic Gradients

Monitoring wells were not installed at the Phase Two Property as part of the Phase Two ESA. As such, vertical hydraulic gradients were not determined.

6.4 Fine-Medium Soil Texture

Three soil samples (including one duplicate) collected from the boreholes advanced at the Phase Two Property were submitted for hydrograph grain size analysis. The soil samples selected for analysis were considered to be representative of the primary stratigraphic unit observed at the borehole locations i.e., a native sand to silty sand unit. As indicated in Table 3, soil samples BH201-S5 and BH203-S5 were classified as coarse-textured (68% and 51% coarse, respectively). Duplicate sample DUP 3 was classified as medium/fine-textured (15% coarse); however, this sample appears to have been collected from a silt/clay seam and is not considered representative of the overall native stratigraphy.

Based on these grain size analysis results and the observed stratigraphy at the borehole locations at the Phase Two Property, it is the QP's opinion that over two-thirds of the overburden at the Phase Two Property is coarse-textured as defined by O. Reg. 153/04. Therefore, the soil at the Phase Two Property was interpreted to be coarse-textured for the purpose of determining the MECP Site Condition Standards applicable to the Phase Two Property.

6.5 Soil Field Screening

Soil vapour headspace concentrations measured in the soil samples collected as part of this Phase Two ESA are presented in the borehole logs. Soil vapour headspace values measured with the CGI in methane elimination mode were all measured at 0 ppm by volume (ppm_v). Soil vapour headspace values measured with the PID ranged from 0 ppm_v in several of the collected soil samples to a maximum of 15 ppm_v in soil sample BH201 S1, collected from borehole BH201 at a depth of approximately 0.1 to 0.8 mbgs.

One most apparent "worst case" soil sample, based on vapour concentrations, sample depth, as well as visual and/or olfactory considerations, recovered from each borehole was submitted for laboratory analysis of VOCs, PHCs (F1-F4) and PCBs.

6.6 Soil Quality

A total of three boreholes were advanced at the Phase Two Property at the locations shown on Figure 6 in order to assess for the presence of subsurface impacts resulting from the APECs identified in the Pinchin Phase One ESA. Select soil samples were collected from each of the advanced boreholes and submitted for laboratory analysis of the COPCs. The soil sample locations, depths and laboratory analyses are summarized in Table 3 and in the borehole logs.

The soil sample analytical results were compared to the *Table 2 Standards* and the following subsections provide a discussion of the findings.

6.6.1 VOCs

The soil sample analytical results for VOCs, along with the corresponding *Table 2 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of VOCs in the soil samples submitted for analysis were below the *Table 2 Standards*.

6.6.2 PHCs F1-F4

The soil sample analytical results for PHCs F1-F4, along with the corresponding *Table 2 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of PHCs F1- F4 in the soil samples submitted for analysis were below the *Table 2 Standards*.

6.6.3 PCBs

The soil sample analytical results for PAHs, along with the corresponding *Table 2 Standards*, are presented in Table 3. As indicated in Table 3, all reported concentrations of PAHs in the soil samples submitted for analysis were below the *Table 2 Standards*.

6.6.4 General Comments on Soil Quality

The soil sample results show no evidence of chemical or biological transformations of chemical parameters in the subsurface.

As noted above, no soil impacts were identified at the Phase Two Property. As such, there is no evidence that the soil at the Phase Two Property is acting as a contaminant source for the groundwater.

The soil sample analytical results also show no evidence of NAPLs in the subsurface at the Site. In addition, no evidence of NAPL was observed during borehole drilling.

6.7 Groundwater Quality

Groundwater was not considered a potentially impacted media and as such no groundwater samples were collected as part of this Phase Two ESA.

6.8 Sediment Quality

Sediment sampling was not completed as part of this Phase Two ESA.

6.9 Quality Assurance and Quality Control Results

QA/QC comprises technical activities that are used to measure or assess the effect of errors or variability in sampling and analysis. It may also include specification of acceptance criteria for the data and corrective actions to be taken when they are exceeded. QA/QC also includes checks performed to evaluate laboratory analytical quality, checks designed to assess the combined influence of field sampling and laboratory analysis and checks to specifically evaluate the potential for cross contamination during sampling and sample handling.

The QA/QC samples collected and submitted for analysis by Pinchin during the Phase Two ESA consisted of the following:

- Field duplicate soil samples to assess the suitability of field sampling methods and laboratory performance.
- A trip blank sample for PHC F1 and VOC soil sampling to assess whether ambient conditions during transport of soil sample containers to the Phase Two Property and back to the analytical laboratory may have biased the soil sample results with respect to volatile constituents.

In addition to the above, laboratory quality control activities and sample checks employed by Caduceon included:

- Method blanks - where a clean sample is processed simultaneously with and under the same conditions (i.e., using the same reagents and solvents) as the samples being analyzed. These are used to confirm whether the instrument, reagents and solvents used are contaminant free.
- Laboratory duplicates - where two samples obtained from the sample container are analyzed. These are used to evaluate laboratory precision.
- Surrogate spike samples - where a known mass of compound not found in nature (e.g., deuterated compounds such as toluene-d8) but that has similar characteristics to the analyzed compounds is added to a sample at a known concentration. These are used to assess the recovery efficiency.
- Matrix spike samples - where a known mass of target analyte is added to a matrix sample with known concentrations. These are used to evaluate the influence of the matrix on a method's recovery efficiency.
- Use of standard or certified reference materials - a reference material where the content or concentration has been established to a very high level of certainty (usually by a national regulatory agency). These are used to assess accuracy.

The results of the field QA/QC samples are discussed in the following subsections.

6.9.1 Soil Duplicate Results

During borehole soil sampling activities, a total of two separate soil duplicate sample pairs were submitted for laboratory analysis. The field duplicate samples were collected by vertically splitting the soil cores into two halves, with one half collected as the regular sample and the other half collected as the field duplicate sample. The sample pairings and corresponding laboratory analyses are as follows:

- Soil sample “BH201 S1” and its corresponding field duplicate “DUP 1” were submitted for laboratory analysis of VOCs, PHCs and PCBs.
- Soil sample “BH201 S2” and its corresponding field duplicate “DUP 2” were submitted for laboratory analysis of pH.

The quality of the analytical results was evaluated by calculating relative percent differences (RPDs) for the parameters analyzed for the original and field duplicate samples. The RPD for each parameter was calculated using the following equation:

$$RPD = \frac{(\text{Original Concentration} - \text{Duplicate Concentration}) \times 100}{(\text{Original Concentration} + \text{Duplicate Concentration})/2}$$

An RPD was not calculated unless the parameter concentration in both the original and duplicate sample had detectable concentrations above the corresponding practical quantitation limit for the parameter, which is equal to five times the lowest laboratory reportable detection limit (RDL).

The calculated RPDs for the original and field duplicate soil samples have been compared to performance standards provided in the *Analytical Protocol.* Pinchin notes that although these performance standards only strictly apply to laboratory duplicate samples, they have been considered suitable for comparison to the field duplicate soil sample results as well.

The calculated RPDs values met the performance standards with the exception of the following:

- The RPD values for soil sample pairing BH201 S1/DUP 1, collected from borehole BH201 at a depth of 0.1 to 0.8 mbgs, exceeded the corresponding performance standard of 30% for the analytical results reported for PHC F3 (RPD of 49%) and PHC F4 (50%).

The primary cause of the elevated RPD values and discrepancies observed in the analytical results for soil sample pairing BH201 S1/DUP 1 is inferred to be heterogeneity in the matrix of the aggregate materials from which the samples were collected. Pinchin notes that aggregate materials are generally more variable in terms of parameter concentrations in comparison to native, undisturbed soil deposits. As such, the observed variances in RPDs for these sample pairings are not expected to reflect deficiencies in sampling or analytical methods. Furthermore, all parameter concentrations in the soil sample pairings are below the corresponding *Table 2 Standards* so the apparent lack of precision is not considered a concern.

Based on Pinchin's review of the calculated RPD values for the remainder of the collected soil duplicate sample pairings, the level of observed variance in the reported analytical results is considered acceptable for the purpose of meeting the data quality objectives of this Phase Two ESA.

6.9.2 Soil Trip Blank Results

One laboratory-prepared methanol vial accompanied the vials used for PHC F1 and VOC soil sampling during transportation of the sample containers from Caduceon to the Phase Two Property, during soil sampling on January 13, 2022 at the Phase Two Property, and during transportation of the soil samples from the Phase Two Property to Caduceon. The trip blank sample was submitted to Caduceon for analysis of PHC F1 and VOCs.

As indicated in Table 3, the concentrations of PHC F1 and VOCs analyzed in the soil trip blank sample were below the laboratory RDLs. These findings indicate that ambient conditions during the transportation of the sample containers to and from the Phase Two Property and during soil sampling did not positively bias the PHC F1 and VOCs analytical results for the soil samples collected on January 13, 2022.

6.9.3 Deviations from Analytical Protocol

There were no deviations from the holding times, preservation methods, storage requirements and container types specified in the *Analytical Protocol* during the completion of the Phase Two ESA.

6.9.4 Laboratory Certificates of Analysis

Pinchin has reviewed the laboratory Certificates of Analysis provided by Caduceon for the samples submitted during the Phase Two ESA and confirms the following:

- All laboratory Certificates of Analysis contain a complete record of the sample submission and analysis and meet the requirements of Section 47(3) of O. Reg. 153/04.
- A laboratory Certificate of Analysis has been received for each sample submitted for analysis during the Phase Two ESA.
- All laboratory Certificates of Analysis have been included in full in Appendix E.
- All of the analytical data reported in the Certificates of Analysis have been summarized, in full, in Tables 3 and 7.

6.9.5 Laboratory Comments Regarding Sample Analysis

Caduceon routinely conducts internal QA/QC analyses in order to satisfy regulatory QA/QC requirements. The results of the Caduceon QA/QC analyses for the submitted soil samples are summarized in the laboratory Certificates of Analyses provided in Appendix E. Also included in Appendix E are all correspondences between the laboratory and staff at Pinchin.

No comments from Caduceon were provided on the laboratory Certificate of Analysis for the submitted soil samples.

The results of the QA/QC analyses were reviewed by the project staff at Caduceon and observed to be within the laboratory's internal requirements. Pinchin has also reviewed the laboratory Certificates of Analysis and has confirmed that the results of the analyses are acceptable for the purpose of meeting the data quality objectives of this Phase Two ESA.

The following general comments apply to the laboratory Certificates of Analysis received from Caduceon as part of this Phase Two ESA:

- The temperatures of the submitted soil samples upon receipt met the sample preservation requirements of the *Analytical Protocol* of 5 ± 3ºC (i.e., between 2 and 8ºC).

6.9.6 QA/QC Sample Summary

The overall evaluation of the QA/QC sample results indicates no issues with respect to field collection methods and laboratory performance, and no apparent bias due to ambient conditions at the Phase Two Property and during transportation of the sample containers/samples to and from the analytical laboratory.

As such, it is the QP's opinion that the soil analytical data obtained during the Phase Two ESA are representative of actual Site conditions and are appropriate for meeting the objective of assessing whether the soil at the Phase Two Property meets the applicable MECP Site Condition Standards.

6.10 Phase Two Conceptual Site Model

The Phase Two Property is part of the larger Park Place commercial plaza with the municipal address 109-129 Park Place Boulevard in Barrie, Ontario. The Phase Two Property is bounded by private roadways, parking lots or commercial retail buildings to the north, east, south and west. A key map showing the Phase Two Property location is provided as Figure 1.

A Phase One CSM was created during the Pinchin Phase One ESA in order to provide a detailed visualization of the APECs which could occur on, in, under, or affecting the Phase Two Property. The Phase One CSM is summarized in Figures 1 through 5, which illustrate the following features within the Phase One Study Area, where present:

- Existing buildings and structures.
- Water bodies located in whole or in part within the Phase One Study Area.
- Areas of natural significance located in whole or in part within the Phase One Study Area.
- Drinking water wells located at the Phase One Property.
- Land use of adjacent properties.

- Roads within the Phase One Study Area.
- PCAs within the Phase One Study Area, including the locations of tanks.
- APECs at the Phase One Property.

The following subsections expand on the Phase One CSM with the information collected during the completion of the Phase Two ESA.

6.10.1 Potentially Contaminating Activities

The Phase One ESA identified a total of 18 PCAs within the Phase One Study Area. These PCAs consisted of four PCAs at the Phase Two Property and 14 PCAs within the Phase One Study Area, outside of the Phase Two Property. Three of the on-Site PCAs (were interpreted as potentially affecting the environmental condition of the subsurface media on, in or under the Phase Two Property and were considered to result in APECs. The fourth on-Site PCA was not considered to contribute to an APEC at the Phase Two Property because it was related to the application of salt for de-icing purposes and as such considered exempt under Section 49.1 of O. Reg. 153/04. Identified on-Site and off-Site PCAs are summarized in Table 2 and their locations are shown on Figure 4.

6.10.2 Areas of Potential Environmental Concern

Table 1 summarizes the APECs identified at the Phase Two Property, as well as their respective PCAs, COPCs and the media that could potentially be impacted. APECs at the Phase Two Property are illustrated on Figure 5. The Phase Two ESA included an assessment of soil quality within each of the APECs.

The following table summarizes the boreholes completed to investigate each of the APECs:

APEC	Investigation Location
APEC-1	BH202
APEC-2	BH203
APEC-3	BH201

Groundwater was not identified as a potentially impacted media and as such monitoring wells were not installed at the Phase Two Property as part of this Phase Two ESA.

A summary of the findings for each of the APECs is provided below.

APEC-1

The Pinchin Phase One ESA identified a hydro vault in the central portion of the Phase Two Property. The subsurface investigation of APEC-1 completed by Pinchin as part of the Phase Two ESA included one borehole (BH202). A soil sample was collected from the borehole at a depth between 0.9 – 1.5 mbgs and submitted for laboratory analysis of VOCs, PHCs and PCBs. The soil sample submitted from the borehole completed within APEC-1 met the *Table 2 Standards*.

APEC-2

The Pinchin Phase One ESA identified a pad-mounted electrical transformer in the south-central portion of the Phase Two Property. The subsurface investigation of APEC-2 completed by Pinchin as part of the Phase Two ESA included one borehole (BH203). A soil sample was collected from the borehole at a depth between 0.1 – 0.8 mbgs and submitted for laboratory analysis of VOCs, PHCs and PCBs. The soil sample submitted from the borehole completed within APEC-2 met the *Table 2 Standards*.

APEC-3

The Pinchin Phase One ESA identified a pad-mounted electrical transformer in the northeastern portion of the Phase Two Property. The subsurface investigation of APEC-3 completed by Pinchin as part of the Phase Two ESA included new borehole (BH201). A soil sample was collected from the borehole at a depth between 0.1 – 0.8 mbgs and submitted for laboratory analysis of VOCs, PHCs and PCBs. The soil sample submitted from the borehole completed within APEC-3 met the *Table 2 Standards*.

6.10.3 Subsurface Structures and Utilities

A number of underground utilities are understood to be present at the Phase One Property, including natural gas, communication, electrical, municipal water and storm and sanitary sewer lines. The approximate known locations of these underground utilities are illustrated on Figure 2.

Groundwater was not considered a potentially impacted media and as such no monitoring wells were installed as part of this Phase Two ESA. As such, Pinchin is unable to comment on the interaction of groundwater with buried utilities at the Phase Two Property.

6.10.4 Physical Setting

Based on the work completed as part of this Phase Two ESA, the following subsections provide a summary of the physical setting of the Phase Two Property.

Stratigraphy

The observed stratigraphy at the borehole locations completed for the Phase Two ESA generally consisted of granular aggregate materials to a maximum depth of approximately 0.9 mbgs. The native soil underlying the surficial aggregate material is generally comprised of sand to silty sand to the maximum investigation depth of approximately 4.6 mbgs. The borehole locations are shown on Figure 6.

Cross-sections summarizing the subsurface geological conditions at the time of the Phase Two ESA have been provided as Figures 7A to 7C.

Since groundwater was not identified as a potentially impacted media, monitoring wells were not installed within any of the boreholes. As such, the presence of any aquifers at the Phase Two Property was not assessed as part of this Phase Two ESA.

Hydrogeological Characteristics

Groundwater was not considered a potentially impacted media and as such no monitoring wells were installed as part of this Phase Two ESA. As such, Pinchin is unable to comment on groundwater elevations, inferred groundwater flow direction or hydraulic gradients.

Depth to Bedrock

Bedrock was not encountered at any of the borehole locations up to the maximum depth drilled of approximately 4.6 mbgs and based on the available water well records, bedrock depth at the Phase Two Property is approximately at least 141 mbgs.

Depth to Water Table

Since groundwater was not identified as a potentially impacted media, monitoring wells were not installed within any of the boreholes. As such, the depth to water table was not determined during this Phase Two ESA. As part of previous environmental investigations completed at other properties within the Phase One Study Area, the depth to water table was generally found to be approximately 5.0 mbgs.

Applicability of Section 35 of O. Reg 153/04 – Non-Potable Site Condition Standards

Site Condition Standards for potable groundwater use have been applied to the Phase Two Property and non-potable Site Condition Standards as per Section 35 of O. Reg. 153/04 are not applicable.

Applicability of Section 41 of O. Reg 153/04 – Environmentally Sensitive Area

Section 41 of O. Reg. 153/04 states that a property is classified as an “environmentally sensitive area” if the property is within an area of natural significance, the property includes or is adjacent to an area of natural significance or part of such an area, the property includes land that is within 30 m of an area of natural significance or part of such an area, the soil at the property has a pH value for surface soil less than 5 or greater than 9 or the soil at the property has a pH value for subsurface soil less than 5 or greater than 11.

The Phase Two Property is not located in or adjacent to, nor does it contain land within 30 m of, an area of natural significance. Furthermore, the pH values measured in the submitted soil samples were within the limits for non-sensitive sites. As such, the Phase Two Property is not an environmentally sensitive area as defined by Section 41 of O. Reg. 153/04.

Applicability of Section 43.1 of O. Reg 153/04 – Shallow Soil Property and Proximity to a Water Body

Section 43.1 of O. Reg. 153/04 states that a property is classified as a "shallow soil property" if one-third or more of the area consists of soil less than 2 m in depth.

Bedrock was not encountered at any of the borehole locations, all of which were extended to depths below 2.0 mbgs. As such, the Phase Two Property is not a shallow soil property as defined by Section 43.1 of O. Reg. 153/04.

As per Section 43.1 of O. Reg. 153/04, the proximity of the Phase Two Property to a water body must be considered when selecting the appropriate Site Condition Standards.

The Phase Two Property does not include all or part of a water body, it is not adjacent to a water body and it does not include land within 30 m of a water body. As such, Site Condition Standards for use within 30 m of a water body were not applied.

Soil Imported to Phase Two Property

No soil was imported to the Phase Two Property during completion of the Phase Two ESA.

Proposed Buildings and Other Structures

Pinchin understands that the redevelopment of the Phase Two Property will include the construction of two, 6 to 16-storey buildings with underground parking. The buildings will be constructed adjacent to the north and south of South Village Way. The land use of the ground floor of the new buildings will be retail commercial, with the upper floors occupied by residential units. The final design of the redevelopment has not been finalized.

6.10.5 Applicable Site Condition Standards

Based on the information obtained from the Phase One and Two ESAs, the appropriate Site Condition Standards for the Phase Two Property are:

- "*Table 2: Full Depth Generic Site Condition Standards for Use in a Potable Ground Water Condition*", provided in the Ontario Ministry of the Environment, Conservation and Parks (MECP) document entitled, "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*" dated April 15, 2011 (*Table 2 Standards*) for:
  - Coarse-textured soils; and
  - Residential/parkland/institutional property use.

6.10.6 Contaminants Exceeding Applicable Site Condition Standards in Soil

All soil samples collected during the Phase Two ESA met the applicable *Table 2 Standards* for the parameters analyzed.

6.10.7 Contaminants Exceeding Applicable Site Condition Standards in Groundwater

Groundwater was not considered a potentially impacted media at the Phase Two Property and as such assessment of contaminants in groundwater was not completed as part of this Phase Two ESA.

6.10.8 Meteorological and Climatic Conditions

As noted above, monitoring wells were not installed as part of this Phase Two ESA. As such, Pinchin cannot comment on the effect of meteorological or climatic conditions on contaminant distribution and migration in the subsurface at the Phase Two Property.

6.10.9 Soil Vapour Intrusion

No volatile parameters were identified at concentrations exceeding the *Table 2 Standards*. As such, soil vapour intrusion into buildings at the Phase Two Property is not considered a concern.

6.10.10 Contaminant Exposure Assessment

Given that all soil collected during the Phase Two ESA met the applicable *Table 2 Standards*, Pinchin considered that an evaluation of potential exposure pathways and receptors was unnecessary.

6.10.11 Applicability of Section 49.1 Exemptions

The Phase Two Property has paved roadways, access routes and parking areas in the eastern portion. It is Pinchin's understanding that salt is applied to the paved areas for safety reasons during winter conditions to remove snow and ice, which represents a PCA; however, does not result in an APEC at the Phase Two Property. It is the opinion of the QP supervising the Phase Two ESA that, although salt-related parameters such as Sodium Adsorption Ratio and electrical conductivity in soil and sodium and chloride in groundwater may be present at concentrations exceeding the applicable Site Condition Standards, the exemption provided in Section 49.1 of O. Reg. 153/04 can been applied. As such, these parameters would be deemed to meet the Site Condition Standards and did not need to be assessed as part of this Phase Two ESA.

7.0 CONCLUSIONS

Pinchin completed a Phase Two ESA at the Phase Two Property in accordance with the requirements stipulated in O. Reg. 153/04 for the purpose of filing an RSC. The RSC is required by the Client in relation to the future redevelopment of the Phase Two Property from commercial to mixed commercial/residential land use.

The Phase Two ESA completed by Pinchin included the advancement of three boreholes at the Phase Two Property.

Based on Site-specific information, the applicable regulatory standards for the Phase Two Property were determined to be the *Table 2 Standards* for residential land use and coarse-textured soils. Soil samples were collected from each of the borehole locations and submitted for laboratory analysis of VOCs, PHCs, and PCBs.

The laboratory results for the submitted soil samples indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 2 Standards*. The maximum reported soil concentrations for the parameters analyzed are summarized in Table 4.

It is the opinion of the QP who supervised the Phase Two ESA that the applicable *Table 2 Standards* for soil at the Phase Two Property have been met as of the Certification Date of January 13, 2022 and that no further subsurface investigation is required in relation to assessing the environmental quality of soil at the Phase Two Property.

7.1 Signatures

This Phase Two ESA was undertaken under the supervision of Francesco Gagliardi, C.E.T., LET, QP_{ESA} in accordance with the requirements of O. Reg. 153/04 to support the filing of an RSC for the Phase Two Property.

7.2 Terms and Limitations

This Phase Two ESA was performed for North American Development Group (Client) in order to investigate potential environmental impacts at 109-129 Park Place Boulevard, Barrie, Ontario (Site). The term recognized environmental condition means the presence or likely presence of any hazardous substance on a property under conditions that indicate an existing release, past release, or a material threat of a release of a hazardous substance into structures on the property or into the ground, groundwater, or surface water of the property. This Phase Two ESA does not quantify the extent of the current and/or recognized environmental condition or the cost of any remediation.

Conclusions derived are specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples have been analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions on a property. Performance of this Phase Two ESA to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions on the Site, and recognizes reasonable limits on time and cost.

This Phase Two ESA was performed in general compliance with currently acceptable practices for environmental site investigations, and specific Client requests, as applicable to this Site.

This report was prepared for the exclusive use of the Client, subject to the terms, conditions and limitations contained within the duly authorized proposal for this project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

If additional parties require reliance on this report, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this report should not be construed as legal advice. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

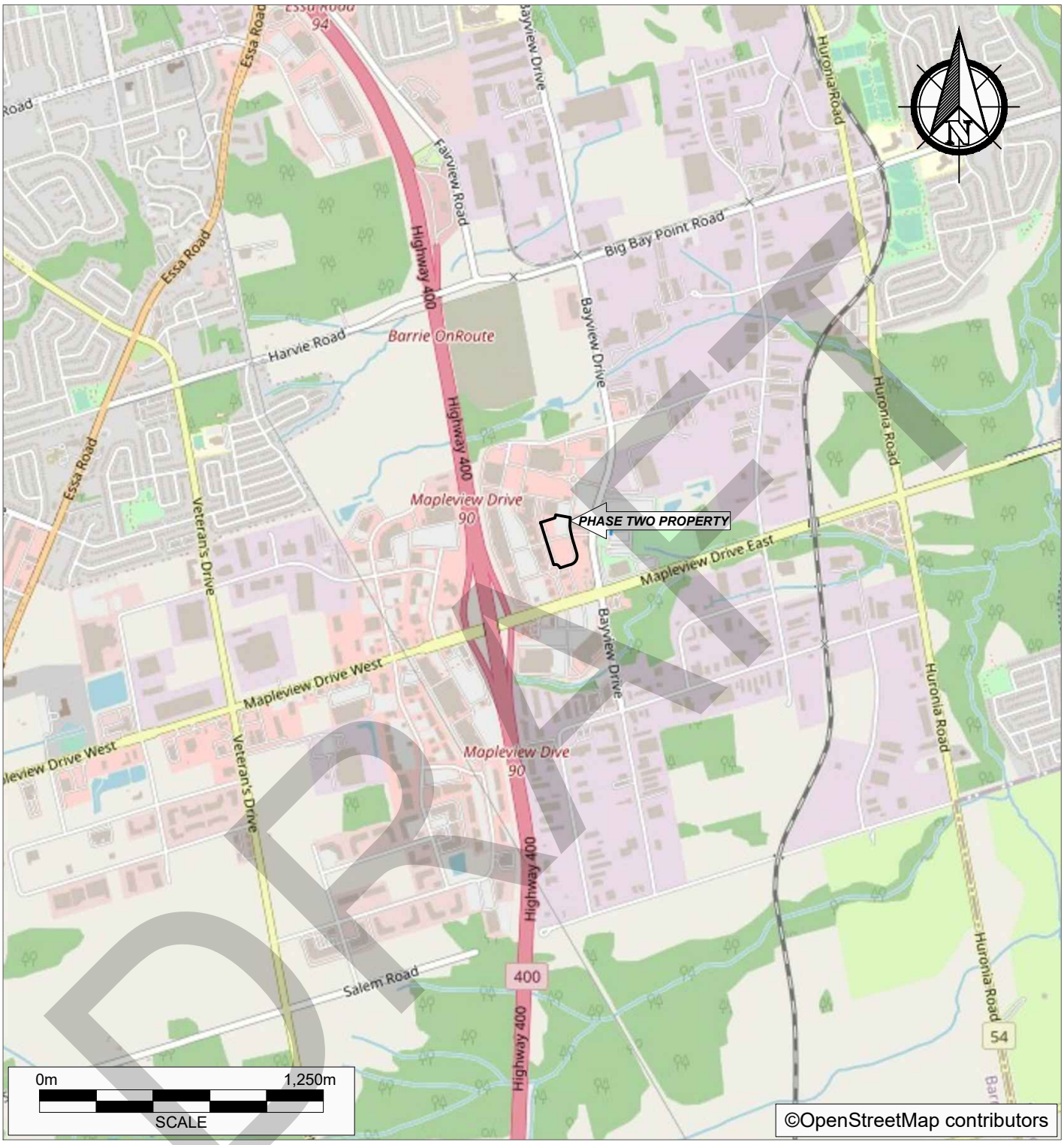
8.0 REFERENCES

The following documents provided information used in this report:

- Association of Professional Geoscientists of Ontario. Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended). April 2011.
- Modified Phase I Environmental Assessment Proposed Target Building Footprint Mapleview Drive East Barrie, Ontario. Prepared for Centrecorp Management Services, by Paterson Group (Paterson). February 5, 2010.
- North American Acquisition Corporation Geotechnical Investigation Proposed Park Place Development Molson Park Barrie, Ontario. Prepared for North American Acquisition Corporation, by JWL. May 27, 2003.
- Ontario Ministry of the Environment. Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario. December 1996.
- Ontario Ministry of the Environment. Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. March 9, 2004 amended July 1, 2011.
- Ontario Ministry of the Environment. Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. April 15, 2011.
- Phase I Environmental Assessment Proposed Target Building Footprint Mapleview Drive East Barrie, Ontario. Prepared for the Client, by Paterson. November 1, 2012.
- Phase I Environmental Assessment Update Park Place Commercial Development Mapleview Drive East Barrie, Ontario. Prepared for Park Place Master LP, by Paterson. November 3, 2015.
- Phase I Environmental Site Assessment Park Place Barrie 100 Mapleview Drive East, Barrie, Ontario. Prepared for the Client, by Pinchin. June 16, 2017.
- Phase I Environmental Site Assessment Park Place 30 North Village Way, Barrie, Ontario. Prepared for the Client, by Pinchin. March 8, 2021
- Phase II Subsurface Investigation Molson Park 100 Molson Park Drive, Barrie, Ontario. Prepared for Centrecorp Management Services Ltd., by Jacques, Whitford and Associates Limited (JWL). May 31, 2002.
- Phase One Environmental Site Assessment, 109-129 Park Place Boulevard, Barrie, Ontario. Prepared for the Client, by Pinchin. December 23, 2021.
- Province of Ontario. Environmental Protection Act, R.S.O 1990, Chapter E.19.

- Province of Ontario. R.R.O. 1990, Regulation 347, General – Waste Management, as amended by Ontario Regulation 234/11.
- Province of Ontario. Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act. Last amended by Ontario Regulation 274/20 on July 1, 2020.
- Tank Removal, Remedial Excavation and Limited Designated Substances Survey Molson Park 100 Molson Park Drive, Barrie, Ontario. Prepared for Molson Canada, by Terrapex Environmental Ltd. March 2001.
- Update Geotechnical Investigation Proposed Park Place Development (Formerly Molson Park). Prepared for North American, by JWL. July 18, 2008.

9.0 FIGURES AND TABLES



PINCHIN

PROJECT NAME: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT		
CLIENT NAME: NORTH AMERICAN DEVELOPMENT GROUP		
PROJECT LOCATION: 109-129 PARK PLACE BOULEVARD, BARRIE, ONTARIO		
FIGURE NAME: KEY MAP		FIGURE NO.: 1
SCALE: AS SHOWN	PROJECT NO.: 296908.003	DATE: FEB. 2022

N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- T PAD MOUNTED TRANSFORMER
- CB CATCHBASIN
- MH MANHOLE
- SITE BUILDING
- H HYDRO VAULT
- C COMMUNICATION LINE
- G NATURAL GAS LINE
- H HYDRO LINE
- STM STORM SEWER LINE

INFERRED GROUNDWATER FLOW DIRECTION

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

PINCHIN

PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD
BARRIE, ONTARIO

FIGURE NAME:
PHASE TWO PROPERTY

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY:	REVIEWED BY:
KP	AN
DATE:	FIGURE NUMBER:
FEBRUARY 2022	2

N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- PHASE ONE STUDY AREA BOUNDARY
- INDUSTRIAL/COMMERCIAL/ COMMUNITY LAND USE
- RESIDENTIAL/PARKLAND/ INSTITUTIONAL LAND USE
- MTC MULTI-TENANT COMMERCIAL
- COM COMMERCIAL
- RFO RETAIL FUEL OUTLET
- T PAD MOUNTED TRANSFORMER
- H HYDRO VAULT
- CURRENT OR FORMER UNDERGROUND STORAGE TANK

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

0m 150m
SCALE

INFERRED GROUNDWATER FLOW DIRECTION

PINCHIN

PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD BARRIE, ONTARIO

FIGURE NAME:
PHASE ONE STUDY AREA

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY:	REVIEWED BY:
KP	AN
DATE:	FIGURE NUMBER:
FEB. 2022	3

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Contributing to an APEC at the Site (Yes/No)	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-1	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	Yes	Soil
PCA-2	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	Yes	Soil
PCA-3	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	Yes	Soil
PCA-4	Eastern portion of the Phase One Property.	Other – Salt Application for De-icing Purposes	On-Site	No	Not Applicable
PCA-5	Western portion of Park Place commercial plaza.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-6	41 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-7	99 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-8	90 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-9	90 Mapleview Drive East.	Item 50 - Soap and Detergent Manufacturing, Processing and Bulk Storage	Off-Site	No	Not Applicable
PCA-10	149 Live Eight Way.	Other - Spill	Off-Site	No	Not Applicable
PCA-11	80 Park Place Boulevard.	Other - Hazardous Waste Generation	Off-Site	No	Not Applicable
PCA-12	Park Place commercial plaza.	Other - Hazardous Waste Generation	Off-Site	No	Not Applicable
PCA-13	149 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-14	120-130 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-15	80-100 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-16	79-99 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-17	159 Live Eight Way (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-18	129 Live Eight Way (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable

N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- PHASE ONE STUDY AREA BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- COM COMMERCIAL
- RFO RETAIL FUEL OUTLET
- T PAD MOUNTED TRANSFORMER
- H HYDRO VAULT
- APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN
- PCA POTENTIALLY CONTAMINATING ACTIVITY
- # PCA CONTRIBUTES TO AN APEC
- # PCA DOES NOT CONTRIBUTE TO AN APEC

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PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD
BARRIE, ONTARIO

FIGURE NAME:
POTENTIALLY CONTAMINATING ACTIVITIES

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY: KP	REVIEWED BY: AN
DATE: FEBRUARY 2022	FIGURE NUMBER: 4

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1 (hydro vault)	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-2 (pad-mounted oil-cooled electrical transformer)	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-3 (pad-mounted oil-cooled electrical transformer)	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil

N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- T PAD MOUNTED TRANSFORMER
- CATCHBASIN
- MANHOLE
- SITE BUILDING
- H HYDRO VAULT
- APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN
- APEC-1
- APEC-2
- APEC-3

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PINCHIN

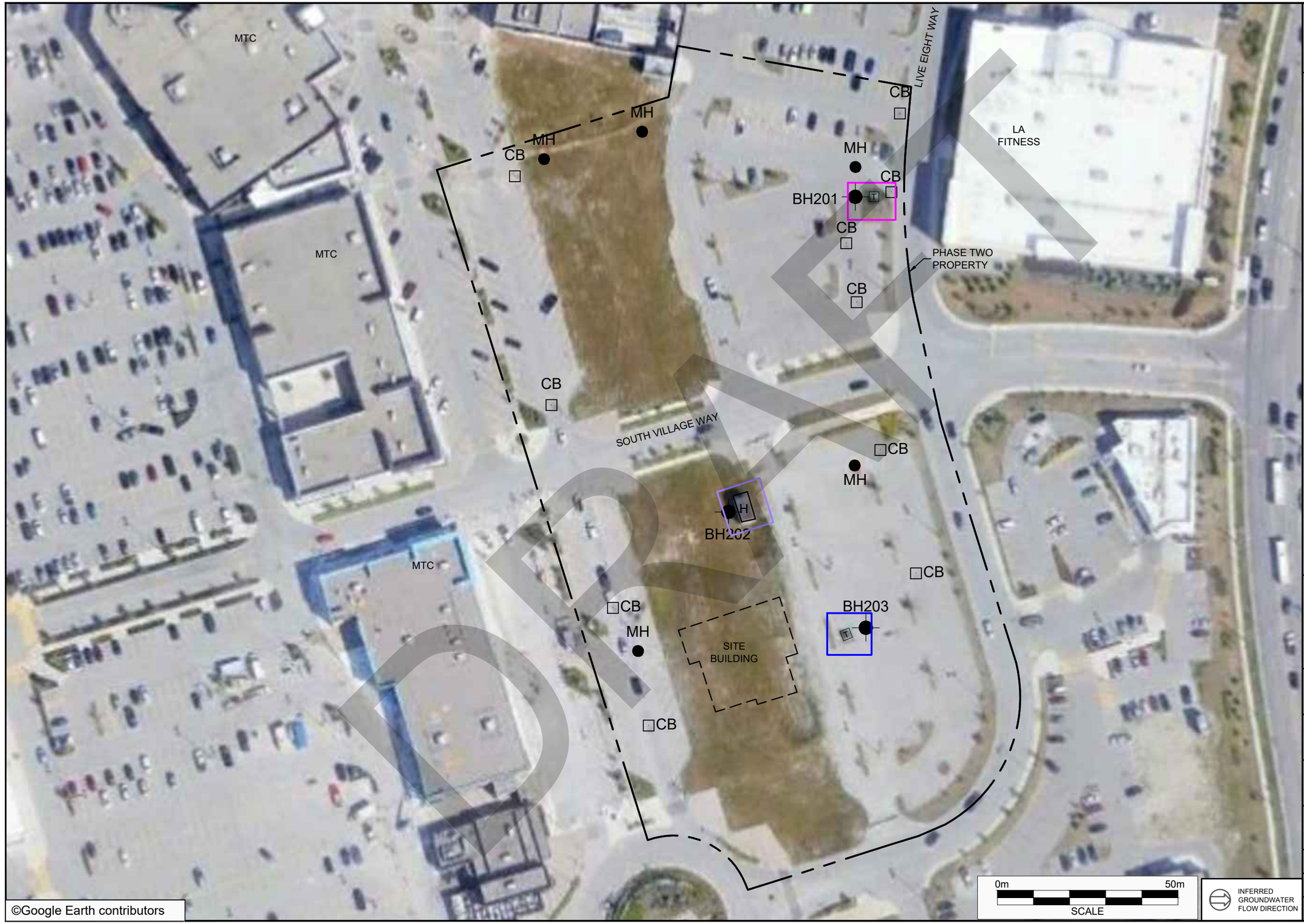
PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD
BARRIE, ONTARIO

FIGURE NAME:
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY: KP	REVIEWED BY: AN
DATE: FEBRUARY 2022	FIGURE NUMBER: 5



N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- T PAD MOUNTED TRANSFORMER
- CATCHBASIN
- MANHOLE
- SITE BUILDING
- H HYDRO VAULT
- T PAD MOUNTED TRANSFORMER
- BOREHOLE
- APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN
- APEC-1
- APEC-2
- APEC-3

LEGEND IS COLOUR DEPENDENT. NON-COLOUR COPIES MAY ALTER INTERPRETATION.

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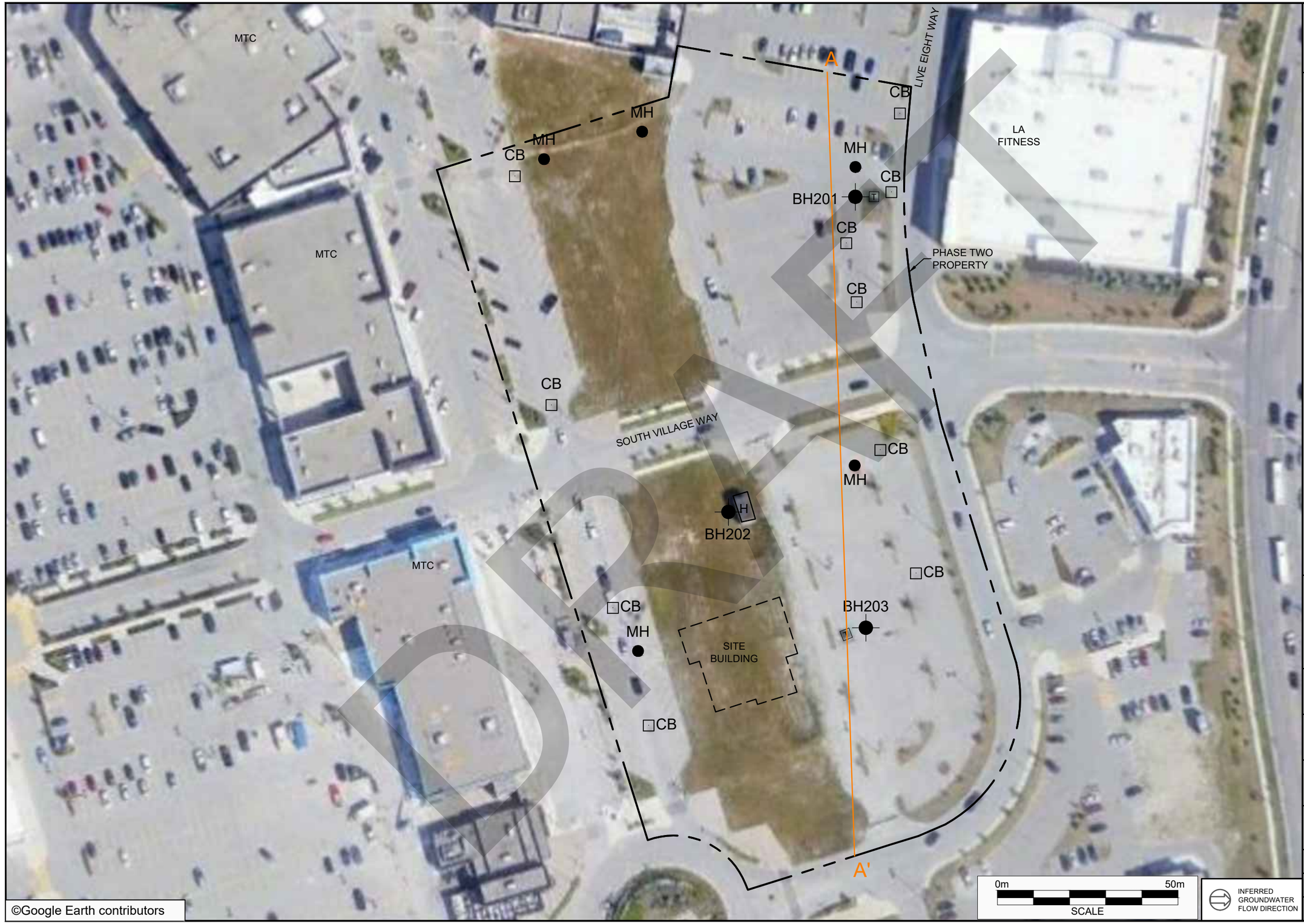
PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD BARRIE, ONTARIO

FIGURE NAME:
BOREHOLE LOCATION PLAN

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY: KP	REVIEWED BY: AN
DATE: FEBRUARY 2022	FIGURE NUMBER: 6



N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- T PAD MOUNTED TRANSFORMER
- CATCHBASIN
- MANHOLE
- SITE BUILDING
- H HYDRO VAULT
- T PAD MOUNTED TRANSFORMER
- BOREHOLE
- A A' CROSS-SECTION LINE

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PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD BARRIE, ONTARIO

FIGURE NAME:
CROSS-SECTION LINE

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY:	REVIEWED BY:
KP	AN
DATE:	FIGURE NUMBER:
FEBRUARY 2022	7A

NORTH

SOUTH

BH201

BH203

A

A'

GROUND ELEVATION (mamsl)

293.0

292.0

291.0

290.0

289.0

288.0

287.0

0.0

50.0

100.0

150.0

200.0

217.3m

DISTANCE (METRES)

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- A A' CROSS-SECTION LINE
- BOREHOLE
- ASPHALT
- SAND AND GRAVEL (AGGREGATE)
- SAND TO SILTY SAND
- GROUNDWATER FLOW DIRECTION
- MEETS SITE CONDITION STANDARD

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PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD
BARRIE, ONTARIO

FIGURE NAME:
CROSS-SECTION DETAILS
A-A'

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY: KP	REVIEWED BY: AN
DATE: FEBRUARY 2022	FIGURE NUMBER: 7B

Table 1 - Table of Areas of Potential Environmental Concern

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1 (hydro vault)	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-2 (pad-mounted oil-cooled electrical transformer)	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-3 (pad-mounted oil-cooled electrical transformer)	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil

Notes:

1 - Areas of potential environmental concern means the area on, in or under a phase one property where one or more contaminants are potentially present, as determined through the phase one environmental site assessment, including through,
(a) identification of past or present uses on, in or under the phase one property, and
(b) identification of potentially contaminating activity.

2 - Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D that is occurring or has occurred in a phase one study area

3 - When completing this column, identify all contaminants of potential concern using the Method Groups as identified in the Protocol for in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011, as specified below:

List of Method Groups:

ABNs	PCBs	Metals	Electrical Conductivity
CPs	PAHs	As, Sb, Se	Cr (VI)
1,4-Dioxane	THMs	Na	Hg
Dioxins/Furans, PCDDs/PCDFs	VOCs	B-HWS	Methyl Mercury
OCs	BTEX	Cl-	Low or high pH,
PHCs	Ca, Mg	CN-	SAR

4 - When submitting a record of site condition for filing, a copy of this table must be attached

Table 2 - Table of Potentially Contaminating Activities

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Distance from Phase One Property (metres)	Location Relative to Inferred Groundwater Flow Direction[1]	Contributing to an APEC at the Site (Yes/No)	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-1	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	NA – On-Site	NA - On-Site PCA	Yes	Soil
PCA-2	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	NA – On-Site	NA - On-Site PCA	Yes	Soil
PCA-3	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	NA – On-Site	NA - On-Site PCA	Yes	Soil
PCA-4	Eastern portion of the Phase One Property.	Other – Salt Application for De-icing Purposes	On-Site	NA – On-Site	NA - On-Site PCA	No	Not Applicable
PCA-5	Western portion of Park Place commercial plaza.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	180	Upgradient	No	Not Applicable
PCA-6	41 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	190	Transgradient	No	Not Applicable
PCA-7	99 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	200	Transgradient	No	Not Applicable
PCA-8	90 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	60	Transgradient	No	Not Applicable
PCA-9	90 Mapleview Drive East.	Item 50 - Soap and Detergent Manufacturing, Processing and Bulk Storage	Off-Site	>60	Transgradient	No	Not Applicable
PCA-10	149 Live Eight Way.	Other - Spill	Off-Site	>40	Transgradient	No	Not Applicable
PCA-11	80 Park Place Boulevard.	Other - Hazardous Waste Generation	Off-Site	100	Upgradient/Transgradient	No	Not Applicable
PCA-12	Park Place commercial plaza.	Other - Hazardous Waste Generation	Off-Site	>100	Upgradient/Transgradient	No	Not Applicable
PCA-13	149 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	70	Transgradient	No	Not Applicable
PCA-14	120-130 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	70	Transgradient	No	Not Applicable

PCA-15	80-100 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	130	Transgradient	No	Not Applicable
PCA-16	79-99 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	60	Transgradient	No	Not Applicable
PCA-17	159 Live Eight Way (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	20	Downgradient	No	Not Applicable
PCA-18	129 Live Eight Way (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	200	Transgradient	No	Not Applicable

Notes:

APEC – Area of Potential Environmental Concern

PCA – Potentially Contaminating Activity

1 – Location of PCA relative to the Phase One Property in relation to the inferred groundwater flow direction in the Phase One Study Area

TABLE 3
SOIL BULK ANALYTICAL RESULTS
North American Development Group
109-129 Park Place Boulevard, Barrie, Ontario

Sample Location	MECP Table 2 SCS (R/P/I-C)	BH201	BH201	BH201	BH201	BH201	BH202	BH202	BH203	BH203	BH203	-
Sample Designation		BH201 S1	DUP 1	BH201 S2	DUP 2	BH201 S5	BH202 S2	DUP 3	BH203 S1	BH203 S2	BH203 S5	Field Trip
Sample Collection Date (dd/mm/yyyy)		13/01/2022	13/01/2022	13/01/2022	13/01/2022	13/01/2022	13/01/2022	13/01/2022	13/01/2022	13/01/2022	13/01/2022	-
Laboratory Certificate No.		B22-01374	B22-01374	B22-01374	B22-01374	B22-01374	B22-01374	B22-01374	B22-01374	B22-01374	B22-01374	B22-01374
Date of Laboratory Analysis (dd/mm/yyyy-dd/mm/yyyy)		14/01/2022 - 18/01/2022	14/01/2022 - 18/01/2022	19/01/2022	19/01/2022	19/01/2022	14/01/2022 - 18/01/2022	19/01/2022	14/01/2022 - 18/01/2022	19/01/2022	19/01/2022	14/01/2022
Laboratory Sample No.		B22-01374-1	B22-01374-2	B22-01374-3	B22-01374-4	B22-01374-5	B22-01374-6	B22-01374-7	B22-01374-8	B22-01374-9	B22-01374-10	B22-01374-11
Sample Depth (mbgs)		0.1 - 0.8	0.1 - 0.8	0.8 - 1.5	0.8 - 1.5	3.1 - 3.8	0.9 - 1.5	3.1 - 3.8	0.1 - 0.8	0.8 - 1.5	3.1 - 3.8	
Miscellaneous Parameters												
pH (pH Units)	NV	-	-	8.08	7.90	8.24	-	7.80	-	7.69	7.58	-
Sieve #200 <0.075 mm (%)	NV	-	-	-	-	32	-	85	-	-	51	-
Sieve #200 >0.075 mm (%)	NV	-	-	-	-	68	-	15	-	-	49	-
Soil Texture	NV	-	-	-	-	COARSE	-	FINE	-	-	COARSE	-
Petroleum Hydrocarbons (PHCs)												
PHCs F1 (C_6 - C_{10})	55	< 10	< 10	-	-	-	< 10	-	< 10	-	-	< 10
PHCs F2 (>C_{10} - C_{16})	98	< 5	< 5	-	-	-	< 5	-	< 5	-	-	-
PHCs F3 (>C_{16} - C_{34})	300	146	240	-	-	-	< 10	-	280	-	-	-
PHCs F4 (>C_{34} - C_{50})	2800	273	453	-	-	-	< 10	-	505	-	-	-
PHCs F4 (>C_{50})	2800	1060	1250	-	-	-	-	-	1080	-	-	-
Volatile Organic Compounds												
Acetone	16	< 0.5	< 0.5	-	-	-	< 0.5	-	< 0.5	-	-	< 0.5
Benzene	0.21	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Bromodichloromethane	1.5	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Bromoform	0.27	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Bromomethane	0.05	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Carbon Tetrachloride	0.05	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Chlorobenzene	2.4	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Chloroform	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Dibromochloromethane	2.3	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,2-Dichlorobenzene	1.2	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
1,3-Dichlorobenzene	4.8	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
1,4-Dichlorobenzene	0.083	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Dichlorodifluoromethane	16	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
1,1-Dichloroethane	0.47	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,2-Dichloroethane	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,1-Dichloroethylene	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
cis-1,2-Dichloroethylene	1.9	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
trans-1,2-Dichloroethylene	0.084	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,2-Dichloropropane	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,3-Dichloropropene (Total)	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Ethylbenzene	1.1	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Ethylene Dibromide	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Hexane	2.8	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Methyl Ethyl Ketone	16	< 0.5	< 0.5	-	-	-	< 0.5	-	< 0.5	-	-	< 0.5
Methyl Isobutyl Ketone	1.7	< 0.5	< 0.5	-	-	-	< 0.5	-	< 0.5	-	-	< 0.5
Methyl t-Butyl Ether (MTBE)	0.75	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Methylene Chloride	0.1	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Styrene	0.7	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
1,1,1,2-Tetrachloroethane	0.058	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,1,2,2-Tetrachloroethane	0.05	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Tetrachloroethylene	0.28	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Toluene	2.3	< 0.2	< 0.2	-	-	-	< 0.2	-	< 0.2	-	-	< 0.2
1,1,1-Trichloroethane	0.38	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
1,1,2-Trichloroethane	0.05	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Trichloroethylene	0.061	< 0.05	< 0.05	-	-	-	< 0.05	-	< 0.05	-	-	< 0.05
Trichlorofluoromethane	4	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Vinyl Chloride	0.02	< 0.02	< 0.02	-	-	-	< 0.02	-	< 0.02	-	-	< 0.02
Xylenes (Total)	3.1	< 0.03	< 0.03	-	-	-	< 0.03	-	< 0.03	-	-	< 0.03
Polychlorinated Biphenyls (PCBs)												
PCBs (Total)	0.35	< 0.3	< 0.3	-	-	-	< 0.3	-	< 0.3	-	-	-

Notes:
MECP Table 2 SCS (R/P/I-C):

Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition, for Residential/Parkland/Institutional Property Use and Coarse-Textured Soils

BOLD	Exceeds SCS
BOLD	Reportable Detection Limit Exceeds SCS
Units	All units in micrograms per gram, unless otherwise noted
mbgs	metres below ground surface
NA	Not Applicable
NV	No Value

Input By: AN
Checked By: SP

TABLE 4
MAXIMUM CONCENTRATIONS IN SOIL
North American Development Group
109-129 Park Place Boulevard, Barrie, Ontario

Parameter	Maximum Concentration	MECP Table 2 SCS (R/P/I-C)	Sample Designation	Sample Location	Sample Depth (mbgs)
Petroleum Hydrocarbons (PHCs)					
PHCs F1 (C_6 - C_{10})	<10	55	Multiple Samples	Multiple Samples	Multiple Samples
PHCs F2 (>C_{10} - C_{16})	<5	98	Multiple Samples	Multiple Samples	Multiple Samples
PHCs F3 (>C_{16} - C_{34})	280	300	BH203 S1	BH203	0.1 - 0.8
PHCs F4 (>C_{34} - C_{50})	505	2800	BH203 S1	BH203	0.1 - 0.8
PHCs F4g (>C_{50})	1250	2800	DUP 1	BH201	0.1 - 0.8
Volatile Organic Compounds					
Acetone	<0.5	16	Multiple Samples	Multiple Samples	Multiple Samples
Benzene	<0.02	0.21	Multiple Samples	Multiple Samples	Multiple Samples
Bromodichloromethane	<0.02	1.5	Multiple Samples	Multiple Samples	Multiple Samples
Bromoform	<0.02	0.27	Multiple Samples	Multiple Samples	Multiple Samples
Bromomethane	<0.05	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Carbon Tetrachloride	<0.05	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Chlorobenzene	<0.02	2.4	Multiple Samples	Multiple Samples	Multiple Samples
Chloroform	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Dibromochloromethane	<0.02	2.3	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichlorobenzene	<0.05	1.2	Multiple Samples	Multiple Samples	Multiple Samples
1,3-Dichlorobenzene	<0.05	4.8	Multiple Samples	Multiple Samples	Multiple Samples
1,4-Dichlorobenzene	<0.05	0.083	Multiple Samples	Multiple Samples	Multiple Samples
Dichlorodifluoromethane	<0.05	16	Multiple Samples	Multiple Samples	Multiple Samples
1,1-Dichloroethane	<0.02	0.47	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichloroethane	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
1,1-Dichloroethylene	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
cis-1,2-Dichloroethylene	<0.02	1.9	Multiple Samples	Multiple Samples	Multiple Samples
trans-1,2-Dichloroethylene	<0.02	0.084	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichloropropane	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
1,3-Dichloropropene (Total)	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Ethylbenzene	<0.05	1.1	Multiple Samples	Multiple Samples	Multiple Samples
Ethylene Dibromide	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Hexane	<0.02	2.8	Multiple Samples	Multiple Samples	Multiple Samples
Methyl Ethyl Ketone	<0.5	16	Multiple Samples	Multiple Samples	Multiple Samples
Methyl Isobutyl Ketone	<0.5	1.7	Multiple Samples	Multiple Samples	Multiple Samples
Methyl t-Butyl Ether (MTBE)	<0.05	0.75	Multiple Samples	Multiple Samples	Multiple Samples
Methylene Chloride	<0.05	0.1	Multiple Samples	Multiple Samples	Multiple Samples
Styrene	<0.05	0.7	Multiple Samples	Multiple Samples	Multiple Samples
1,1,1,2-Tetrachloroethane	<0.02	0.058	Multiple Samples	Multiple Samples	Multiple Samples
1,1,2,2-Tetrachloroethane	<0.05	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Tetrachloroethylene	<0.05	0.28	Multiple Samples	Multiple Samples	Multiple Samples
Toluene	<0.2	2.3	Multiple Samples	Multiple Samples	Multiple Samples
1,1,1-Trichloroethane	<0.02	0.38	Multiple Samples	Multiple Samples	Multiple Samples
1,1,2-Trichloroethane	<0.02	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Trichloroethylene	<0.05	0.061	Multiple Samples	Multiple Samples	Multiple Samples
Trichlorofluoromethane	<0.02	4	Multiple Samples	Multiple Samples	Multiple Samples
Vinyl Chloride	<0.02	0.02	Multiple Samples	Multiple Samples	Multiple Samples
Xylenes (Total)	<0.03	3.1	Multiple Samples	Multiple Samples	Multiple Samples
Polychlorinated Biphenyls (PCBs)					
PCBs (Total)	<0.3	0.35	Multiple Samples	Multiple Samples	Multiple Samples

Notes:

Units	All units in micrograms per gram, unless otherwise noted
mbgs	metres below ground surface

10.0 APPENDICES

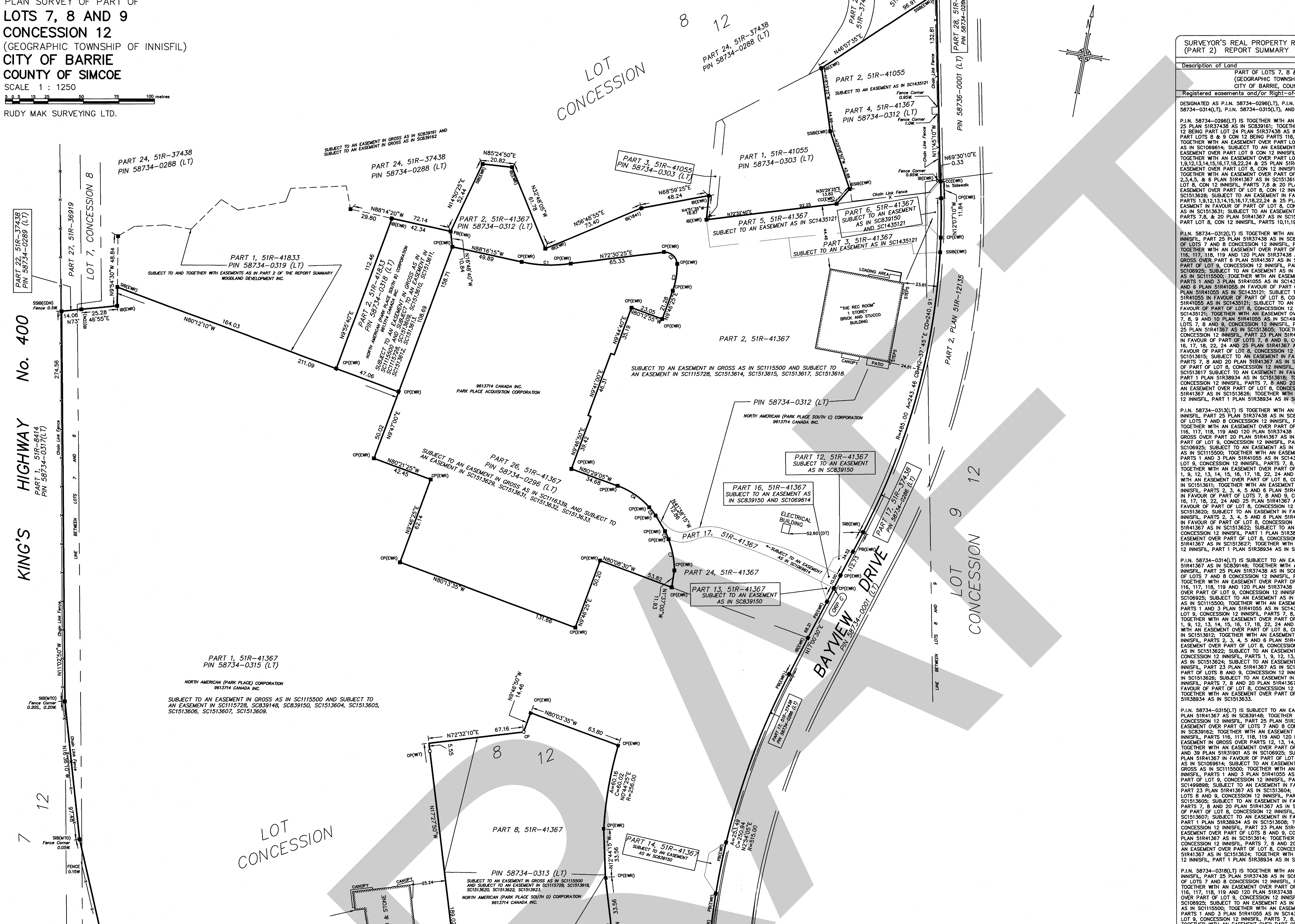
APPENDIX A

Legal Survey and Survey Data

SURVEYOR'S REAL PROPERTY REPORT
PART 1
PLAN SURVEY OF PART OF

LOTS 7, 8 AND 9
CONCESSION 12
(GEOGRAPHIC TOWNSHIP OF INNISFIL)
CITY OF BARRIE
COUNTY OF SIMCOE
SCALE 1 : 1250

RUDY MAK SURVEYING LTD.



SURVEYOR'S REAL PROPERTY REPORT
(PART 2) REPORT SUMMARY

Description of Land

PART OF LOTS 7, 8 & 9, CONCESSION 12
(GEOGRAPHIC TOWNSHIP OF INNISFIL)
CITY OF BARRIE, COUNTY OF SIMCOE

Registered easements and/or Right-of-Ways

DESIGNATED AS P.I.N. 58734-0296(LT), P.I.N. 58734-0312(LT), P.I.N. 58734-0313(LT), P.I.N. 58734-0314(LT), P.I.N. 58734-0315(LT), AND P.I.N. 58734-0318(LT).

P.I.N. 58734-0296(LT) IS TOGETHER WITH AN EASEMENT OVER PART LOT 8 CON 12 BEING PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART LOT 7 & 8 CON 12 BEING PART LOT 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART LOTS 8 & 9 CON 12 BEING PARTS 116,117,118,119 & 120 PLAN 51R37438 AS IN SC839164; TOGETHER WITH AN EASEMENT OVER PART LOT 8 CON 12 BEING PARTS 2 & 3 PLAN 51R38934 AS IN SC1069614; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1116339; TOGETHER WITH AN EASEMENT OVER PART LOT 9 CON 12 INNISFIL PARTS 7,8,9, & 10 51R41055 AS IN SC1499898; TOGETHER WITH AN EASEMENT OVER PART LOTS 7,8, & 9 CON 12 INNISFIL, PARTS 1,9,12,13,14,15,16,17,18,22,24 & 25 PLAN 51R41367 AS IN SC1513608; TOGETHER WITH AN EASEMENT OVER PART LOT 8, CON 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513613; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2,3,4,5, & 6 PLAN 51R41367 AS IN SC1513618; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CON 12 INNISFIL, PARTS 7,8 & 20 PLAN 51R41367 AS IN SC1513623; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CON 12 INNISFIL, PARTS 10,11,19, & 21 PLAN 51R41367 AS IN SC1513628; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 7,8, & 9, CON 12 INNISFIL, PARTS 1,9,12,13,14,15,16,17,18,22,24 & 25 PLAN 51R41367 AS IN SC1513629; SUBJECT TO AN EASMENT IN FAVOUR OF PART OF LOT 8, CON 12 INNISFIL, PARTS 2,3,4,5 & 6 PLAN 51R41367 AS IN SC1513631; SUBJECT TO AN EASEMENT IN FAVOUR OF PART LOT 8, CON 12 INNISFIL, PARTS 7,8, & 20 PLAN 51R41367 AS IN SC1513632; SUBJECT TO AN EASEMENT IN FAVOUR OF PART LOT 8, CON 12 INNISFIL, PARTS 10,11,19 & 21 PLAN 51R41367 AS IN SC1513633.

P.I.N. 58734-0312(LT) IS TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7 AND 8 CONCESSION 12 INNISFIL, PART 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 116, 117, 118, 119 AND 120 PLAN 51R37438 AS IN SC839164; SUBJECT TO AN EASEMENT IN GROSS OVER PART 6 PLAN 51R41367 AS IN SC839150; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 26, 27, 30 AND 39 PLAN 51R31901 AS IN SC106925; SUBJECT TO AN EASEMENT AS IN SC1115728; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1115500; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; SUBJECT TO AN EASEMENT OVER PARTS 4 AND 6 PLAN 51R41055 IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; SUBJECT TO AN EASEMENT OVER PARTS 4, 5 AND 6 PLAN 51R41055 IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; SUBJECT TO AN EASEMENT OVER PART 2 PLAN 51R41055 IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 7, 8, 9 AND 10 PLAN 51R41055 AS IN SC1499898; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513605; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513610; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513614; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513615; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513616; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513617 SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513618; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513621; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513626; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513631.

P.I.N. 58734-0313(LT) IS TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7 AND 8 CONCESSION 12 INNISFIL, PART 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 116, 117, 118, 119 AND 120 PLAN 51R37438 AS IN SC839164; SUBJECT TO AN EASEMENT IN GROSS OVER PART 20 PLAN 51R41367 AS IN SC839148 TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 26, 27, 30 AND 39 PLAN 51R31901 AS IN SC106925; SUBJECT TO AN EASEMENT AS IN SC1115728; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1115500; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 7, 8, 9 AND 10 PLAN 51R41055 AS IN SC1499898; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513606; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513611; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513616; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513619; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513620; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513621; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513622; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513623; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513627; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513632.

P.I.N. 58734-0314(LT) IS SUBJECT TO AN EASEMENT IN GROSS OVER PARTS 19 AND 21 PLAN 51R41367 AS IN SC839148; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7 AND 8 CONCESSION 12 INNISFIL, PART 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 116, 117, 118, 119 AND 120 PLAN 51R37438 AS IN SC839164; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 26, 27, 30 AND 39 PLAN 51R31901 AS IN SC106925; SUBJECT TO AN EASEMENT AS IN SC1115728; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1115500; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 7, 8, 9 AND 10 PLAN 51R41055 AS IN SC1499898; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513607; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513612; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513617; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513622; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513624; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513625; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513626; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513627; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513628; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513633.

P.I.N. 58734-0315(LT) IS SUBJECT TO AN EASEMENT IN GROSS OVER PARTS 18, 22 AND 25 PLAN 51R41367 AS IN SC839148; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7 AND 8 CONCESSION 12 INNISFIL, PART 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 116, 117, 118, 119 AND 120 PLAN 51R37438 AS IN SC839164; SUBJECT TO AN EASEMENT IN GROSS OVER PARTS 12, 13, 14, 15 AND 16 PLAN 51R41367 AS IN SC839150; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 26, 27, 30 AND 39 PLAN 51R31901 AS IN SC106925; SUBJECT TO AN EASEMENT OVER PARTS 16 AND 17 PLAN 51R41367 IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1069614; SUBJECT TO AN EASEMENT AS IN SC1115728 SUBJECT TO AN EASEMENT IN GROSS AS IN SC1115500; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 7, 8, 9 AND 10 PLAN 51R41055 AS IN SC1499898; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513604; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513605; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513606; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513607; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513608; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 23 PLAN 51R41367 AS IN SC1513609; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513614; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513619; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513624; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513629.

P.I.N. 58734-0318(LT) IS TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7 AND 8 CONCESSION 12 INNISFIL, PART 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 116, 117, 118, 119 AND 120 PLAN 51R37438 AS IN SC839164; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 26, 27, 30 AND 39 PLAN 51R31901 AS IN SC106925; SUBJECT TO AN EASEMENT AS IN SC1115728; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1115500; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 7, 8, 9 AND 10 PLAN 51R41055 AS IN SC1499898; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513604; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513609; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513610; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513611; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513612; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513613; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513615; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513620; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513625; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513630.

P.I.N. 58734-0319(LT) IS TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 25 PLAN 51R37438 AS IN SC839161; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7 AND 8 CONCESSION 12 INNISFIL, PART 24 PLAN 51R37438 AS IN SC839162; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 116, 117, 118, 119 AND 120 PLAN 51R37438 AS IN SC839164; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 26, 27, 30 AND 39 PLAN 51R31901 AS IN SC106925; SUBJECT TO AN EASEMENT AS IN SC1115728; SUBJECT TO AN EASEMENT IN GROSS AS IN SC1115500; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 1 AND 3 PLAN 51R41055 AS IN SC1435121; TOGETHER WITH AN EASEMENT OVER PART OF LOT 9, CONCESSION 12 INNISFIL, PARTS 7, 8, 9 AND 10 PLAN 51R41055 AS IN SC1499898; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513604; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 7, 8 AND 9, CONCESSION 12 INNISFIL, PARTS 1, 9, 12, 13, 14, 15, 16, 17, 18, 22, 24 AND 25 PLAN 51R41367 AS IN SC1513609; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513610; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513611; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513612; SUBJECT TO AN EASEMENT IN FAVOUR OF PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513613; TOGETHER WITH AN EASEMENT OVER PART OF LOTS 8 AND 9, CONCESSION 12 INNISFIL, PARTS 2, 3, 4, 5 AND 6 PLAN 51R41367 AS IN SC1513615; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 7, 8 AND 20 PLAN 51R41367 AS IN SC1513620; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PARTS 10, 11, 19 AND 21 PLAN 51R41367 AS IN SC1513625; TOGETHER WITH AN EASEMENT OVER PART OF LOT 8, CONCESSION 12 INNISFIL, PART 1 PLAN 51R38934 AS IN SC1513630.

NOTE:
EASEMENTS AND FURTHER RESTRICTIONS ON ANY OR ALL OF THE PARCEL MAY BE FOUND IN THE ORIGINAL CROWN PATENT, ZONING BY-LAWS, OFFICIAL PLANS, SUBDIVISION AGREEMENTS, DEVELOPMENT AGREEMENTS ETC., AND THIS SURVEY AND PLAN HAS NOT SEARCHED FOR THESE RESTRICTIONS, NOR DO WE ACCEPT ANY LIABILITY WITH RESPECT TO ANY OF THESE ELEMENTS.

Boundary Issues

NONE.

Compliance with Municipal Zoning By-Laws

Not certified by this Report.

Additional Remarks

NOTE LOCATION OF FENCES

LEGEND

- ■ DENOTES FOUND MONUMENT
- □ DENOTES PLANTED MONUMENT
- IB DENOTES IRON BAR
- SIB DENOTES STANDARD IRON BAR
- SSIB DENOTES SHORT STANDARD IRON BAR
- PB DENOTES PLASTIC BAR
- CP DENOTES CONCRETE PIN
- 1841 DENOTES RAIKES SURVEYING LTD
- P1 DENOTES PLAN 51R-37438
- CDN DENOTES CDN LAND SURVEYORS INC.
- MTO DENOTES MINISTRY OF TRANSPORTATION AND COMMUNICATION OF ONTARIO
- EWR DENOTES EPLETT WOROBEC RAIKES SURVEYING LTD.
- DT DENOTES DIRECT TIE
- WIT DENOTES WITNESS
- -X-X- DENOTES CHAIN LINK FENCE

METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

BEARING NOTE
BEARINGS HEREON ARE UTM GRID BEARINGS AND ARE DERIVED FROM SPECIFIED CONTROL POINTS 00119673109 AND 03120080027 REFERRED TO THE CENTRAL MERIDIAN (81° OF LONGITUDE) IN ZONE 17 BASED ON NAD 83.

DISTANCE NOTE
DISTANCES SHOWN ON THIS PLAN ARE HORIZONTAL GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999694.

THIS REPORT WAS PREPARED FOR:
NORTH AMERICAN (PARK PLACE) CORP.
NORTH AMERICAN (PARK PLACE SOUTH B) CORP.
NORTH AMERICAN (PARK PLACE SOUTH C) CORP.
NORTH AMERICAN (PARK PLACE SOUTH D) CORP.
NORTH AMERICAN (PARK PLACE SOUTH E) CORP.
PARK PLACE ACQUISITION CORP.
9613714 CANADA INC

AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR USE BY OTHER PARTIES.

SPECIFIED CONTROL POINTS(SCPs) UTM ZONE 17
NAD 83 ORIGINAL
COORDINATES TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG 216/10

UTM NAD 83 ORIGINAL COORDINATE TABLE		
SCP#00119673109	4915700.13	604482.06
SCP#03120080027	4917932.87	602243.44
ORP A	4910031.01	604961.87
ORP B	4910153.80	605305.44
ORP C	4910582.70	605318.96

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

CURVE DATA

NUM	ARC	RADIUS	BEARING	CHORD
C1	34.81	94.25	N81°08'55"E	34.61
C2	15.09	9.00	N59°30'25"W	13.38
C3	18.54	50.00	N 0°51'05"W	18.44
C4	27.16	55.00	N66°25'30"W	26.88
C5	7.32	55.00	N48°28'05"W	7.31
C6	6.06	65.00	N33°47'50"W	6.06
C7	22.67	65.00	N21°08'05"W	22.55
C8	32.84	22.55	N65°11'10"W	30.01
C9	7.70	40.00	N67°01'00"E	7.69
C10	26.77	40.00	N42°19'25"E	26.28
C11	10.08	40.00	N15°55'50"E	10.05
C12	15.90	40.00	N 2°40'35"W	15.80
C13	1.25	22.25	N21°53'30"W	1.25

SURVEYOR'S CERTIFICATE
I CERTIFY THAT:
1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2) THE SURVEY WAS COMPLETED ON THE 13TH DAY OF AUGUST, 2021.

AUGUST 18, 2021
DATE

RUDY MAK
ONTARIO LAND SURVEYOR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2172802

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3).

RUDY MAK SURVEYING LTD.
ONTARIO LAND SURVEYORS
89 BIG BAY POINT ROAD
BARRIE, ONTARIO L4N 8M5 (705) 722-3845
E-MAIL MAIL@MAKSURVEYING.COM

DRAWN BY: GM	CHECK BY: RM	FILE No. 14909

APPENDIX B

Sampling and Analysis Plan

Sampling and Analysis Plan for Phase Two Environmental Site Assessment

109-129 Park Place Boulevard
Barrie, Ontario

Prepared for:

North American Development Group
2851 John Street, Suite One
Markham, ON L3R 5R7

Attn: Marisa Kay
Coordinator, Development Service

January 25, 2022

Pinchin File: 296908.003

Issued To:	**North American Development Group**
Contact:	**Marisa Kay** **Coordinator, Development Service**
Issued On:	**January 25, 2022**
Pinchin File:	**296908.003**
Issuing Office:	**Mississauga, ON**
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APPENDICES

FIGURES

TABLES

1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) has prepared this Sampling and Analysis Plan (SAP) for the Phase Two Environmental Site Assessment (ESA) to be performed at the property located at 109-129 Park Place Boulevard in Barrie, Ontario (the Site or Phase Two Property). The Phase Two Property is presently developed with a two-storey commercial building (Site Building) and is part of the larger 'Park Place' commercial plaza. A Key Map showing the Phase Two Property location is provided on Figure 1 (all Figures are located in Appendix I).

The Phase Two ESA will be conducted at the request of North American Development Group (the Client) in relation to the future redevelopment of the Phase Two Property from commercial to residential land use. A Record of Site Condition (RSC) submittal to the Ontario Ministry of the Environment, Conservation and Parks (MECP) is a mandatory requirement when a land use changes to a more sensitive land use and as such, to support the RSC submission, the Phase Two ESA will be conducted in accordance with the Province of Ontario's *Ontario Regulation 153/04: Records of Site Condition – Part XV.1 of the Act*, as amended (O. Reg. 153/04).

This SAP provides the scope of work and procedures for completing the field investigation for the Phase Two ESA. The Phase Two ESA will be performed in accordance with the scope of work, and terms and conditions described in the proposal entitled *"Proposal for Environmental, Geotechnical and Hydrogeological Services"*, prepared for the Client, dated August 5, 2021.

2.0 AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

The objectives of the Phase Two ESA will be to assess soil quality at the Phase Two Property in relation to three areas of potential environmental concern (APECs) and related potentially contaminating activities (PCAs) and contaminants of potential concern (COPCs) identified in a Phase One ESA completed by Pinchin in accordance with O. Reg. 153/04, the findings of which are provided in the draft report entitled "*Phase One Environmental Site Assessment Report, 109-129 Park Place Boulevard, Barrie, Ontario",* prepared for the Client. The APECs and corresponding PCAs and COPCs are summarized in Table 1 (all Tables are located in Appendix II) and shown on Figures 2 and 3.

3.0 SCOPE OF WORK

The information obtained from the Phase One ESA, in particular the Phase One Conceptual Site Model, was used to determine the environmental media requiring investigation during the Phase Two ESA (i.e., soil), the locations and depths for sample collection, and the parameters to be analyzed for the samples submitted from each APEC. The Phase Two ESA scope of work will include the advancement of three boreholes. The proposed borehole locations are provided on Figure 4.

Table 2 in Appendix II provides a detailed summary of the proposed Phase Two ESA scope of work, including:

- Boreholes to be completed within each APEC and the COPCs to be analyzed for samples collected in each APEC.
- Media to be sampled at each sampling location, the sampling system (see Section 7.0), the soil sampling depth intervals and the sampling frequency.
- Number of samples per borehole to be collected and submitted for laboratory analysis.

Note that the soil sampling depth intervals (i.e., borehole depths) and sampling frequency are based on Pinchin's current knowledge of subsurface conditions and may be revised based on the actual subsurface conditions encountered.

Additional scope of work items include the following:

- Submission of up to two surface soil samples (0 to 1.5 mbgs) and up to two subsurface soil samples (deeper than 1.5 mbgs) for pH analysis.
- Submission of up to two soil samples for grain size analysis.
- Elevation surveying of the ground surface elevations of all borehole locations.

4.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) for the Phase Two ESA will be to obtain unbiased analytical data that are representative of actual soil conditions at the Phase Two Property. This will be accomplished by implementing a quality assurance/quality control (QA/QC) program, as described in Section 5.0, and by completing the field work in accordance with Pinchin's standard operating procedures (SOPs), as described in Section 6.0. Pinchin's SOPs are based in part on the MECP's *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated December 1996 and the Professional Geoscientists of Ontario document entitled *"Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)"*, dated April 2011.

The DQOs are intended to minimize uncertainty in the analytical data set such that the data are considered reliable enough to not affect the conclusions and recommendations of the Phase Two ESA and to meet the overall objective of the Phase Two ESA, which is to assess the environmental quality of the Phase Two Property in relation to the identified APECs.

5.0 QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

5.1 Non-Dedicated Sampling and Monitoring Equipment Cleaning

Based on the proposed scope of work, the non-dedicated sampling and monitoring equipment such as a spatula for soil sampling will be used during completion of the Phase Two ESA.

The equipment will be cleaned prior to initial use and between samples or sampling locations, as appropriate, following the equipment cleaning procedures described in SOP-EDR009. Any non-dedicated sampling or monitoring equipment not listed above that is used during the Phase Two ESA will also be cleaned in accordance with SOP-EDR009.

5.2 Trip Blanks

A trip blank is a set of VOC sample vials provided by the analytical laboratory and shipped with the sample containers. Trip blanks will be stored with the sample containers provided by the analytical laboratory during travel to the Phase Two Property, while on the Phase Two Property, and during travel from the Phase Two Property back to the analytical laboratory. The sample containers comprising a trip blank will not be opened in the field.

Groundwater sampling is not being undertaken during the Phase Two ESA and as such, submission and analysis of groundwater trip blanks is not required. A trip blank will accompany the soil sample containers.

One trip blank will accompany each submission to the laboratory. Each trip blank will be submitted for analysis of BTEX. Based on the scope of work and anticipated field work schedule for the Phase Two ESA, it is estimated that analysis of one trip blank will be required. Additional trip blanks will be submitted if there are additional laboratory submissions.

5.3 Field Duplicate Samples

Field duplicate soil samples will be collected for laboratory analysis in accordance with SOP-EDR025 at a frequency of one sample for every ten samples submitted for laboratory analysis, with a minimum of one sample per media sampled per COPC.

5.4 Calibration Checks on Field Instruments

5.4.1 Field Screening Instruments

The photoionization detector (PID) and combustible gas indicator (CGI) used for the field screening of soil samples will be calibrated in accordance with the procedures described in SOP-EDR003. Calibration checks will also be made at the frequency specified in SOP-EDR003.

Records of the calibration and calibration checks of the PID and CGI, including any calibration sheets provided by the equipment supplier, will be retained in Pinchin's project file.

5.4.2 Water Quality Measurement Instruments

The Phase Two ESA scope of work will not include groundwater sampling and the calibration of water quality measurement instruments is not required.

6.0 STANDARD OPERATING PROCEDURES

The proposed field investigation for the Phase Two ESA will require the following SOPs to be followed:

- Borehole drilling (SOP-EDR006).
- Soil sampling (SOP-EDR013 and SOP-EDR019).
- Field screening (SOP-EDR003).
- QA/QC sampling (SOP-EDR025).
- Non-dedicated field equipment decontamination (SOP-EDR009).
- Vertical elevation surveying (SOP-EDR026).

The above-referenced SOPs are provided in Appendix III. Each SOP includes a section describing the specific requirements for Phase Two ESAs completed to support the filing of an RSC in accordance with O. Reg. 153/04.

Any deviations from the SOPs will be summarized in the Phase Two ESA report.

7.0 SAMPLING SYSTEM

The borehole locations in all APECs will be selected following a judgemental sampling system. Boreholes will be placed at locations where the potential for COPCs to be present is considered the highest (i.e., “worst case”), as per the following:

- A borehole will be placed at the nearest safe distance to the hydro vault located in the central portion of the Phase Two Property (APEC-1).
- A borehole will be placed at the nearest safe distance to an electrical transformer located in the south-central portion of the Phase Two Property (APEC-2).
- A borehole will be placed at the nearest safe distance to an electrical transformer located in the northeastern portion of the Phase Two Property (APEC-3).

In addition, the field screening results for soil samples collected from each borehole will be used to select “worst case” samples for laboratory analysis.

The sampling system that will be used for each APEC is summarized in Table 2.

8.0 PHYSICAL IMPEDIMENTS

Pinchin does not anticipate any physical impediments that will limit access to the Phase Two Property during completion of the Phase Two ESA.

9.0 TERMS AND LIMITATIONS

This Sampling and Analysis Plan (SAP) has been prepared to summarize the general scope of work and field procedures to be followed for the Phase Two ESA that will be performed for North American Development Group (Client) in order to investigate potential environmental impacts at 109-129 Park Place Boulevard in Barrie, Ontario (Site). The term recognized environmental condition means the presence or likely presence of any hazardous substance on a property under conditions that indicate an existing release, past release, or a material threat of a release of a hazardous substance into structures on the property or into the ground, groundwater, or surface water of the property. The Phase Two ESA will not quantify the extent of the current and/or recognized environmental condition or the cost of any remediation.

Conclusions derived from the Phase Two ESA will be specific to the immediate area of study and cannot be extrapolated extensively away from sample locations. Samples will be analyzed for a limited number of contaminants that are expected to be present at the Site, and the absence of information relating to a specific contaminant does not indicate that it is not present.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions on a property. Performance of the Phase Two ESA to the standards established by Pinchin is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions on the Site, and recognizes reasonable limits on time and cost.

The Phase Two ESA will be performed in general compliance with currently acceptable practices for environmental site investigations, and specific Client requests, as applicable to this Site.

This SAP was prepared for the exclusive use of the Client, subject to the terms, conditions and limitations contained within the duly authorized proposal for this project. Any use which a third party makes of this SAP, or any reliance on or decisions to be made based on it, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

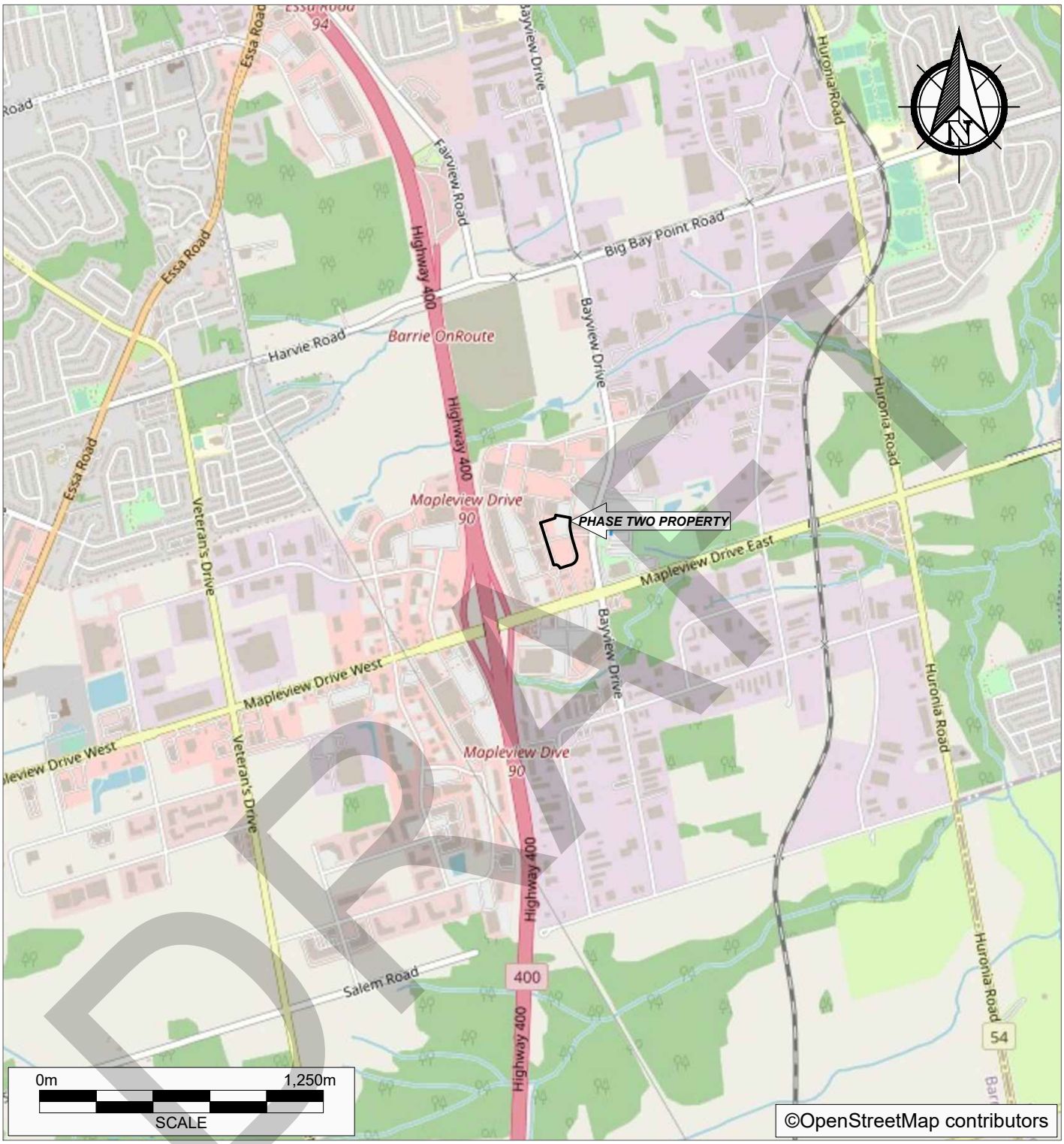
If additional parties require reliance on this SAP, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No other warranties are implied or expressed. Furthermore, this SAP should not be construed as legal advice. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this SAP, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

296908.003 RSC Phase Two ESA SAP 109-129 Park Place Boulevard Barrie ON Jan 25 2022.docx

Template: RSC Sampling and Analysis Plan, EDR, January 17, 2020

APPENDIX I
Figures



PINCHIN

PROJECT NAME	PHASE TWO ENVIRONMENTAL SITE ASSESSMENT - SAMPLING AND ANALYSIS PLAN		
CLIENT NAME	NORTH AMERICAN DEVELOPMENT GROUP		
PROJECT LOCATION	109-129 PARK PLACE BOULEVARD, BARRIE, ONTARIO		
FIGURE NAME	KEY MAP		FIGURE NO. 1
SCALE	AS SHOWN	PROJECT NO. 296908.003	DATE DECEMBER 2021

PCA Designation	Location of Potentially Contaminating Activity	Potentially Contaminating Activity	Location of PCA (On-Site or Off-Site)	Contributing to an APEC at the Site (Yes/No)	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
PCA-1	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	Yes	Soil
PCA-2	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	Yes	Soil
PCA-3	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	Yes	Soil
PCA-4	Eastern portion of the Phase One Property.	Other – Salt Application for De-icing Purposes	On-Site	No	Not Applicable
PCA-5	Western portion of Park Place commercial plaza.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-6	41 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-7	99 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-8	90 Mapleview Drive East.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	No	Not Applicable
PCA-9	90 Mapleview Drive East.	Item 50 - Soap and Detergent Manufacturing, Processing and Bulk Storage	Off-Site	No	Not Applicable
PCA-10	149 Live Eight Way.	Other - Spill	Off-Site	No	Not Applicable
PCA-11	80 Park Place Boulevard.	Other - Hazardous Waste Generation	Off-Site	No	Not Applicable
PCA-12	Park Place commercial plaza.	Other - Hazardous Waste Generation	Off-Site	No	Not Applicable
PCA-13	149 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-14	120-130 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-15	80-100 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-16	79-99 Park Place Boulevard (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-17	159 Live Eight Way (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable
PCA-18	129 Live Eight Way (approximate).	Item 55 - Transformer Manufacturing, Processing and Use	Off-Site	No	Not Applicable

N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- PHASE ONE STUDY AREA BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- COM COMMERCIAL
- RFO RETAIL FUEL OUTLET
- T PAD MOUNTED TRANSFORMER
- H HYDRO VAULT
- APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN
- PCA POTENTIALLY CONTAMINATING ACTIVITY
- # PCA CONTRIBUTES TO AN APEC
- # PCA DOES NOT CONTRIBUTE TO AN APEC

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PINCHIN

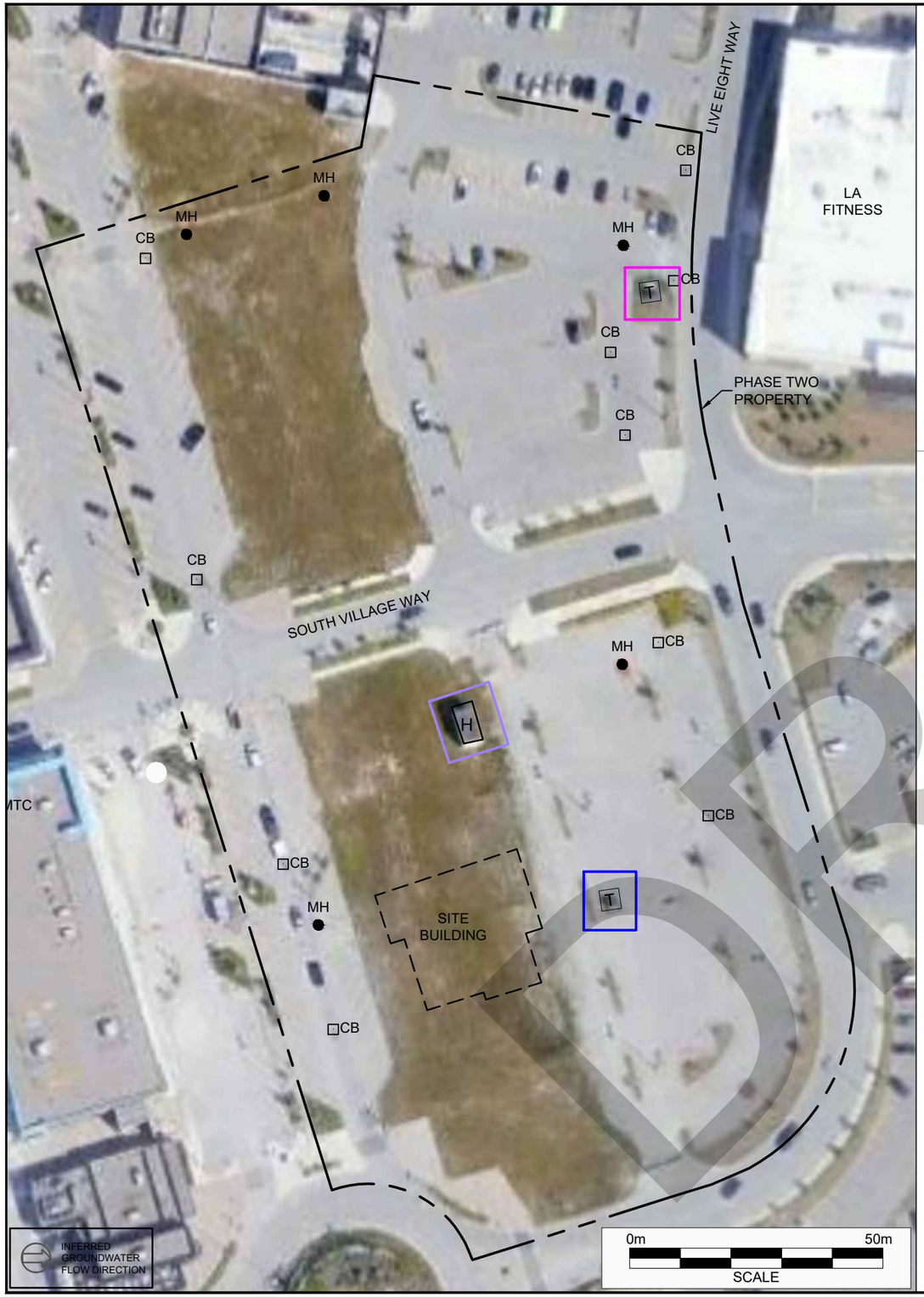
PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT - SAMPLING AND ANALYSIS PLAN

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD
BARRIE, ONTARIO

FIGURE NAME:
POTENTIALLY CONTAMINATING ACTIVITIES

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY: KP	REVIEWED BY: AN
DATE: DECEMBER 2021	FIGURE NUMBER: 2



Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1 (hydro vault)	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-2 (pad-mounted oil-cooled electrical transformer)	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-3 (pad-mounted oil-cooled electrical transformer)	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil

N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- T PAD MOUNTED TRANSFORMER
- CATCHBASIN
- MANHOLE
- SITE BUILDING
- H HYDRO VAULT
- APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN
- APEC-1
- APEC-2
- APEC-3

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PINCHIN

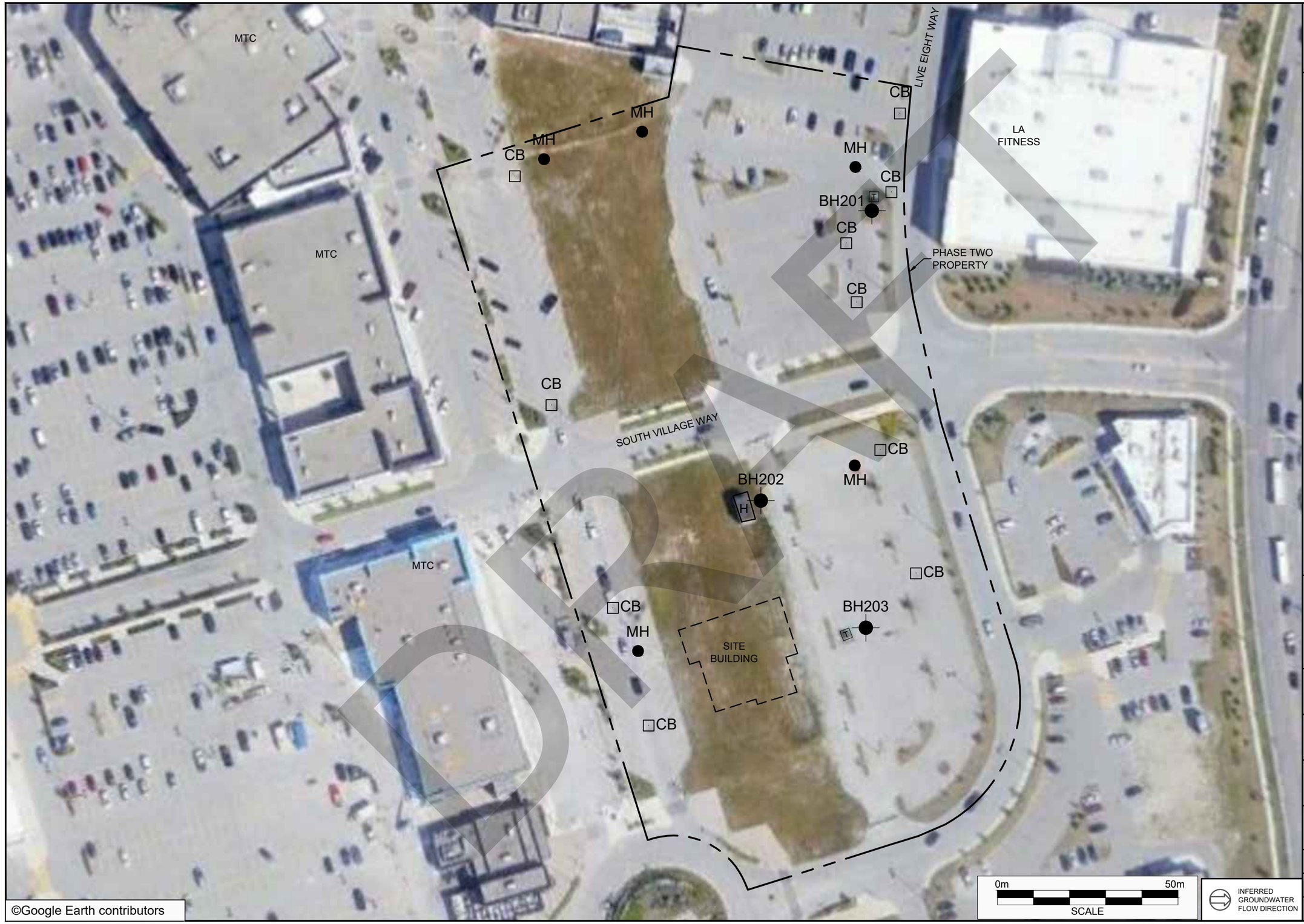
PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT - SAMPLING AND ANALYSIS PLAN

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD BARRIE, ONTARIO

FIGURE NAME:
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY: KP	REVIEWED BY: AN
DATE: DECEMBER 2021	FIGURE NUMBER: 3



N

LEGEND

- APPROXIMATE PHASE TWO PROPERTY BOUNDARY
- MTC MULTI-TENANT COMMERCIAL
- T PAD MOUNTED TRANSFORMER
- CATCHBASIN
- MANHOLE
- SITE BUILDING
- H HYDRO VAULT
- PROPOSED BOREHOLE
- T PAD MOUNTED TRANSFORMER

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PINCHIN

PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
NORTH AMERICAN DEVELOPMENT GROUP

PROJECT LOCATION:
109-129 PARK PLACE BOULEVARD
BARRIE, ONTARIO

FIGURE NAME:
PROPOSED BOREHOLE LOCATION PLAN

PROJECT NUMBER:	SCALE:
296908.003	AS SHOWN
DRAWN BY:	REVIEWED BY:
KP	AN
DATE:	FIGURE NUMBER:
DECEMBER 2021	4

APPENDIX II

Tables

Table 1 - Table of Areas of Potential Environmental Concern

Area of Potential Environmental Concern[1]	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity[2]	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern[3]	Media Potentially Impacted (Ground Water, Soil and/or Sediment)
APEC-1 (hydro vault)	Central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-2 (pad-mounted oil-cooled electrical transformer)	South-central portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil
APEC-3 (pad-mounted oil-cooled electrical transformer)	Northeastern portion of the Phase One Property.	Item 55 - Transformer Manufacturing, Processing and Use	On-Site	PHCs BTEX PCBs	Soil

Notes:

1 - Areas of potential environmental concern means the area on, in or under a phase one property where one or more contaminants are potentially present, as determined through the phase one environmental site assessment, including through,
(a) identification of past or present uses on, in or under the phase one property, and
(b) identification of potentially contaminating activity.

2 - Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D that is occurring or has occurred in a phase one study area

3 - When completing this column, identify all contaminants of potential concern using the Method Groups as identified in the Protocol for in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011, as specified below:

List of Method Groups:

ABNs	PCBs	Metals	Electrical Conductivity
CPs	PAHs	As, Sb, Se	Cr (VI)
1,4-Dioxane	THMs	Na	Hg
Dioxins/Furans, PCDDs/PCDFs	VOCs	B-HWS	Methyl Mercury
OCs	BTEX	Cl-	Low or high pH,
PHCs	Ca, Mg	CN-	SAR

4 - When submitting a record of site condition for filing, a copy of this table must be attached

Table 2 - Phase Two Scope of Work Summary

Sampling Location	APEC	Media Sampled	COPCs			Number of Samples Submitted for Analysis	Soil Sampling Depth Interval (mbgs)	Screen Interval (mbgs)	Sampling Frequency	Sampling System	Rationale/Notes
			PHCs	VOCs	PCBs						
BH201	3	Soil	●	●	●	1	0 - 4.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Assess soil quality in relation to an electrical transformer in the northeastern portion of the Phase Two Property
BH202	1	Soil	●	●	●	1	0 - 4.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Assess soil quality in relation to a hydro vault in the central portion of the Phase Two Property
BH203	2	Soil	●	●	●	1	0 - 4.5	NA	Continous/Soil cores every 1.5 m	Judgemental	Assess soil quality in relation to an electrical transformer in the south-central portion of the Phase Two Property

PHCs	Petroleum Hydrocarbon	APEC	Area of Potential Environmental Concern
VOCs	Volatile Organic Compo	COPCs	Contaminants of Potential Concern
PCBs	Polychlorinated Biphenyl	m	Metres
		mbgs	Metres Below Ground Surface
		NA	Not Applicable

APPENDIX III

Pinchin Standard Operating Procedures

SOP – EDR003 – REV005 – FIELD SCREENING OF SOIL SAMPLES

Title:	Field Screening of Soil Samples
Practice:	EDR
First Effective Date:	June 16, 2009
Version:	005
Version Date:	January 20, 2020
Author:	Robert MacKenzie
Authorized by:	Terry Duffy

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	June 16, 2009	N/A	MEM
001	November 26, 2010	Update approval signature	FG
002	September 25, 2013	Revised SOP to reflect current practices/Added section on O.Reg. 153/04 compliance	RLM
003	April 29, 2016	Updated Section 4.0/Modified time between readings to 1 hour	RLM
004	April 28, 2017	Removed reference to Pinchin West/In Section 5.2, clarified that soil vapour measurements do not need to be made within one hour of sampling during winter conditions	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM
005	January 20, 2020	Remove PG Logo and Pinchin LeBlanc Reference	TD

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the quantitative and qualitative methods to be used by Pinchin field personnel for field screening soil samples for potential impacts during field investigations.

The quantitative part of field screening consists of the measurement of vapour concentrations in soil sample headspace in order to assess the potential for volatile constituents to be present in the soil. The soil vapour readings obtained from these measurements are then used to assist in selecting potential "worst case" soil samples for submission to the laboratory for analysis. There are no regulatory standards for comparison with soil headspace vapour readings and we are using the general principle that the sample with the highest soil headspace vapour concentration from a group of samples is often the most likely to be impacted by volatile constituents.

The qualitative part of field screening includes assessing the soil for visual or olfactory indicators of potential contamination and is used in conjunction with the soil headspace vapour readings to select "worst case" soil samples to be submitted for laboratory analysis.

Note that soil vapour measurements have limited value when selecting "worst case" soil samples for laboratory analysis of non-volatile parameters such as metals. Visual observations of the presence of staining and debris (e.g., brick fragments and other building materials, coal ash, etc.), along with sample depth and likely migration pathways are to be factored into selecting the samples. The sample with the highest soil headspace vapour reading is not automatically selected under these circumstances.

Soil samples collected for soil vapour measurement must not be submitted for laboratory analysis except for analysis of non-volatile parameters (i.e., metals and inorganics) or grain size analysis.

This SOP also applies to the field screening of sediment samples but for simplicity, only soil samples are referred to below.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

- Resealable plastic bags (e.g., Ziploc®);

  (Note that small capacity bags (e.g., 500 millilitre capacity) are preferred over larger sized bags. When conducting headspace screening of a set of soil samples, the size of bag used should be consistent throughout in order to maintain the same approximate headspace volume in each bag);
- Combustible gas indicator (CGI) capable of operating in methane-elimination and/or photo-ionization detector (PID);

  (The Project Manager will be responsible for selecting the appropriate instrument(s) for each project. CGIs (e.g., RKI Eagle or Gastechtor) are acceptable for screening of petroleum hydrocarbons (PHCs) and related compounds, whereas PIDs (e.g., MiniRAE) are acceptable for screening for volatile organic compounds (VOCs), including chlorinated solvents, but can also be used when screening for PHCs. For many projects, it will be appropriate to employ both a CGI and a PID); and
- Calibration equipment (e.g., calibration gas, regulators, tubing, calibration bags, etc. as provided by the equipment supplier).

5.2 Soil Headspace Vapour Measurement Procedure

The procedure for conducting soil headspace vapour measurements for soil sample headspace is as follows:

1. Unless pre-calibrated by the equipment supplier, calibrate the CGI/PID as per the instrument manufacturer's instructions before commencing soil vapour measurements. Record the date and time of calibration, and type and concentration of the calibration gas used in the field logbook or field forms;
2. Label the plastic bag with the sample number;
3. Create a split soil sample by splitting the sample core vertically (i.e., along the longitudinal axis) with one half used for soil headspace vapour measurement and the other half used to fill sample jars for laboratory analysis of volatile parameters (e.g., VOCs and PHCs (F1 fraction)). In other words, the depth interval of the soil subjected to soil headspace vapour measurements should be the same as the depth interval from which samples for volatile parameters are collected. This procedure doesn't apply to grab samples but is to be completed when soil cores are obtained, such as sampling with dual tube samplers, split-spoon samplers and hand augers. For grab samples, soil used for laboratory analysis and soil headspace vapour measurements should be collected from proximal locations;
4. Place the soil into the plastic bag until the bag is approximately one-quarter full as soon as possible after the sampling device is retrieved/opened;
5. Seal the bag and break apart the soil by manually kneading the soil in the sealed bag;
6. Allow the soil sample to equilibrate at ambient temperature for a minimum of 5 minutes but no longer than one hour before taking a soil headspace vapour measurement. The exception to this is that during winter conditions, the soil samples should be placed in a heated environment (e.g., building interior) to warm up for a minimum of 15 minutes before taking soil vapour measurements. In this case, the soil vapour measurements do not need to be completed within one hour of sample collection;
7. Do not store the bagged soil samples in direct sunlight prior to taking soil headspace vapour measurements;
8. When conducting soil headspace vapour measurements with a CGI, make sure it is switched to methane elimination mode;
9. When completing soil headspace vapour measurements of a soil sample using both a PID and CGI, the vapour measurement using the PID should be made first;

10. Immediately before taking a soil headspace vapour measurement, gently agitate the bag and then create a small opening in the top of the bag. Insert the tip of the CGI/PID into the headspace of the bag and quickly reseal the bag around the tip to minimize leakage. If there is any water inside the bag, ensure that the tip does not contact the water;
11. Record the maximum vapour concentration measured within the first 10 seconds after inserting the tip of the CGI/PID into the bag. Note any anomalies that occur during the taking of the measurement (e.g., if the readings displayed by the instrument progressively increase and do not reach an obvious peak);
12. Remove the tip of the CGI/PID from the bag and reseal the bag immediately in case additional soil headspace vapour measurements are needed. If the soil headspace vapour is measured for a sample using a PID and an additional measurement with a CGI is required, wait a minimum of five minutes after the bag is resealed before taking the measurement with the CGI;
13. Before completing the next soil headspace vapour measurement, allow the CGI/PID to reach “zero” or “baseline”. If the CGI/PID does not return to “zero” or “baseline” it should be recalibrated before further soil headspace vapour measurements are made;
14. At the discretion of the Project Manager, a calibration check of the CGI/PID should be completed at least once per day or at a frequency of once per 100 soil headspace vapour measurements (for projects where numerous soil headspace vapour measurements are made on a daily basis such as a large remediation project); and
15. A calibration check is made by measuring the concentration of a sample of the calibration gas with the CGI/PID without making any adjustments to the instrument beforehand and comparing the measured concentration with the known concentration. The comparison of the measured concentration versus the actual concentration of the calibration gas indicates how much the instrument’s calibration may have been altered during soil headspace vapour measurements, which is known as “instrument drift”. Should the calibration check show instrument drift of more than 10%, the CGI/PID needs to be recalibrated before completing further soil headspace vapour measurements. Record all pertinent information for the calibration check (e.g., date and time, initial measured concentration, calibration gas type and concentration) in the field logbook or field forms.

5.3 Visual Screening

Visual screening consists of examining the soil sample for potential indicators of contamination as per the following:

1. Visually examine the soil sample, including breaking apart a portion of the sample;

2. Note any indications of a mottled appearance, dark discolouration or staining, free-phase product or unusual colour;
3. Note any indications of non-soil constituents, such as brick, asphalt, wood or concrete fragments, coal fragments, coal ash, etc.; and
4. Record the findings of the visual screening in the field logbook or field forms. If there is no visual evidence of impacts this should be noted.

5.4 Olfactory Screening

Record in the field logbook or field forms the presence of any odours noted during sample collection and visual screening. Field staff are not expected to directly smell soil samples to assess the presence/absence of odours.

If it is possible to identify the likely type of odour (e.g., PHC-like, solvent-like, etc.) then this information should be recorded along with a comment on the severity of the odour (e.g., slight, strong, etc.). If the odour cannot be readily identified, it should be described in the field notes as “unidentified odour”.

If no odours are observed, this information should also be recorded in the field logbook or field forms.

5.5 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment (ESA) in accordance with Ontario Regulation 153/04, the following additional procedures must be undertaken:

- Calibration of the CGI/PID must be completed at the beginning of each field day and calibration checks must be made either at the end of each field day or after every 100 soil vapour readings (whichever occurs first); and
- Thorough records of the CGI/PID calibration and calibration checks must be kept, including any calibration sheets provided by the equipment supplier. The Quality Assurance/Quality Control section of the Phase Two ESA report requires a discussion of field screening instrument calibration, and equipment calibration records must be appended to the Phase Two ESA report.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

Ontario Ministry of the Environment, *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*, December 1996.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR006 – REV005 – BOREHOLE DRILLING

Title:	Borehole Drilling
Practice:	EDR
First Effective Date:	November 25, 2010
Version:	004
Version Date:	November 19, 2020
Author:	Francesco Gagliardi and Robert MacKenzie
Authorized by:	Terry Duffy

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 25, 2010	N/A	FG
001	November 22, 2013	Streamlined text to reflect most common current practices/Removed sections covered by other SOPs	RM
002	April 29, 2016	Updated Section 4.0	RM
003	April 28, 2017	Removed reference to Pinchin West	RM
004	January 30, 2020	Annual Review	TJD
005	November 19, 2020	Formatting updates	RM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents a description of the methods employed for the completion of boreholes and the collection of subsurface soil samples.

Boreholes are typically completed to determine geologic conditions for hydrogeological evaluation, to allow the installation of monitoring wells, and to allow for the collection of subsurface soil samples for laboratory analysis.

Several methods are available for the collection of shallow subsurface soil samples using hand-held equipment (e.g., hand augers, post-hole augers). However, the use of a drill rig, equipped with direct-push tooling, solid-stem augers and/or hollow-stem augers, is the most common method used by Pinchin to advance boreholes and will be the focus of this SOP.

A detailed discussion of all the various drilling rigs and drilling methods (e.g., direct push, augering, sonic drilling, air/water/mud rotary drilling, etc.) is beyond the scope of this SOP. The Project Manager will be responsible for determining the appropriate drill rig and drilling method for the site investigation.

The majority of the site investigations completed by Pinchin involve relatively straightforward drilling within the overburden within a one aquifer system. In some situations, such as when multiple aquifers are spanned by a borehole, when drilling into bedrock or when there are known impacts in the shallow subsurface, drilling using telescoped casing methods may be appropriate. Telescoped casing and bedrock drilling methods are beyond the scope of this SOP. In these situations, the Project Manager, in consultation with the drilling contractor, will be required to confirm the drilling requirements and procedures.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier for distribution as appropriate.

5.0 PROCEDURE

5.1 General

The overall borehole drilling program is to be managed in accordance with SOP-EDR005. In particular, utility locates must be completed in accordance with SOP-EDR021 before any drilling activities commence.

All non-dedicated drilling and sample collection equipment must be decontaminated in accordance with SOP-EDR009.

5.2 Prior Planning and Preparation

The planning requirements for borehole drilling programs are covered in detail in SOP-EDR005.

As noted above, the type of drilling rig and drilling method will be determined by the Project Manager when scoping out the site investigation. In some cases, a switch in drilling rig and/or drilling method may be required depending on site conditions. For example, if competent bedrock is encountered in the subsurface at a depth above the water table, bedrock coring would be required to advance the borehole deep enough to install a monitoring well.

5.3 Borehole Drilling Procedures

Once the final location for a proposed boring has been selected and utility clearances are complete, one last visual check of the immediate area should be performed before drilling proceeds. This last visual check should confirm the locations of any adjacent utilities (subsurface or overhead) and verification of adequate clearance.

In some instances, in particular where there is uncertainty regarding the location of buried utilities or the borehole is being completed near a buried utility, the use of a hydro-excavating (hydro-vac) unit will be required to advance the borehole to a depth below the bottom of the utility. The hydro-vac uses a combination of high-pressure water and high-suction vacuum (in the form of a vacuum truck) to excavate

soil. This is also known as “daylighting”. The need to use a hydro-vac will be determined by the Project Manager.

If it is necessary to relocate any proposed borehole due to terrain, utilities, access, etc., the Project Manager must be notified, and an alternate location will be selected.

5.4 Borehole Nomenclature

If a borehole is advanced strictly for the purpose of soil sampling and no monitoring well is installed, the borehole should be identified as “BHxx”. If a monitoring well is installed in a borehole, the borehole should be identified as “MWxx”.

To avoid confusion, for site investigations involving both boreholes and monitoring wells, the numerical identifiers are to be sequential (e.g., there should not be a BH01 and MW01 for the same project).

When completing supplemental drilling programs, the borehole number should start at either the next sequential number after the last borehole number used in the first stage, or label them as ‘100 series’, ‘200 series’, etc. as appropriate (e.g., BH101, MW102, etc. for the first series of additional boreholes).

It is also acceptable to add the 2 digit year either before or after the borehole or monitoring well name (e.g., 17-MW101 or MW101-17).

5.5 Borehole Advancement

Each borehole will be advanced incrementally to permit intermittent or continuous sampling as specified by the Project Manager. Typically, the sampling frequency is one sample for every 2.5 or 5 feet (0.75 or 1.5 metres) the borehole is advanced. At the discretion of the Project Manager, soil samples may be collected at a lower frequency in homogeneous soil or at a higher frequency if changes in stratigraphy or other visual observations warrant it.

5.6 Direct-Push Drilling

This method is most commonly used at Pinchin to obtain representative samples of the subsurface soil material at a site. Direct-push drilling is achieved by driving a steel sampler into the subsurface at 1.5 metre intervals until the desired depth is achieved. The samplers are advanced by the drilling rig by means of a hydraulic hammer. For each soil sample run, a dedicated PVC sample liner is placed within the steel sampler which collects the soil as the sampler is advanced. After each sample run, a new sampler is assembled, and it is advanced deeper down the open borehole.

There are generally two methods of direct-push drilling which are used:

- Dual-tube sampling; and
- Macro-core sampling.

A dual-tube sampler consists of an 8.25 centimetre (cm) inner diameter steel tooling (outer tube), equipped with a steel cutting-shoe affixed to the advancing end. A smaller diameter steel tooling, consisting of a 5.75 cm inner diameter (inner tube), fits within the outer tube and contains a PVC sample liner within. These two tubes form the completed dual-tube sampler. The completed dual-tube sampler has a length of 1.5 metres.

A macro-core sampler consists of the smaller inner tube (mentioned above) used independently. The macro-core sampler measures approximately 1.5 metres in length.

The difference in drilling methods used is typically determined by soil conditions. Where soil conditions consist of tight or dense soil types (e.g., silts or clays), the macro-core sampling method may be used as this method provides less resistance to advancing the sampler. In soil types that are less resistive (e.g., loose sands), the dual-tube sampler may be used.

5.7 Auger Drilling (Split-Spoon)

The auger drilling method for borehole advancement and sampling involves using an auger drill rig to advance the borehole to the desired sampling depth and sampling with a split-spoon sampler. Borehole advancement with hollow stem augers is the preferred drilling method when sampling with split-spoon samplers as it minimizes the potential from sloughed material to reach the bottom of a borehole and possibly cross-contaminate samples when the split-spoon is driven beyond the bottom of the borehole. Solid stem augers can be used when drilling at sites with cohesive soils (e.g., silty clay), provided that the borehole remains open after the augers are removed from the ground prior to driving the split-spoon sampler.

The split-spoon sampler consists of an 18- or 24-inch (0.45 or 0.60 metres) long, 2-inch (5.1 cm) outside diameter tube, which comes apart lengthwise into two halves.

Once the borehole is advanced to the target depth, the sampler is driven continuously for either 18 or 24 inches (0.45 or 0.60 metres) by a 140-pound (63.5 kilogram) hammer. The hammer may be lifted and dropped by either the cathead and rope method, or by using an automatic or semi-automatic drop system.

The number of blows applied in each 6-inch (0.15 metre) increment is counted until one of the following occurs:

- A total of 50 blows have been applied during any one of the 6-inch (0.15 metre) increments described above;
- A total of 100 blows have been applied;

- There is no advancement of the sampler during the application of ten successive blows of the hammer (i.e., the spoon is "bouncing" on a cobble or bedrock); or
- The sampler has advanced the complete 18 or 24 inches (0.45 or 0.60 metre) without the limiting blow counts occurring as described above.

On the field form, record the number of blows required to drive each 6-inch (0.15 metre) increment of penetration. The first 6 inches is considered to be a seating drive.

The sum of the number of blows required for the second and third 6 inches (0.15 metres) of penetration is termed the "standard penetration resistance" or the "N-value". This information is typically provided on the borehole logs included in our site investigation reports.

The drill rods are then removed from the borehole and the split-spoon sampler unthreaded from the drill rods.

Caution must be used when drilling with augers below the groundwater table, particularly in sandy or silty soils. These soils tend to heave or "blow back" up the borehole due to the difference in hydraulic pressure between the inside of the borehole and the undisturbed formation soil. If blowback occurs, the drilling contractor will introduce water or drilling mud into the borehole or inside of the hollow-stem augers (if used) to equalize the hydraulic pressure and permit drilling deeper to proceed.

Heaving conditions and the use of water or drilling mud must be noted on the field logs, including the approximate volume of water or drilling mud used.

5.8 Auger Drilling (Direct Sampling)

In some jurisdictions (e.g., BC, Manitoba) it may be acceptable to collect soil samples directly from auger flights when using solid stem augers.

When sampling directly from auger flights, care must be exercised not to collect soils that were in direct contact with the auger or that were smeared along the edge of the borehole.

5.9 Borehole Advancement in Bedrock

It is sometimes possible to advance augers through weathered bedrock but borehole advancement through competent bedrock requires alternate drilling procedures. Bedrock drilling can be accomplished by advancing core barrels or tri-cone bits using air rotary or water rotary drilling methods. A description of the various bedrock drilling procedures is beyond the scope of this SOP.

The bedrock drilling method selected will depend in part on the type of bedrock, the borehole depth required, whether bedrock core logging is required, whether telescoped casing is required, etc. The Project Manager, in consultation with the drilling contractor, will determine the best method for advancing boreholes in competent bedrock.

5.10 Borehole Soil Sample Logging and Collection

The following describes the methods for logging and collection of samples from a split-spoon or direct-push sampler but can be adapted for sample collection from augers:

1. After the driller opens the split-spoon sampler or PVC liner, measure the length of the soil core retained in the sampler in inches or centimetres. Be sure to be consistent in the use of metric or imperial units, and that the units used are clearly noted in the field notes. The percentage of soil retained versus the length of the sampler is known as “sample recovery” and this information is presented on the borehole logs within our Phase II ESA reports;
2. Dedicated, disposable nitrile gloves are to be worn during soil logging and sampling;
3. When using a dual-tube or macro-core sampler with direct-push drilling, there is usually sufficient sample recovery to permit the collection of two soil samples from each sample run. In this case, if the sample recovery is greater than 2.5 feet (0.75 metres), divide the recovered soil into two depth intervals and log/collect a sample from each interval. Split-spoon samplers typically are not long enough nor provide enough sample to divide a sample run into two. However, if a recovered sample contains distinct stratigraphic units (e.g., fill material and native material, obviously impacted soil and non-impacted soil), the distinct units are to be sampled separately. It is especially important that potentially impacted soil (e.g., fill material, obviously impacted soil) is not mixed with potentially unimpacted soil (e.g., native soil, soil without obvious impacts) to form one sample;
4. Discard the top several centimetres in each core as this material is the most likely to have sloughed off the borehole wall and may not be representative of the soil from the intended depth interval;
5. To minimize the potential for cross-contamination, scrape the exterior of the soil core with a clean, stainless-steel putty knife, trowel or similar device to remove any smeared soil. Note that is not practical and can be skipped if the soil is non-cohesive (e.g., loose sand);
6. Split the soil core longitudinally along the length of the sampler and to the extent practical, collect the soil samples for laboratory analysis from the centre of the core (i.e., soil that has not contacted the sampler walls). When sampling directly from augers, soils in direct contact with the auger or soils retained on the augers that may have been in contact with the edge of the borehole should not be collected;

   Collect soil samples for potential volatile parameter analysis and field screening (in that order) as soon as possible after the core is opened. The length of time between opening the sampler and sample collection for these parameters should not exceed 2 minutes. It is important to follow this as it minimizes the potential for volatile constituents in the soil to

be lost. See SOP-EDR003 for additional details regarding the collection of soil samples for field screening;

7. Drillers are not to open the split-spoon sampler or PVC liner until instructed to do so. If drilling and sample retrieval is occurring at a rate faster than Pinchin staff are able to sample and log the soil cores, the drillers are to be instructed to slow down or stop until further notice. This will prevent a back log of soil cores from accumulating and minimize the exposure of the soil cores to ambient conditions. This is particularly important when sampling for VOCs;
8. Collect soil samples for the remaining parameters to be analyzed;
9. Soil samples are to be labelled and handled in accordance with SOP-EDR013;
10. Record the parameters sampled for, the type(s) and number of sample containers, and the time and date of sample collection in the field notes;
11. Determine the soil texture in accordance with SOP-EDR019 and record this information in the field notes;
12. Soil samples collected for soil headspace vapour measurement must not be submitted for laboratory analysis except for analysis of non-volatile parameters (i.e., metals and inorganics) or grain size analysis;
13. Immediately following collection, place each sample container in a cooler containing ice bags or ice packs; and
14. After the maximum borehole drilling depth is reached, measure the borehole depth with a weighted measuring tape and record the total depth in the field notes if the borehole diameter is large enough to permit measurement.

5.11 Borehole Backfilling.

Following completion of each borehole in which a well is not installed, it must be properly backfilled with bentonite and/or bentonite grout by the drilling contractor. The drilling contractor is to be consulted to confirm the proper borehole abandonment procedures required by the local regulations (e.g., Ontario Regulation 903 (as amended) for Ontario sites).

Drill cuttings are not be used to backfill boreholes.

Record the borehole backfilling method and materials used in the field notes.

5.12 Borehole Location Documentation

For each borehole, complete the following to document its location:

1. Photograph the completed borehole location. Close up photographs of the borehole are to be taken as well as more distant photographs that show the location of site landmarks relative to the borehole so that the photograph can be used to locate the borehole in the future; and
2. Using a measuring tape or measuring wheel, measure the distance between the borehole and a nearby landmark (e.g., corner of the nearest building) and provide a borehole location sketch in the field notes. Measurements are to be made at right angles relative to the orientation of the landmark or to a fixed axis (e.g., relative to true north). If required by the Project Manager, measure the UTM coordinates of the borehole with a hand-held GPS device.

5.13 Field Notes

The field notes must document all drilling equipment used, sample depths and measurements collected during the borehole drilling activities. The field notes must be legible and concise such that the entire borehole drilling and soil sampling event can be reconstructed later for future reference. The field notes are to be recorded on the field forms or in a field book.

5.14 Additional Considerations for O. Reg. 153/04 Phase Two ESA Compliance

None. Following this SOP will be sufficient to comply with the Ontario Regulation 153/04 requirements for Phase Two Environmental Site Assessments.

5.15 Health and Safety

All work activities under this SOP will be completed in a safe manner following the requirements of Pinchin's Occupational Health and Safety Program, client site requirements and current legislation.

Pinchin Employees conducting work under this SOP must meet the job competency requirements as outlined in Section 2.3 Job Competency of the Pinchin Health and Safety Program.

Where technical occupational health and safety assistance is required in evaluating hazards and determining controls, a Qualified Person should be engaged following Pinchin Health and Safety Program Section 3.2 Project Hazard Assessments.

If, while working on a site and following this SOP, there is an incident resulting in loss (personal injury, property damage) or a near miss (potential loss), fill in and submit the appropriate incident form (3.3.1.) or near miss form (3.3.2).

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of Health & Safety Training by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Canadian Standards Association, *Phase II Environmental Site Assessment, CSA Standard Z769-00 (R2018)*, dated 2000 and reaffirmed in 2018.

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)*, April 2011.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR009 – REV004 – FIELD DECONTAMINATION OF NON-DEDICATED MONITORING AND SAMPLING EQUIPMENT

Title:	Field Decontamination of Non-Dedicated Monitoring and Sampling Equipment
Practice:	EDR
First Effective Date:	August 03, 2009
Version:	004
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	August 02, 2009	N/A	MEM
001	November 26, 2010	Updated Approval Signature/Added reference to Ontario Regulation 511/09	FG
002	September 20, 2013	Revised majority of text to reflect current practices/Focused on equipment cleaning and removed reference to personnel decontamination/Added section on O. Reg. 153/04 requirements/Revised reference list	RLM
003	April 29, 2016	Updated Section 4.0/Removed methanol as optional cleaning reagent	RLM
004	April 28, 2017	Removed reference to Pinchin West/In Section 5.2.2, modified requirements for cleaning water level tapes and interface probes/In Section 5.2.3, modified requirements for cleaning electrical or retrieval cables for pumps	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the general requirements for field decontamination of non-dedicated equipment used for monitoring of environmental media and the collection of environmental samples (i.e., equipment that is re-used between monitoring and sampling locations). Note that the procedures described in this SOP also apply to pumps used for well development.

3.0 OVERVIEW

The main purpose of non-dedicated monitoring and sampling equipment decontamination is to minimize the potential for cross-contamination during monitoring/sampling activities completed for site investigations. Cross-contamination can occur when equipment used to monitor/sample contaminated soil, groundwater or sediment is reused at another monitoring/sampling location without cleaning. This can result in the transfer of contaminants from a “dirty” monitoring/sampling location to a “clean” monitoring/sampling location, causing possible positive bias of subsequent samples. Positive sample bias can result in reported analytical results that are not representative of actual site conditions and, if significant cross-contamination occurs, can result in reported exceedances of the applicable regulatory standards for samples that would have met the standards had cross-contamination not occurred.

Site investigations completed by Pinchin typically use the following non-dedicated monitoring/sampling equipment:

- Manually operated equipment (e.g., water level tapes/interface probes using during groundwater monitoring and sampling, knifes/spatulas used for soil sampling, hand augers);
- Pumps for groundwater monitoring well development, purging and/or sampling (e.g., bladder pumps, submersible pumps); and
- Downhole drilling/sampling equipment (e.g., split-spoon samplers, augers).

The above list is not all inclusive and other non-dedicated monitoring/sampling equipment may be employed during a site investigation that requires decontamination. For example, it may be appropriate to decontaminate the bucket of a backhoe used for test pitting between test pit locations. The Project Manager will be responsible for identifying the additional monitoring/sampling equipment that requires decontamination and instructing field staff regarding the procedure to be followed for cleaning this equipment.

When conducting field monitoring and sampling work in the field, it is not always possible to judge whether a monitoring/sampling location is uncontaminated. Because of this, it is important that all non-dedicated monitoring/sampling equipment be properly cleaned before initial use and between uses to minimize the potential for cross-contamination to occur.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

The following is a list of equipment needed to perform the decontamination of non-dedicated monitoring and sampling equipment in accordance with this SOP:

- Personal Protective Equipment (PPE);
- Potable tap water;
- Distilled water (store bought);

- Volatile organic compound (VOC)-free deionized distilled water (supplied by the analytical laboratory);
- Laboratory grade, phosphate-free soap;
- Wash buckets (minimum of three);
- Scrub brushes;
- Paper towels; and
- Buckets or drums with resealable lids for containing liquids generated by equipment cleaning.

Other equipment required to clean drilling equipment (e.g., steam cleaner, power washer, tub for containing wash water, etc.) is typically provided by the drilling subcontractor. The Project Manager is responsible for ensuring that the drilling subcontractor brings the required cleaning equipment to the project site. Prior to mobilization, the Project Manager should also assess the availability of a potable water supply for drilling equipment cleaning at the project site. When no accessible potable water supply is available at a project site, the drilling subcontractor will need to bring a potable water supply to the site in the drill rig water supply tank or separate support vehicle, or arrange to have a third-party supplier deliver potable water to the site.

5.2 Procedure

5.2.1 General Procedures and Considerations

The following general procedures and considerations apply to all decontamination of non-dedicated monitoring/sampling equipment activities:

- Personnel will dress in suitable PPE to reduce personal exposure during equipment decontamination activities;
- In addition to cleaning between monitoring/sampling locations, all non-dedicated monitoring/sampling equipment must be cleaned before initial use. Field staff should not assume that the equipment was properly cleaned by the last person to use it;
- Prior to starting a drilling program, the downhole drilling equipment (e.g., augers) must be inspected and any “dirty” equipment must not be used in the drilling program or it must be cleaned prior to use; and
- All liquids and solids generated by the cleaning of non-dedicated monitoring/sampling equipment are to be containerized and managed in accordance with the procedures outlined in SOP-EDR020 – Investigation Derived Wastes.

5.2.2 Decontamination of Manually Operated Monitoring/Sampling Equipment

The procedure for decontaminating manually operated monitoring/sampling equipment is as follows:

- Wash the equipment in a bucket filled with a mixture of phosphate-free soap/potable water, while using a brush to remove any obvious contamination and/or adhered soil;
- Rinse the equipment thoroughly in a bucket filled with potable water;
- Rinse the equipment thoroughly using a spray bottle filled with distilled water, capturing the rinsate in a bucket; and
- Allow the equipment to air dry. If there is insufficient time to allow the equipment to air dry before reusing, or the equipment cleaning is occurring during winter conditions, the equipment should be dried after the final rinse with a clean paper towel.

At the discretion of the Project Manager, it may be acceptable to use spray bottles, rather than buckets, for lightly contaminated equipment or if no obvious contaminants are present.

Should soil or obvious contaminants remain on the equipment after cleaning, the above procedure must be repeated until the soil or contaminants have been removed. The equipment should not be reused if repeated cleanings do not remove the soil or contaminants.

The above equipment cleaning procedure applies to, but is not limited to, the following non-dedicated monitoring/sampling equipment:

- Knives/spatulas used for soil sampling;
- Hand augers;
- Water level tapes and interface probes (both the end probe and portion of the tape that entered the well);
- The exterior of submersible pumps and interior/exterior of bladder pumps (including the portion of the electrical or retrieval cables that contact groundwater in a well); and
- Various pieces of drilling equipment, including split-spoon samplers, hollow stem auger centre plugs, continuous sampling tubes, and the reusable portions of dual-tube samplers.

At the discretion of the Project Manager, the distilled water used for the final equipment rinse will be VOC-free deionized distilled water supplied by the analytical laboratory. For example, the use of VOC-free distilled water would be appropriate for a project where trace VOCs are being investigated and it is important to minimize the potential for cross-contamination and positive bias of VOC sample results.

For tapes associated with water level tapes and interface probes, if they were submerged in a monitoring well water free of non-aqueous phase liquids or obvious contamination, the tape can be cleaned at the discretion of the Project Manager by pulling the tape through a towel dampened with phosphate-free soap/potable water as the tape is retrieved. The end probe should then be cleaned as described above.

5.2.3 Decontamination of Groundwater Sampling Pumps

The exterior of each bladder or submersible pump that is used for well development, well purging and/or groundwater sampling, and the portion of any electrical or retrieval cables that entered the well, are to be cleaned following the procedure described above for decontaminating manually operated monitoring/sampling equipment.

Submersible pumps are not designed to be disassembled in the field and cleaning of the interior of this type of pump requires flushing of cleaning solutions through the pump. After cleaning the exterior of the pump, the minimum decontamination requirement for a submersible pump is the flushing of a phosphate-free soap/potable water mixture contained in a bucket through the pump (i.e., pumping the mixture through the pump and capturing the pump outflow in the same bucket or a separate bucket), followed by flushing distilled water contained in a separate bucket through the pump and capturing the pump outflow in the same bucket or separate bucket. Note that store bought distilled water is acceptable for this purpose.

At the discretion of the Project Manager and depending on the requirements of the project, the final step in the process is a final flush with laboratory-supplied VOC-free distilled water.

The following summarizes the flushing sequence for decontaminating the interior of a submersible pump:

- Soap/water mixture*;
- Distilled water (store bought)*; and
- Distilled water (laboratory supplied VOC-free distilled water - to be confirmed by the Project Manager).

* Minimum requirement.

Bladder pumps are designed for disassembly in the field to facilitate the replacement of the bladders. The internal parts of a bladder pump are to be cleaned in accordance with the procedure described above for decontaminating manually operated monitoring/sampling equipment. Whenever possible, bladders are to be disposed of between well locations. However, if it is necessary to reuse a bladder, it must be cleaned in accordance with the procedure for cleaning manually operated monitoring/sampling equipment. It should be noted that bladders are difficult to clean and the decontamination procedure needs to be thorough.

Flushing of a bladder pump with distilled water after cleaning and reassembly is not required unless specified by the Project Manager.

5.2.4 Decontamination of Downhole Drilling Equipment

Hollow stem and solid stem augers used for borehole advancement are to be decontaminated by the drilling contractor using the following procedure:

- Wherever possible, all augers used for borehole drilling should be cleaned before initial use and between borehole locations by steam cleaning or power washing with potable water. However, the minimum requirements for auger cleaning are as follows:
  - Use a brush or shovel to remove excess soil from all used augers; and
  - Any augers that may come into contact with groundwater are to be decontaminated by steam cleaning or power washing with potable water. An auger must not be used for the balance of the drilling program if obvious contaminants or residual soil remain on the auger following decontamination, unless subsequent cleaning efforts remove these materials.

As noted previously, downhole drilling equipment used for soil sample retrieval (e.g., split-spoon samplers, continuous sampling tubes and the reusable portions of dual-tube samplers used with direct push rigs) and the hollow stem auger centre plug are to be decontaminated following the procedure outlined above for cleaning manually operated monitoring/sampling equipment.

5.3 Decontamination Records

Field personnel will be responsible for documenting the decontamination of non-dedicated monitoring/sampling equipment and drilling equipment in their field log book or field forms. The documentation should include the type of equipment cleaned and the frequency of cleaning, the methods and reagents used for equipment cleaning, and how fluids generated by the equipment cleaning were stored.

5.4 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment (ESA) in accordance with Ontario Regulation 153/04, the following additional procedures must be undertaken:

- All augers must have excess soil removed by a brush or shovel and be steam cleaned or power washed before initial use and between borehole locations regardless of whether they contact the groundwater or not (i.e., the minimum requirements listed above for auger cleaning are not sufficient); and

- Thorough records of the frequency and cleaning materials used for the decontamination of non-dedicated monitoring/sampling equipment and downhole drilling equipment must be kept. The Quality Assurance/Quality Control section of the Phase Two ESA report requires a summary of what steps were taken to minimize the potential for cross-contamination during the Phase Two ESA. The handling and disposal of fluids generated by equipment decontamination must also be well documented in the field for inclusion in the Phase Two ESA report.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

9.0 APPENDICES

None.

I:\2018 SOP Updates\SOP - EDR009 - REV004 - Field Decontamination.docx

Template: Master SOP Template – February 2014

SOP – EDR013 – REV004 – SAMPLE HANDLING DOCUMENTATION

Title:	Sample Handling Documentation
Practice:	EDR
First Effective Date:	August 03, 2009
Version:	004
Version Date:	January 3, 2018
Author:	Mark McCormack and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

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1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	August 03, 2009	N/A	MEM
001	November 26, 2010	Updated Approval Signature/Added reference to Ontario Regulation 511/09	FG
002	September 12, 2013	Updated text/Added tables from MOE lab protocol/Streamlined reference section/Added O. Reg. 153/04 compliance section	RLM
003	April 29, 2016	Updated Section 4.0/Aligned document retention with PEP	RLM
004	April 28, 2017	Removed reference to Pinchin West	RLM
004	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the general requirements for sample handling and documentation practices.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment Required

- Laboratory-supplied sample containers;
- Field log book or field forms; and
- Laboratory-supplied Chain-of-Custody forms.

5.2 Procedures

5.2.1 Sample Labelling

Sample labels are to be filled out in the field at the time of sampling as completely as possible by field personnel. All sample labels shall be filled out using waterproof ink. At a minimum, each label shall contain the following information:

- Sample identifier, consisting of sample location (borehole number, monitoring well number, surface sample location, etc.) and sample number (if appropriate). For example, the second soil sample collected during borehole advancement at borehole BH3 would be labelled "BH3-2";
- Pinchin project number;
- Date and time of sample collection;
- Company name (i.e., Pinchin); and
- Type of analysis.

5.2.2 Sample Containers, Preservation and Holding Times

The sample containers, sample preservation and holding times for projects in Ontario are to be those specified in Table A (for soil and sediment) and Table B (groundwater) from the Ontario Ministry of the Environment Climate Change (MOECC, formerly the Ontario Ministry of the Environment) document entitled *"Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act",* dated March 9, 2004, amended as of July 1, 2011. These tables are attached and form part of this SOP.

With reference to the attached Tables A and B, field personnel must use the sample containers appropriate for the parameters being sampled for, undertake any required field preservation or filtration and observe the sample holding times.

Each province has its own preservation and holding time regulations or guidance, which are generally similar. It is the Project Manager's responsibility to ensure that field staff are aware of, and can meet, the requirements in the province they are working in.

5.2.3 Sample Documentation

The following sections describe documentation required in the field notes and on the Chain-of-Custody forms.

Field Notes

Documentation of observations and data from the field will provide information on sample collection and also provide a permanent record of field activities. The observations and data will be recorded using a pen with permanent ink in the field log book or on field forms.

The information in the field book or field forms will, at a minimum, include the following:

- Site name;
- Name of field personnel;
- Sample location (borehole number, monitoring well number, surface sample location, etc.);
- Sample number;
- Date and time of sample collection;
- Description of sample;
- Matrix sampled;
- Sample depth (if applicable);
- Method of field preservation (if applicable);
- Whether filtration was completed for water samples;
- Analysis requested;
- Field observations;
- Results of any field measurements (e.g., field screening measurements, depth to water, etc.); and
- Volumes purged (if applicable).

In addition to the above, other pertinent information is to be recorded in the field log book or field forms depending on the type of sampling being completed (e.g., field parameter measurements and pumping rates for low flow sampling) as required by the SOP for the particular sampling activity.

Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the sampler's memory.

All field notes are to be scanned and saved to the project folder on the server immediately upon returning from the field.

Sample Chain-of-Custody

Sample Chain-of-Custody maintains the traceability of the samples from the time they are collected until the analytical data are issued by the laboratory. Initial information concerning collection of the samples will be recorded in the field log book or field forms as described above. Information on the custody, transfer, handling and shipping of samples will be recorded on a Chain-of-Custody for each sample submission.

All signed Chain-of-Custody forms will be photocopied or duplicate copies retained prior to sample shipment. A Chain-of-Custody should be laboratory-specific and will typically be supplied by the laboratory with the sample containers requested for the project. The sampler will be responsible for fully filling out the Chain-of-Custody for each sample submission.

The Chain-of-Custody will be signed by the sampler when the sampler relinquishes the samples to anyone else (i.e., courier or laboratory). Until samples are picked up by the courier or delivered to the laboratory, they must be stored in a secure area. The following information needs to be provided on the Chain-of-Custody at a minimum:

- Company name;
- Name, address, phone number, fax number and e-mail address of the main contact for the submission (typically the Project Manager);
- Project information (project number, site address, quotation number, rush turnaround number, etc.);
- Regulatory standards or criteria applicable to the samples (including whether the samples are for regulated drinking water or whether the samples are for a Record of Site Condition);
- Sample identifiers;
- Date and time of sample collection;
- Matrix (e.g., soil, groundwater, sediment, etc.);
- Field preservation information (e.g., whether groundwater samples for metals analysis were field filtered);
- Analyses required;
- Number of sample containers per sample;
- Analytical turnaround required (i.e., standard or rush turnaround);
- Sampler's name and signature;
- Date and time that custody of the samples was transferred;

- Name and signature of person accepting custody of the samples from Pinchin, and date and time of custody transfer; and
- Method of shipment (if applicable).

The person responsible for delivery of the samples to the laboratory or transfer to a courier will sign the Chain-of-Custody, retain a duplicate copy or photocopy of the Chain-of-Custody so it can be scanned and saved to the project file, document the method of shipment, and send the original copy of the Chain-of Custody with the samples.

5.3 Additional Considerations for Ontario Regulation. 153/04 Phase Two ESA Compliance

Custody seals must be placed on all coolers containing samples prior to transfer to a courier or delivery to the laboratory. The laboratory will comment on the presence/absence of custody seals in the Certificate-of-Analysis for each submission and this information must be discussed in the Quality Assurance/Quality Control section of the Phase Two Environmental Site Assessment report.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Ontario Ministry of the Environment and Climate Change, *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, March 9, 2004, as amended as of July 1, 2011.

9.0 APPENDICES

Appendix I Tables A and B From Ontario MOECC Laboratory Protocol

APPENDIX I

Tables A and B From Ontario MOECC Laboratory Protocol

TABLE A: SOIL AND SEDIMENT Sample Handling and Storage Requirements

SOIL Inorganic Parameters	Container[1]	Field Preservation	Storage Temp.[2]	Preserved Holding Time[3]	Unpreserved Holding Time[3]
Chloride, electrical conductivity	glass, HDPE or PET	none	5 ± 3 °C		30 days as received (without lab drying); indefinite when dried at the lab
Cyanide (CN^-)	glass wide-mouth jar, Teflon™ lined lid	protect from light	5 ± 3 °C		14 days
Fraction organic carbon (FOC)	glass jar, Teflon™ lined lid	none	5 ± 3 °C		28 days as received(without lab drying); indefinite storage time when dried
Hexavalent chromium	glass, HDPE	none	5 ± 3 °C		30 days as received
Metals (includes hydride-forming metals, SAR, HWS boron, calcium, magnesium, sodium)	glass, HDPE	none	5 ± 3 °C		180 days as received (without lab drying); indefinite when dried at the lab
Mercury, methyl mercury	glass, HDPE or PET	none	5 ± 3 °C		28 days
pH	glass, HDPE or PET	none	5 ± 3 °C		30 days as received
SOIL Organic Parameters	**Container [1,5,6,7,20]**	**Field Preservation**	**Storage Temp.[2]**	**Preserved Holding Time[3]**	**Unpreserved Holding Time[3]**
BTEX[8], PHCs (F1)[8], THMs, VOCs[7] **NB: SEE FOOTNOTE #20**	40–60 mL glass vial (charged with methanol preservative, pre-weighed)[6] AND glass jar (for moisture content) [hermetic samplers are an acceptable alternative [5, 18]]	methanol (aqueous $NaHSO_4$ is an acceptable alternative for bromomethane)[6, 7, 18,20]	5 ± 3 °C	14 days	hermetic samples: stabilize with methanol preservative within 48 hours of sampling[18]
1,4-Dioxane[9, 15]	when processed as a VOC sample: same as per VOCs above; when processed as an extractable: same as per ABNs below; (consult laboratory)[9,15,18]		5 ± 3 °C	14 days	when processed as a VOC sample: same as per VOCs above; when processed as an extractable: same as per ABNs below; (consult laboratory)[18]
PHCs (F2–F4)	glass wide-mouth jar, Teflon™ lined lid	none	5 ± 3 °C		14 days
ABNs, CPs, OCs, PAHs	glass wide-mouth jar, Teflon™ lined lid	none	5 ± 3 °C		60 days
Dioxins and furans, PCBs	glass wide-mouth jar Teflon™ lined lid	none	5 ± 3 °C		indefinite storage time

HDPE = high density polyethylene; PET = polyethylene terephthalate; HWS = hot water soluble boron; THM = trihalomethanes; VOC = volatile organic compounds; BTEX = benzene, toluene, ethylbenzene, xylenes; PHCs = petroleum hydrocarbons; CPs = chlorophenols; PCBs = polychlorinated biphenyls; OCs = organochlorine pesticides

[1–20]footnotes immediately follow Table B

TABLE B: GROUND WATER Sample Handling and Storage Requirement

GROUND WATER Inorganic Parameters	**Container[10]**	**Field Preservation**	**Storage Temperature[2]**	**Preserved Holding Time[3]**	**Unpreserved Holding Time[3]**
Chloride, electrical conductivity, pH	HDPE or glass	none	5 ± 3 °C		28 days
Cyanide (CN^-)	HDPE or glass	NaOH to a pH > 12	5 ± 3 °C	14 days	must be field preserved
Hexavalent chromium	HDPE or glass	field filter followed by buffer solution to a pH 9.3–9.7 [17]	5 ± 3 °C	28 days[17]	24 hours[17]
Metals (includes hydride-forming metals, calcium, magnesium, sodium)	HDPE or Teflon™ [10]	field filter followed by HNO_3 to pH < 2[11]	room temperature when preserved	60 days	must be field preserved
Mercury	glass or Teflon™ [10]	field filter followed by HCl to pH < 2[11]	room temperature when preserved	28 days	must be field preserved
Methyl mercury	glass or Teflon™	DO NOT FILTER HCl or H_2SO_4 to pH <2[12]	5 ± 3 °C	28 days	DO NOT FILTER must be field preserved[12]
GROUND WATER Organic Parameters[10, 13, 14]	**Container[10, 13, 14]**	**Field Preservation**	**Storage Temperature[2]**	**Preserved Holding Time[3]**	**Unpreserved Holding Time[3]**
BTEX, PHCs (F1),THMs, VOCs;	40–60 mL glass vials (minimum of 2)[14] (no headspace)	$NaHSO_4$ or HCl to a pH < 2[16]	5 ± 3 °C	14 days	7 days
1,4-Dioxane[9, 15]	when processed as a VOC sample: same as per VOCs above; when processed as an extractable: same as per ABNs below; (consult laboratory)[9, 15]		5 ± 3 °C	14 days	14 days
PHCs (F2–F4)	1L amber glass bottle, Teflon™ lined lid	$NaHSO_4$ or HCl to a pH < 2[16]	5 ± 3 °C	40 days	7 days
ABNs, CP, OCs, PAHs[19], PCBs	1L amber glass bottle, Teflon™ lined lid	none	5 ± 3 °C		14 days
Dioxins and furans	1L amber glass bottle, Teflon™ lined lid	None	5 ± 3 °C		indefinite storage time

HDPE = high density polyethylene;THM = trihalomethanes; VOC = volatile organic compounds; BTEX = benzene, toluene, ethylbenzene, xylenes; PHCs = petroleum hydrocarbons; CPs = chlorophenols; PCBs = polychlorinated biphenyls; OCs = organochlorine pesticides

1 One soil container is generally sufficient for inorganic analysis and another for extractable organics. A separate container is required for BTEX, THM, VOC and PHC (F1) moisture analysis.

2 Storage temperature refers to storage at the laboratory. Samples should be cooled and transported as soon as possible after collection.

3 Holding time refers to the time delay between time of sample collection and time stabilization/analysis is initiated. For samples stabilized with methanol, the hold time for the recovered methanol extract is up to 40 days.

[4] PET can not be used for samples requiring antimony analysis.

[5] As an alternative, the USEPA has investigated hermetic sample devices that take and seal a single core sample. The sample is submitted as is to the laboratory where it is extruded into an extracting solvent. Samples must be received at the laboratory within 48 hours of sampling. (Note that replicate samples are necessary for bisulphate and methanol extraction for all samples plus laboratory duplicates and spikes.) Consult the laboratory for the number of samples required.

[6] The USEPA has approved field preservation. Pre-weighed vials containing known weights of methanol preservative (or aqueous sodium bisulphate if used for bromomethane) are sent to the field. Sample cores (approximately 5 g) are extruded directly into the vial. The vials are sealed, and submitted directly to the laboratory. In practice, this technique requires great care to prevent losses of methanol due to leaking vials or through splashing. Consult the laboratory for the number of containers required.

[7] Methanol-preserved samples may elevate the detection limit for bromomethane (VOC); a separate bisulphate-preserved sample or hermetically sealed sample may be submitted at the time of sampling if bromomethane is a chemical of concern – contact the laboratory to determine if a separate sample should be collected.

[8] For BTEX and PHC (F1) pre-charging the soil sampling container with methanol preservative is an accepted deviation from the CCME method.

[9] 1,4-Dioxane may be analyzed with the ABNs or VOCs; sample container requirements used for ABNs or VOCs are both acceptable. If 1,4-dioxane is to be analyzed with ABNs, follow the ABN sample container requirements; similarly if it is to be analyzed with VOCs, follow VOC sample container requirements. Consult the laboratory for the container type and the total number required (see also footnote #15).

[10] Samples containing visual sediment at the time of analysis should be documented and noted on the Certificate of Analysis or written report as results may be biased high due to the inclusion of sediment in the extraction.

[11] Field filter with 0.45µm immediately prior to adding preservative or filling pre-charged container.

[12] Sample directly into a HCl or H_2SO_4 preserved container, or add acid to an unfiltered sample immediately after sample collection in the field.

[13] Aqueous organic samples should be protected from light. If amber bottles are not available, glass should be wrapped in foil.

[14] Separate containers are required for each organic water analysis. Consult the laboratory for required volumes. Chloride and electrical conductivity can be taken from the same container.

[15] For 1,4-dioxane in soil and sediment, no preservative is required if processed as an ABN, however. Methanol is an acceptable alternative if processed as a VOC. For 1,4-dioxane in groundwater, no preservative is required, however, $NaHSO_4$ or HCl are acceptable alternatives.

[16] Preserved to reduce biodegradation, however effervescence/degassing may occur in some ground water samples. In this case, rinse preservative out three times with sample and submit to the laboratory as unpreserved.

[17] To achieve the 28-day holding time, use the ammonium sulfate buffer solution [i.e., $(NH_4)_2SO_4/NH_4OH$] or $(NH_4)_2SO_4/NH_4OH$/NaOH + NaOH] as specified in EPA Method 218.6 (revision 3.3, 1994) or Standard Methods 3500-Cr Chromium (2009).Using only NaOH without the ammonium sulfate buffer to adjust the pH would require analysis within 24 hours of sampling.

[18] Alternatively, to achieve a longer hold time, hermetic samples may be frozen within 48 hours of sampling as per ASTM method D6418 – 09; however, storage stability must be validated by the laboratory with no more than 10% losses.

[19] For benzo(a)pyrene in ground water samples filtration prior to analysis on a duplicate sample is permitted.

[20] For VOC, BTEX, F1 PHCs, 1,4 dioxane soil samples collected before July 1, 2011, the following sampling and handling requirements are also permitted.

SOIL Organic Parameters	Container	Preservative	Storage Temperature	Preserved Holding Time	Unpreserved Holding Time
VOC, BTEX, F1 PHCs, 1,4-dioxane*	glass jar, Teflon lined lid, no headspace, separate container required Hermetic samplers are an acceptable alternative	none field preservation with aqueous sodium bisulphate and methanol is an acceptable alternative	5 ± 3C	See notations 1-3 below	Stabilize by extraction or freezing within 48 hrs of receipt at the laboratory (7days from sampling). Frozen or field preserved samples must be extracted within 14 days of sampling.

*Special care must be used when sampling for VOC, BTEX and F1 in soil and sediment. Studies have shown that substantial losses can occur through volatilization and bacterial degradation. There are several allowable options for field collection of samples. Each is discussed below. Consult SW846, Method 5035A for additional detail. The laboratory is required to stabilize the sample on the day of receipt, either by extraction or freezing.

1. Collection in soil containers: To minimize volatilization losses, minimize sample handling and mixing during the process of filling the sample container. The bottle should be filled with headspace and voids minimized. Care is required to ensure that no soil remains on the threads of the jar, preventing a tight seal and allowing volatilization losses. To minimize losses through bacterial degradation, commence cooling of the samples immediately and transport the samples to the lab as soon as possible, ideally on the day of sampling. Samples must be received at the laboratory within 48 hours of sampling. Freezing can be used to extend the hold time to 14 days, however the practice is difficult to implement in the field and can cause sample breakage.
2. As an alternative, the USEPA has investigated hermetic sample devices that take and seal a single core sample. The sampler is submitted as is to the laboratory where it is extruded into the extracting solvent. Samples must be received at the laboratory within 48 hours of sampling. This technique minimizes volatilization losses and is worth consideration for critical sites. (Note that replicate samplers are necessary for bisulphate and methanol extraction for all samples plus lab duplicates and spikes). Consult the laboratory for the number of samplers required.
3 The USEPA has also approved field preservation. Pre-weighed vials containing known weights of methanol and aqueous sodium bisulphate preservative are sent to the field. Sample cores (≈5 g) are extruded directly into the vial. The vials are sealed, and submitted directly to the laboratory. In practice, this technique requires great care to implement successfully. Losses due to leaking vials, through splashing and effervescence (aqueous bisulphate) can easily occur and make the sample unusable. Consult the laboratory for the number of containers required.

SOP – EDR019 – REV004 – SOIL SAMPLE LOGGING

Title:	Soil Sample Logging
Practice:	EDR
First Effective Date:	August 03, 2013
Version:	004
Version Date:	January 3, 2018
Author:	Francesco Gagliardi and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

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1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 26, 2010	N/A	FG
001	October 31, 2013	Streamlined SOP to focus only on soil sample logging/Added O. Reg. 153/04 compliance section	RLM
002	April 29, 2016	Updated Section 4.0	RLM
003	April 28, 2017	Removed reference to Pinchin West	RLM
004	January 3, 2018	Modified percentages of minor constituents in Section 5.1.3/Clarified when geotechnical terms can be used for soil logging in Section 5.2	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents the methods used to describe the physical characteristics of soil samples collected during site investigations.

The methods and equipment used for retrieving soil samples are provided in other SOPs (e.g., SOP-EDR007 – Borehole Drilling) and will not be repeated herein.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

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- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 General Procedures

For each soil sample collected during a site investigation, the following information is to be recorded in the field log book or field forms in the order presented below:

- Depth;
- Primary soil texture;
- Colour;
- Minor constituents*;
- Noticeable odours;
- Noticeable staining;
- Noticeable free-phase product/sheen*; and
- Moisture content.

*These constituents only need to be noted if they are actually present in the sample.

5.1.1 Primary Soil Texture

The primary soil texture should be determined using the attached flow chart as a guide to help classify the soil.

5.1.2 Colour

Describe the primary colour of the soil sample (e.g., brown, grey, black, green, white, yellow, red). The relative lightness or darkness of the primary colour can be described using the adjectives “light” or “dark” as appropriate. Soil that exhibits different shades or tints is to be described by using two colours (e.g., brown-grey). If the soil sample contains spots of a different colour, this is to be described as “mottling” (e.g., grey with green mottling).

5.1.3 Minor Constituents

Note the presence of minor constituents in the soil that are “natural” materials (e.g., gravel, cobbles, sand, oxidation, etc.) or “man-made” materials (e.g., asphalt, brick, concrete, coal or glass fragments, coal ash, etc.). Gravel comprises particles between 5 millimetres (mm) and 75 mm in diameter. Cobbles comprise particles greater than 75 mm in diameter (approximately the size of a man’s fist) and boulders are particles greater than 150 mm in diameter (approximately the size of man’s head).

When the percentage of the minor constituents in the soil is between approximately 1 and 10%, the adjective used to describe the relative amount of the minor constituent is “trace” (e.g., silty sand with trace brick fragments).

When the percentage of minor constituents of soil is between approximately 10 and 20%, the adjective used to describe the relative amount of the minor constituent is “some” (e.g., silty sand with some concrete fragments).

When the percentage of the “natural” minor soil constituents is between approximately 20 and 35%, the minor soil type is described by adding a ‘y’ or ‘ey’ to the soil type (e.g., silty, sandy, clayey).

When the percentage of the “natural” minor soil constituents is also greater than 35%, the minor soil type is described by using “and” the soil type (e.g., sand and gravel, sand and silt).

When the percentage of the “man-made” minor soil constituents is between approximately 30 and 50%, describe the soil as per the normal procedure and add “with” the minor constituent type(s) (e.g., silty sand with coal ash and brick fragments).

5.1.4 Noticeable Odours

Field staff are not expected to directly smell soil samples to assess the presence/absence of odours.

If it is possible to identify the likely type of odour then this information should be recorded along with a comment on the severity of the odour (e.g., slight, strong, etc.). Identification of specific chemical compounds, such as petroleum hydrocarbons (PHCs) or solvents is acceptable; however, this identification should be referenced as “xxxx-like” (e.g., PHC-like, solvent-like, etc.). This principle also applies when describing staining and free-phase product.

If the odour cannot be readily identified, it should be described in the field notes as “unidentified odour”. If no noticeable odours are observed, this needs to be recorded in the field notes as “no odour”.

5.1.5 Noticeable Staining

Describe the colour and possible source of the staining (e.g., black PHC-like staining).

If no noticeable staining is observed, this needs to be recorded in the field notes as “no staining”.

5.1.6 Noticeable Free-Phase Product/Sheen

Describe the colour, odour, possible composition and relative viscosity (if sufficient product is present to assess) of the product (e.g., dark brown, viscous, motor oil-like product). Identification of the composition of the product is acceptable but needs to be described as PHC-like, motor oil-like. Alternatively, the product can be described as “resembling” a substance (e.g., “resembling motor oil”).

The presence of any observed iridescent sheen is to be recorded in the field notes. Note that the presence of an iridescent sheen by itself in the soil does not constitute the presence of free-phase product but may be an indicator that free-phase product is present within the vicinity of the borehole.

5.1.7 Moisture Content

Describe the moisture content of the soil sample using one of the following three terms:

- Dry – no visible evidence of water and the soil is dry to the touch;
- Moist – visible evidence of water but the soil is relatively dry to the touch. Do not use the term "damp" to describe this type of soil; and
- Wet – visible evidence of water and the soil is wet to the touch. Free water is evident when sandy soil is squeezed. Do not use the term "saturated" to describe this type of soil.

5.1.8 Recording Soil Sample Descriptions in Field Notes

Recording the information in the field notes consistently in the above order will make it easier to prepare the borehole logs for the site investigation report.

Example soil sample descriptions are as follows:

- Sand, grey, trace gravel, PHC-like odours, free-phase PHC-like product, wet;
- Silty sand, brownish-grey, some gravel, trace asphalt and brick fragments, no odours or staining, moist; and
- Silty clay, brown, trace gravel, no odours or staining, moist to wet at 2.4 mbgs.

5.2 General Considerations

Where any physical properties change within a soil sample, the depth at which this transition takes place needs to be recorded. For example, for a soil sample collected from 1.8 to 2.4 metres below ground surface (mbgs), if the upper 0.3 metres has no odours but PHC-like odours are present below this depth then the field notes need to state "no odours from 1.8 to 2.1 mbgs, PHC-like odours from 2.1 to 2.4 mbgs".

Some soil samples will contain a thin seam of a different soil type, such as a sand seam within a silty clay. The depth interval of any such seam is to be recorded in the field notes, and the material comprising the seam should be described separately using the logging procedure outlined above.

Unless soil sampling is being completed as part of a combined environmental/geotechnical investigation and EDR staff logging the soil samples have the appropriate geotechnical training, avoid the use of geotechnical terms (e.g., stiff, dense, high plasticity, etc.) when logging soil samples. If any geotechnical terms are inadvertently included in the field notes by staff who have not had geotechnical training, they must not be included in the borehole logs provided in our report.

5.3 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

None. Following this SOP will be sufficient to comply with the Ontario Regulation 153/04 requirements for Phase Two ESAs with respect to field logging. Risk assessments completed in accordance with Ontario Regulation 153/04 will typically require soil samples to be submitted to a laboratory for full soil texture analysis, but this is beyond the scope of field logging.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

American Society for Testing and Materials, *ASTM D2487-11 - Standard Practice for Classification of Soils for Engineering Purposes (United Soil Classification System)*, 2011.

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended)*, April 2011.

9.0 APPENDICES

Appendix 1 Soil Texture by Feel Chart

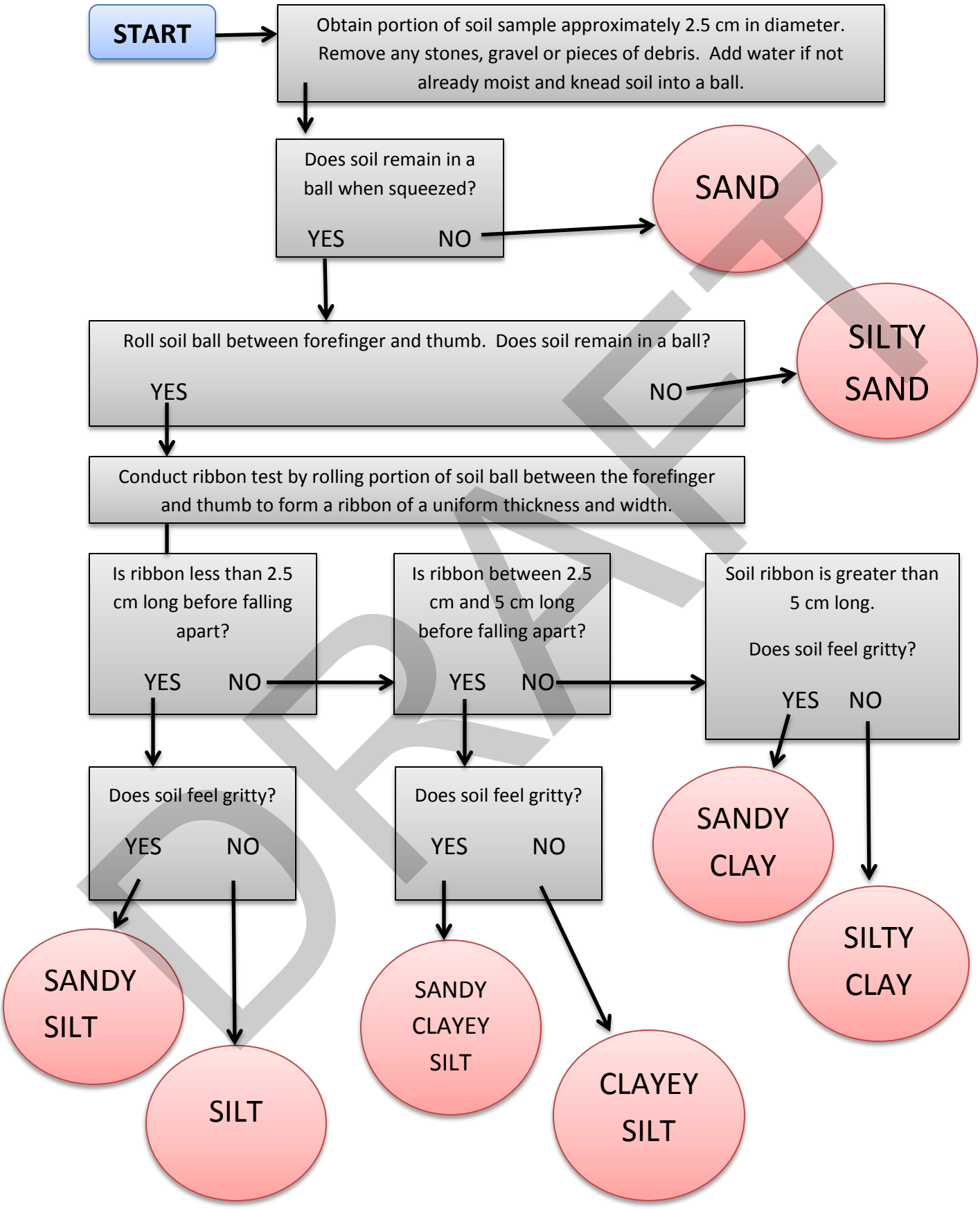
I:\2018 SOP Updates\SOP - EDR019 - REV004 - Soil Sampling Logging.docx

Template: Master SOP Template – February 2014

APPENDIX I

Soil Texture by Feel Chart

Key to Soil Texture by Feel



SOP – EDR025 – REV004 – QA/QC SAMPLING

Title:	QA/QC Sampling
Practice:	EDR
First Effective Date:	January 17, 2014
Version:	004
Version Date:	January 3, 2018
Author:	Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	January 17, 2014	N/A	RLM
001	June 26, 2014	Amended blind duplicate sampling requirements	RLM
002	April 29, 2016	Updated Section 4.0/Amended O.Reg. 153/04 trip blank requirements	RLM
003	April 28, 2017	Removed reference to Pinchin West	RLM
004	January 3, 2018	In Section 5.2.6, clarified order of regular investigative sample and duplicate sample collection	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for collecting soil, water and sediment samples for quality assurance/quality control (QA/QC) purposes.

A QA/QC program is essentially a management system that ensures that quality standards are met within a stated level of confidence. The QC component of the program comprises daily activities in the field and laboratory that are used to control the quality of both the samples collected and the sample analytical data. The QA component of the program is made up of measures used to determine whether the QC activities are effective.

When completing a site investigation, one of our primary goals is to obtain analytical data that are representative of actual soil, water and/or sediment conditions at the site. The completion of a QA/QC program, consisting of the collection and analysis of various QA/QC samples, provides information for use in evaluating the accuracy of the analytical data used to assess the environmental quality of the site.

The type and number of samples comprising the QA/QC program will be determined by the Project Manager on a site-by-site basis, but will typically include at a minimum a trip blank when collecting water samples for volatile parameter analysis and duplicate soil, water or sediment samples. Other types of QA/QC samples may be collected (e.g., equipment or field blanks) to meet project-specific requirements at the discretion of the Project Manager or to meet regulatory requirements.

The QA/QC sampling requirements and procedures for indoor air, soil vapour and sorbent tube samples are described in SOP-EDR012, SOP-EDR018 and SOP-EDR027, respectively.

3.0 OVERVIEW

The types of samples collected for the QA/QC program during site investigations may include the following:

- Trip blanks;
- Field blanks;
- Equipment blanks; and
- Field duplicates.

Trip blanks are used to assess whether ambient air conditions may have resulted in positive bias of water samples collected for volatile parameter analysis during transportation of the sample containers to and from a project site. Note that the term “positive bias” means that reported sample concentrations are greater than actual in situ sample concentrations due to some form of “cross-contamination”.

Field blanks are collected to assess whether ambient air conditions may have resulted in positive bias of samples collected at a project site for volatile parameter analysis at the time of sampling.

Equipment blanks are collected to assess the efficiency of non-dedicated monitoring/sampling equipment cleaning procedures.

Duplicate samples are collected to assess whether field sampling and laboratory analytical methods are suitable and reproducible.

The analytical results of the QA/QC samples are reviewed by the Project Manager to assess whether any data quality issues are evident which may affect the interpretation of the soil, water and/or sediment sample analytical data.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document.

This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and
- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

5.1 Equipment and Supplies

The equipment/supplies required for QA/QC sample collection are the same as that used for regular investigative sampling, except for the following:

- Volatile organic compound (VOC)-free distilled water supplied by the analytical laboratory for use in the collection of field blanks and/or equipment blanks;
- Additional sample jars supplied by the analytical laboratory for the collection of field blanks, equipment blanks and field duplicates; and
- Trip blanks supplied by the analytical laboratory.

5.2 QA/QC Sampling Procedures

5.2.1 General Procedures for QA/QC Blank Sampling

The analytical laboratory that will be completing the analysis of the regular investigative samples and QA/QC samples for a project must supply the water used to collect field blanks and equipment blanks. Water provided by another analytical laboratory or store-bought distilled water must not be used.

5.2.2 Trip Blanks

A trip blank is a set of VOC sample vials filled by the analytical laboratory with VOC-free distilled water and shipped with the sample containers. A trip blank is to be stored with the sample containers provided by the analytical laboratory during travel to the project site, while on the project site, and during travel from the project site back to the analytical laboratory. The sample containers comprising a trip blank are not to be opened in the field.

For some projects, submissions of volatile parameter samples to the analytical laboratory over several days will be required. In this case, a trip blank sample should accompany each submission to the laboratory. If this situation is anticipated, the Project Manager must request that the analytical laboratory provide sufficient trip blanks so that a trip blank can accompany the submission of each set of samples to the laboratory.

Trip blanks are to be analyzed for the same volatile parameters (i.e., VOCs and/or petroleum hydrocarbons (PHCs) (F1 fraction)) as the regular investigative samples. For example, if the groundwater sampling program includes analysis of VOCs and PHCs (F1-F4 fractions), then the trip blank(s) require analysis of VOCs and PHCs (F1 fraction). If the groundwater sampling program only includes VOC analysis, then the trip blank(s) require analysis of VOCs only.

Unless specified by the Project Manager, trip blanks are not required for soil and sediment sampling, or for water sampling involving only non-volatile parameters. At the discretion of the Project Manager and to meet project-specific requirements, trip blanks for non-volatile parameters can be prepared and analyzed using the same principles as for volatile parameter trip blanks.

5.2.3 Field Blanks

A field blank is a set of VOC sample vials filled during a sampling event at a project site with VOC-free distilled water supplied by the analytical laboratory and submitted for analysis of volatile parameters (i.e., VOCs and/or PHCs (F1 fraction)).

Field blanks are to be collected at a sample location considered "worst case" with respect to ambient air conditions (e.g., adjacent to and downwind of the pump island of an active retail fuel outlet, inside an active on-the-premises dry cleaner, etc.). At project sites where there is no obvious "worst case" ambient air location, the field blank can be collected at a sampling location picked randomly. The field blank collection location and rationale for selecting it must be documented in the field notes.

If a groundwater sampling event at a project site occurs over more than one day, a field blank is to be collected for each day of sampling.

Some project sites may have an isolated area where the ambient air conditions are significantly poorer than the remainder of the site and a field blank collected from this area may not be representative of conditions elsewhere on the site. In this case, at the discretion of the Project Manager, the collection of two field blanks may be appropriate, with one field blank collected from the poor ambient air area and one field blank collected from a location outside of this area.

Unless specified by the Project Manager, field blanks are not required for soil and sediment sampling, or for water sampling involving only non-volatile parameters. At the discretion of the Project Manager and to meet project-specific requirements, field blanks for non-volatile parameters can be collected and analyzed using the same principles as for volatile parameter field blanks.

5.2.4 Equipment Blanks

An equipment blank is collected by pouring VOC-free distilled water supplied by the analytical laboratory either over or through non-dedicated sampling/monitoring equipment that has been cleaned following sampling/monitoring using the procedures outlined in SOP-EDR009. The resulting rinsate is then captured in sample containers appropriate for the intended analysis. Note that the surface over which the distilled water is poured must be the surface from which samples are collected from or that is in contact with the medium being monitored. For example, if an equipment blank is being collected from a split-spoon sampler, the distilled water must be poured through the interior of the sampler, and not the exterior of the sampler.

The Project Manager will be responsible for determining the sampling/monitoring equipment from which equipment blanks will be obtained, the number of equipment blanks and the parameters to be analyzed. Regarding the latter, the parameters analyzed for equipment blanks are typically the parameters of concern for a given project site.

5.2.5 Evaluation of Blank Sample Results

The Project Manager will evaluate the results of the blank sample analysis to assess whether these results show that bias may have been introduced to investigative samples collected during the field sampling activities. Judgement by the Project Manager will be required to assess whether the blank sample results have any effect on the interpretation of the investigative sample results. This is assessed on a case-by-case basis, but the following general principles can be applied:

- If all soil, groundwater and/or sediment samples collected for a site investigation meet the applicable environmental standards/criteria, the presence of detectable or elevated parameter concentrations in the blanks has no effect on the interpretation of the investigative sample results;
- If parameters have detectable or elevated concentrations in the blank samples but none of these parameters are present in the regular investigative samples at concentrations exceeding the applicable environmental standards/criteria, the blank sample results have no effect on the interpretation of the investigative sample results;
- If parameters have detectable or elevated parameter concentrations in the blank samples and one or more of these parameters are present in the regular investigative samples at concentrations exceeding the applicable environmental standards/criteria, then positive bias of the regular investigative samples may have occurred. The Project Manager will need to assess a number of variables, including the relative parameter concentrations in the blank and regular investigative samples, to determine whether the regular investigative sample data are considered representative and usable for assessing the environmental quality of the site. If the regular investigative sample data are questionable, then resampling may be required; and
- If the regular investigative samples have exceedances of the applicable environmental standards/criteria and the blank samples have non-detectable parameter concentrations, the blank sample results have no effect on the interpretation of the investigative sample results.

5.2.6 General Procedures for QA/QC Duplicate Sampling

Whenever possible, duplicate samples are to be collected from "worst case" sample locations. The reason for this is that Relative Percent Differences (RPDs) are calculated using the analytical results of the duplicate and regular investigative samples to evaluate the suitability and reproducibility of field sampling and laboratory analytical methods. However, RPDs for a given parameter can only be calculated if there are detectable concentrations in both samples, and "worst case" sample locations are the most likely to have detectable levels of parameters of concern. The calculation and evaluation of RPDs is discussed at the end of this section.

When filling sample containers, the order of collection is to fill the sample container for a particular parameter or parameters for the regular investigative sample first and then fill the sample container for the same parameter or parameters for the duplicate sample second. For example, if groundwater was being sampled for PAHs and metals and a duplicate sample was required, the order of filling the sample containers would regular investigative sample for PAHs, duplicate sample for PAHs, regular investigative sample for metals and duplicate sample for metals.

5.2.7 Field Duplicate Samples – Soil/Sediment

Soils/sediments are frequently heterogeneous because they are typically deposited in horizontal layers over time, causing both small scale and large scale grain size variations that can often result in significant variations in contaminant concentrations between layers. Because of this, it is important that duplicate soil/sediment samples be collected from the same vertical depths as the regular investigative samples in sample cores or at discrete sampling locations (e.g., grab samples).

When collecting a duplicate soil/sediment sample from a sampling device that provides a soil core (e.g., dual-tube sampler, split-spoon sampler), the soil core is to be split in half vertically (i.e., longitudinally). A portion of one half of the core is used for the regular investigative sample and a portion of the other half of the core is used for the duplicate sample. The portion of each core placed in sample jars for analysis must be obtained from the same depth interval within the cores.

When collecting a duplicate soil/sediment sample from a grab sample (e.g., excavation floor or sidewall), the field duplicate sample must be collected as close as possible to the regular investigative sample location at the sample depth and within the same soil layer.

There are no special procedures for collecting field duplicates of composite soil/sediment samples given that the soil/sediment is homogenized during the composite sample collection procedure.

A field duplicate soil/sediment sample must be collected at the same time as the regular investigative sample. Retroactively splitting a soil/sediment sample to obtain a field duplicate sample is not permitted.

5.2.8 Field Duplicate Samples – Surface Water/Potable Water/Groundwater

There are no special procedures for collecting surface water/potable water/groundwater field duplicate samples with the following exceptions:

- When collecting a duplicate water sample for metals analysis and field filtering is required, a new filter is to be used to collect the duplicate sample unless the groundwater has a low sediment content; and
- When collecting a duplicate surface water sample, the sample containers for the same parameter(s) should be immersed in the surface water body at the same location and at the same time whenever possible.

5.2.9 Duplicate Sample Labelling

The duplicate sample should have the term “DUP” in the sample identifier to distinguish it as a duplicate sample.

5.2.10 Evaluation of Duplicate Sample Results

Duplicate sample results are evaluated by calculating RPDs using the following equation:

$$RPD = \frac{\text{Absolute Value (Original Concentration – Duplicate Concentration)}}{\text{(Original Concentration + Duplicate Concentration)/2}} \times 100\%$$

RPDs are not calculated unless the parameter concentrations in both the regular investigative sample and duplicate sample are detectable concentrations above the corresponding practical quantitation limit (PQL) for the parameter, which is equal to five times the lowest laboratory reportable detection limit (RDL).

For example, if the RDL for a parameter is 0.1 parts per million (ppm), and the concentration in the regular investigative sample is 0.4 ppm and the concentration in the duplicate sample is 0.6 ppm, the RPD cannot be calculated because the concentration in the regular investigative sample (0.4 ppm) is less than the PQL of 0.5 ppm (5 times the RDL of 0.1 ppm).

Also, if the regular investigative sample concentration is 2 ppm and the duplicate sample concentration is <1 ppm, then the RPD cannot be calculated regardless of the PQL since detectable concentrations were not reported for both samples.

Calculated RPDs for the regular investigative and field duplicate samples are compared to established performance standards to evaluate the suitability and reproducibility of field sampling and laboratory analytical methods. In Ontario, the Ontario Ministry of the Environment and Climate Change (formerly the Ontario Ministry of the Environment) provides duplicate sample performance standards in the document *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the*

Environmental Protection Act, dated March 9, 2004, amended as of July 1, 2011. Although these performance standards only strictly apply to laboratory duplicate samples, they are considered suitable for comparison to field duplicate samples. Other provinces provide their own similar guidance.

When calculated RPDs exceed the performance standards, the Project Manager will evaluate whether these results have any effect on the interpretation of the investigative sample results. This is judged on a case-by-case basis, but in many situations RPD values above the performance standards can be attributed to small scale heterogeneity inherent in soil samples or variations in the quantity of sediment in groundwater or surface water samples, and are not indicative of poor field sampling or laboratory procedures. The results of internal laboratory QA/QC sampling may provide additional information as to the precision of the data. Furthermore, if all soil, water and/or sediment samples collected for a site investigation meet the applicable environmental standards/criteria, the apparent lack of precision shown by elevated RPD values should not affect the interpretation of the investigative sample results.

Sometimes a regular investigative sample will meet the applicable environmental standards/criteria and its corresponding duplicate sample will fail the applicable environmental standards/criteria (or vice versa). In Ontario, it is permitted to average the parameter concentrations of two samples provided they are collected at the same time and from the same sample location and depth. The resulting average parameter concentrations are then compared with the applicable standards to determine whether the sample meets or fails the standards. This approach is not acceptable in all jurisdictions. In situations where averaging is not acceptable to the regulatory agency, the “worst case” sample result is to be used in assessing the environmental condition of the project site.

5.3 Fieldwork Records

The field notes must include the following information with respect to QA/QC samples:

- The date and time of sampling for all blank/duplicate samples;
- The sample location for field blanks and the rationale for selecting the field blank locations;
- The type of equipment from which a rinsate was collected for equipment blanks and the parameters to be analyzed; and
- The corresponding regular investigative sample location/sample interval for duplicate samples and the parameters to be analyzed.

5.4 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two ESA in accordance with Ontario Regulation 153/04, the QA/QC sampling program must consist of the following as a minimum:

- At least one field duplicate soil, sediment or groundwater sample must be collected for every ten samples submitted for analysis. The frequency is one duplicate sample for one to 10 regular investigative samples, two duplicate samples for 11 to 20 samples, etc. for all parameters analyzed. For example, even if only one groundwater sample is collected for PAHs analysis, a duplicate of this sample must be collected.

When sampling for VOCs, one trip blank sample must be submitted to the laboratory for VOCs analysis for each submission to the laboratory. In other words, if a groundwater sampling program lasts three days and samples are submitted to the laboratory at the end of each day, there must be a total of three trip blanks submitted with the samples (i.e., one per day of sampling). Note that analysis of trip blank samples for other volatile parameters (e.g., PHCs (F1 Fraction)) is not mandatory but can be completed at the discretion of the Qualified Person.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Association of Professional Geoscientists of Ontario, *Guidance for Environmental Site Assessments under Ontario Regulation 153/04 (as amended),* April 2011.

Ontario Ministry of the Environment and Climate Change, *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, March 9, 2004, as amended as of July 1, 2011.

Water, Air and Climate Change Branch, Ministry of Water, Land and Air Protection, Province of British Columbia, *British Columbia Field Sampling Manual*, 2003.

9.0 APPENDICES

None.

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Template: Master SOP Template – February 2014

SOP – EDR026 – REV005 – VERTICAL ELEVATION SURVEYING

Title:	Vertical Elevation Survey
Practice:	EDR
First Effective Date:	April 3, 2014
Version:	005
Version Date:	January 3, 2018
Author:	Kathryn Matheson and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	April 2, 2014	N/A	KM
001	April 22, 2014	Text and figure edits	KM/RM
002	January 22, 2015	Added instruction regarding need to include a least one TP in a survey	RM
003	April 29, 2016	Updated Section 4.0	RM
004	April 28, 2017	Removed reference to Pinchin West	RM
005	January 3, 2018	Minor wording changes throughout	RM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) presents a description of the methods employed for the completion of vertical elevation surveys of monitoring wells.

Relative vertical elevation surveys are typically completed on sites where three or more monitoring wells have been installed in order to allow for the triangulation of groundwater flow direction. The relative vertical elevation surveys completed by Pinchin are typically not used to determine elevations relative to sea level. However, if elevations relative to sea level are needed, a local benchmark with a known geodetic elevation is required.

Two methods are available for the completion of vertical elevation surveys: completion of the survey using a manual scope and survey rod (which requires a two-person team); or completion of the survey using a laser level. The use of a laser level and associated sensor is the most common surveying method used by Pinchin and will be the focus of this SOP. With minor modifications, this SOP can also be used for "conventional" surveying using a manual scope, survey rod and two-person team.

3.0 OVERVIEW

Not applicable.

4.0 DISTRIBUTION

This is an on-line document. Paper copies are valid only on the day they are printed. Refer to the author if you are in any doubt about the accuracy of this document. This SOP will be distributed to all Pinchin staff and others as follows:

- Posted to the SOP section of the Environmental Due Diligence and Remediation (EDR) Practice Line on the Pinchin Orchard; and

- Distributed to senior staff at Le Groupe Gesfor Poirier and Pinchin LeBlanc for distribution as appropriate.

5.0 PROCEDURE

The following terms are used in the completion of a vertical elevation survey:

Temporary Benchmark (TBM): A permanent landmark either on the site, or in a nearby location, which is used as an elevation reference and can be located again if required, including during winter. For our purposes, the benchmark is assigned an arbitrary elevation of 100.00 metres (m). If a geodetic benchmark is available and will be used instead, the elevation of this benchmark relative to sea level is used in lieu of 100.00 m.

Turning Point (TP): A temporary benchmark used to provide a reference point so that the tripod and laser level can be moved to a new location.

Backsight (BS): A reading taken on a point of known or assigned elevation (This will always be the first reading to determine the Height of the Instrument (HI)).

Foresight (FS): A reading taken on a point where the elevation is unknown.

Intermediate Sight (IS): A reading taken that is not a part of the main circuit of the survey. These points are not used as TPs or benchmark readings. Monitoring well elevations are usually recorded as IS.

5.1 Equipment and Supplies

5.1.1 Documents and Information Gathering

- A copy of the Site plan with monitoring well locations;
- A copy of Pinchin's Elevation Survey Sheet obtained from the Pinchin Orchard;
- A copy of this SOP;
- A site-specific Health and Safety Plan (as per the project requirements); and
- Client or site representative's contact details.

5.1.2 Vertical Survey Equipment

- Laser level and associated sensor;
- Tri-pod;
- Survey rod;
- Interface probe and equipment cleaning materials (Optional if water level measurements are required);
- Well keys;
- Tools to open monitoring wells (T-bar, socket set, Allen keys, etc.);

- Extra batteries; and
- Field forms or field log book.

5.2 Theory

Vertical elevation surveys use a benchmark to determine the relative or actual elevation of select points (i.e., monitoring wells). For relative elevation surveys, the benchmark is given an arbitrary elevation of 100.00 m and is used to calculate the relative elevations of the monitoring wells. If a geodetic benchmark is available, the elevation of this benchmark may be used to calculate the actual elevations of the monitoring wells relative to sea level.

BS, FS and IS are measured using a laser level mounted on a tripod. The laser level shoots a beam at a survey rod which is equipped with a sensor. With the rod standing vertically on top of the point to be measured, the field technician moves the laser receiver up the rod until the receiver indicates it is in the right position. The measurement is then read off the rod and recorded on the survey sheet. This process is repeated until measurements are obtained at all required locations.

Vertical elevation surveys are typically completed on a site in the following situations:

- At least three monitoring wells have been installed on-site and determining inferred groundwater flow direction is required;
- The casing or pipe elevation of a well has changed. This could be due to repairs, damage or frost heave;
- New monitoring well(s) have been installed on the site. Note that in this situation, the new monitoring well(s) may be “tied in” to the existing survey by using the original TBM or to at least three of the previously surveyed wells as reference points. If this is not possible, then an entirely new survey must be completed that includes all new and previously installed wells; and
- The survey error exceeds the allowable error.

5.3 Vertical Elevation Survey

The following general procedures and considerations apply to all vertical elevation surveys:

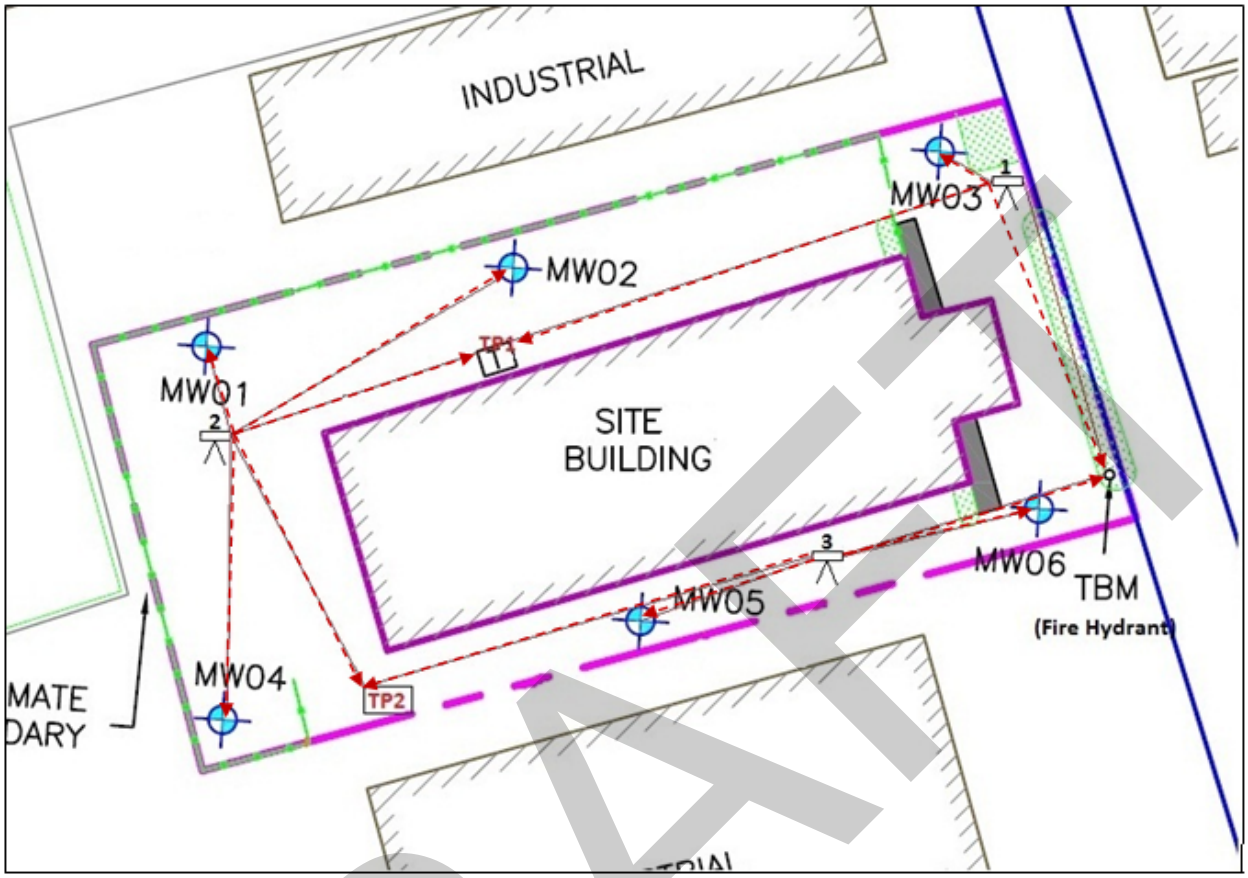
- Prior to use, turn on the laser level and receiver to ensure the batteries are fully charged; and
- Check equipment calibration (Equipment rentals should come with a calibration sheet for the survey equipment).

The following presents the general procedure for vertical elevation surveying:

1. Open all wells and, if required by the Project Manager, monitor the depth to groundwater from the top of the well casing with the interface probe. If the wells are flushmount installations located in an area with vehicle or pedestrian traffic, place a traffic cone or the original well cover over top of each well after it is opened so that the open well doesn't get run over or pedestrians do not trip over the open well.

   Select a permanent fixture to be the TBM whose elevation **should not change over time.** All elevations will be relative to this spot. Good choices for a TBM include concrete pads, gas shut offs, corners of catch basins or fire hydrants. The TBM will be assigned an arbitrary reference elevation of 100.00 m for ease of calculation. *Note: if using a fire hydrant as the TBM, do not use the bolts on the top or sides of the hydrant. If the hydrant is used in the future, the elevation of those bolts may change. Ideally, new personnel should be able to come to the site and reproduce or continue the survey using the same TBM at a later date;*

2. Using the Site Plan, plan the route for the survey. The ideal route requires as few TPs as possible as moving the tri-pod increases the chance of error in the measurements. However, at least one TP is required to create a survey loop and allow the error to be assessed unless a calibrated, self-levelling survey instrument is being used. The survey route must start by taking a BS to the TBM, followed by an IS to each of the well locations. The last shot of the survey will be a FS to the TBM location. Figure 1 below shows an example of a survey route;



3. Once the survey layout is complete, walk the survey route to ensure it is free of obstructions. Next, set up the tripod in a secure location where it is not likely to tip or be knocked over;
4. Hold the survey rod vertically on top of the TBM. Use the leveling bubble on the sensor to ensure the rod is level, and then move the sensor up the rod until it signals it is in the correct position. Record the BS of the TBM on the survey sheet;
5. Use the same method to record IS for the monitoring wells. Record an IS for both the top of casing and grade level for each monitoring well location. The top of casing elevation is to be measured with the survey rod placed at the reference point marked at the time of well installation. If no reference point is marked on the well, one should be added and used for all subsequent elevation survey and depth to groundwater measurements. All FS, BS and IS are to be recorded to the nearest 0.001 m;
6. If it is necessary to move the tri-pod, record the FS to the TP. Next, move the tripod to the new location and shoot a BS back to the TP (see Figure 2). **Make sure the location of the TP does not change between shooting the FS and the BS**;

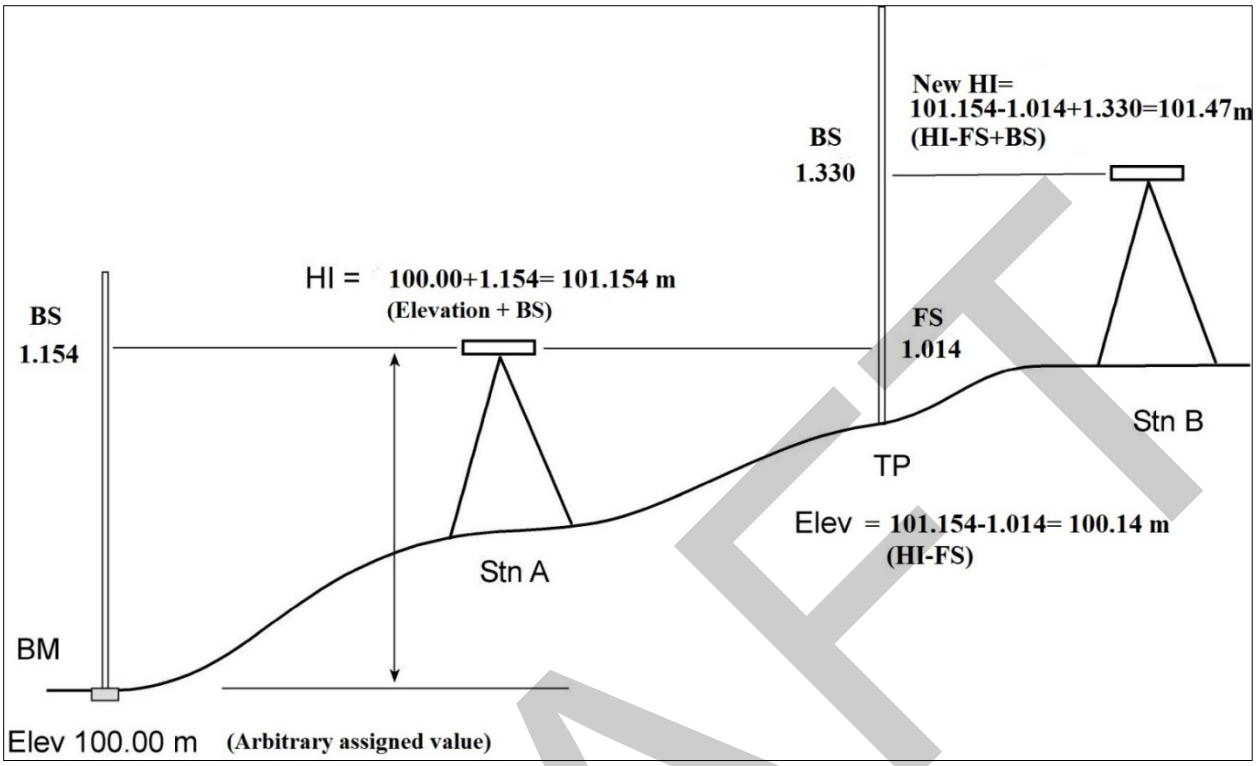


Figure 1: Survey set up from TBM with one TP.

7. Repeat steps 5 and 6 until a top of casing and grade IS have been recorded for all monitoring wells;
8. Record a final FS reading back to the TBM to close the survey; and
9. Perform a field calculation to ensure the survey error is within acceptable limits. The calculated difference between the sum of the FS and the sum of the BS values should be approximately equal. The difference between these values will be equal to the error. If the difference between these values is greater than the allowable error (see Section 5.4), the survey will have to be repeated. If the error is acceptable, the survey is complete and you may leave the site. The remaining calculations may be completed at the office.

5.4 Allowable Error

The acceptable error limit is 3 millimetres (mm) (0.003 m) per TP, with a maximum allowable error of 5 mm per survey. If the total error per survey exceeds 0.003 m per TP or 0.005 m per survey, the survey must be repeated. Common sources of error include:

- Tripod movement;
- Errors in reading the survey rod; and
- Not keeping the TP location consistent between FS and BS readings.

As noted in Section 5.3, an error check must be performed **before leaving the site** to ensure the survey error is within acceptable limits.

5.5 Calculations

Once the survey is complete, calculate the relative elevations of each surveyed point. This can be done in the field or at the office. Calculate each elevation by subtracting the IS values from the height of the instrument. A new HI will need to be calculated following each TP. The following is an example of the survey calculations for the survey layout shown in Figure 1.

PINCHIN ENVIRONMENTAL

ELEVATION SURVEY SHEET

PAGE 1 OF 1

PROJECT #:12345.006 | LOCATION: Survey Town

DATE: April 3, 2014 | TECH:KM | PM:

TEMPORARY BENCHMARK DESCRIPTION: Base of Fire Hydrant in the southeast corner of the Site.

Height of Instrument= Elevation + BS

TBM ELEV= 100.00

IS	BS	HI (ELEV+BS)	FS	ELEV (HI-FS)	DESCRIPTION
	1.154	101.154		100.00	TBM
1.332				99.822	MW03 Top of Casing
1.2105				99.944	MW03 Grade
			1.014		TP1
	1.330	101.47			
1.470				100.00	MW02 Top of Casing
1.354				100.116	MW02 Grade
1.465				100.005	MW01 Top of Casing
1.335				100.135	MW01 Grade
1.521				99.949	MW04 Top of Casing
1.401				100.069	MW04 Grade
			1.109		TP2
	1.156	101.517			
1.2985				100.219	MW05 Top of Casing
1.208				100.309	MW05 Grade
1.440				100.077	MW06 Top of Casing
1.345				100.172	MW06 Grade
			1.516		TP3
				100.001	Error=0.001
Sum=	3.640	Sum=	3.639		

Elevation= HI-IS

Recalculate the height of the instrument after each TP.
New HI = (Last HI)-(FS)+(BS)

Continue elevation calculations with new HI.

Difference between final elevation and original TBM elevation should be less than 0.003 m per turning point or 0.005 m total.

NOTES: Field error calculation= Sum(FS)-sum(BS) = 3.640-3.639 Error=0.001

5.6 Horizontal Survey

A horizontal survey should be completed on every site in conjunction with the vertical elevation survey if not already completed during the borehole drilling/well installation program. To complete a horizontal survey, measure the distance of each of the well locations relative to a nearby permanent or semi-permanent landmark (e.g., corner of the nearest building, fire hydrant, etc.) using a measuring wheel or tape. Measurements are to be made at 90 degree angles relative to the orientation of the landmark, and parallel or perpendicular to the long or short axis of the landmark or to a fixed axis (i.e., relative to true north) as appropriate. Record these measurements in a field book or on the site plan. If required by the Project Manager, measure the UTM coordinates of the well location with a hand-held GPS device.

5.7 General Considerations

When surveying a site where one or more well locations are located inside a building and inaccessible to survey, it is acceptable to survey the concrete foundation of the building in place of the well. If this method is used this must be noted on the survey sheet.

A higher error factor may be acceptable on very large sites and sites where a large number of TPs are used. These situations should be discussed with the Project Manager.

On sites with large elevation changes, the use of a scope and manual survey rod in place of the laser level may be more appropriate. This method requires a two-person team and allows the surveying of sites with large elevation changes without the use of unnecessary TPs. This method should be discussed with the Project Manager prior to use to ensure it meets project budget requirements.

5.8 Additional Considerations for Ontario Regulation 153/04 Phase Two ESA Compliance

When completing a Phase Two Environmental Assessment in accordance with Ontario Regulation 153/04, all surveying work must be undertaken by a licensed Ontario Land Surveyor and this SOP is not applicable.

6.0 TRAINING

The Practice Leader is responsible for identifying the training needs of EDR staff and ensuring that staff are trained and competent before undertaking work assignments.

All trained personnel are responsible for identifying coaching or re-training needs (if they are uncomfortable with work assignments that have been assigned).

The careful application of *Health & Safety Training* by each employee is an integral part of all activities and is assumed as part of this SOP.

7.0 MAINTENANCE OF SOP

1 Year.

8.0 REFERENCES

Canadian Standards Association, *Environmental Investigation Methodology for Contaminated Sites*, 2005.

9.0 APPENDICES

None.

I:\2018 SOP Updates\SOP - EDR026 - REV005 - Vertical Elevation Surveying.docx

Template: Master SOP Template – February 2014

APPENDIX C

Borehole Logs

Log of Borehole: BH201

Project #: 296908.003 **Logged By:** BG

Project: Phase Two Environmental Site Assessment

Client: North American Development Group

Location: 109-129 Park Place Boulevard, Barrie, Ontario

Drill Date: January 13, 2022

SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface						
		Asphalt	0.00					
1		***Sand and Gravel (Aggregate)*** Brown, moist.				S1	0/15	PHCs, VOCs, PCBs
2					100			
1 / 3		***Sand to Silty Sand*** Brown, moist. Trace to some clay.	0.76			S2	0/5	pH
4								
5								
2 / 6						S3	0/8	
7					100			
8						S4	0/0	
9								
3 / 10		Some gravel.						
11						S5	0/5	pH, Grain Size
12					100			
4 / 13						S6	0/5	
14								
15		End of Borehole	4.57					
5 / 16								
17								

No Monitoring Well Installed

Contractor: Strata Drilling Group

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 292.05 mamsl

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH202

Project #: 296908.003 **Logged By:** BG

Project: Phase Two Environmental Site Assessment

Client: North American Development Group

Location: 109-129 Park Place Boulevard, Barrie, Ontario

Drill Date: January 13, 2022

SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface						
0		**Grass**	0.00					
1		**Sand to Silty Sand** Brown, moist. Some gravel.				S1	0/0	PHCs, VOCs, PCBs, pH, Grain Size
2					90	S2	0/0	
3 / 1								
4						S3	0/2	
5					70			
6 / 2						S4	0/2	
7								
8		Trace to some clay.						
9								
10 / 3						S5	0/0	pH, Grain Size
11					100			
12						S6	0/0	
13 / 4								
14								
15		End of Borehole	4.57					
16								
17 / 5								

Contractor: Strata Drilling Group

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 293.84 mamsl

Top of Casing Elevation: NA

Sheet: 1 of 1

Log of Borehole: BH203

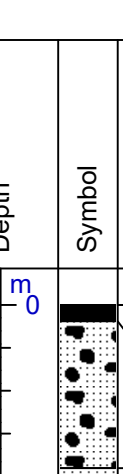
Project #: 296908.003 **Logged By:** BG

Project: Phase Two Environmental Site Assessment

Client: North American Development Group

Location: 109-129 Park Place Boulevard, Barrie, Ontario

Drill Date: January 13, 2022



SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface						
		Asphalt	0.00					
1		***Sand and Gravel (Aggregate)*** Brown, moist.				S1	0/0	PHCs, VOCs, PCBs
2					90			
3 / 1		***Sand to Silty Sand*** Brown, trace gravel, moist.	0.76			S2	0/9	pH
4								
5						S3	0/5	
6 / 2					100			
7						S4	0/0	
8								
9								
10 / 3						S5	0/1	pH, Grain Size
11					80			
12								
13 / 4						S6	0/0	
14								
15		End of Borehole	4.57					
16								
17 / 5								

No Monitoring Well Installed

Contractor: Strata Drilling Group

Drilling Method: Direct Push

Well Casing Size: NA

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 292.98 mamsl

Top of Casing Elevation: NA

Sheet: 1 of 1

APPENDIX D

Residue Management

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B22-03002

Report To:

Pinchin Ltd
80 Tiverton Ct, Suite 110
Markham ON L3R 0G4
Attention: Amanda Brandt

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 31-Jan-22
DATE REPORTED: 04-Feb-22
SAMPLE MATRIX: Soil/Leachate

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Cyanide	1	Kingston	kwe	04-Feb-22	A-CN-001 (k)	SM 4500CN
Fluoride	1	Kingston	kwe	04-Feb-22	A-FI COLOURMETRIC	SM 4500FD
Anions	1	Holly Lane	VK	04-Feb-22	A-IC-01 (o)	SM4110C
Comment	1	Default Site	CS	04-Feb-22	C-Arochlor Comment	-
SVOC	1	Kingston	sge	04-Feb-22	C-NAB-W-001 (k)	EPA 8270
PCB's	1	Kingston	CS	04-Feb-22	C-PCB-03 K	EPA 8082
VOC's	1	Richmond Hill	FAL	03-Feb-22	C-VOC-02 (rh)	EPA 8260

O. Reg. 558 - O. Reg. 558
Schedule 4 - Schedule 4 - Leachate Toxic Criteria

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 31-Jan-22
DATE REPORTED: 04-Feb-22
SAMPLE MATRIX: Soil/Leachate

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		TCLP-COMP1				O. Reg. 558 Schedule 4	
	Sample I.D.		B22-03002-1					
	Date Collected		13-Jan-22					
Parameter	**Units**	**R.L.**						
Cyanide (Free)	mg/L	0.005	< 0.005				20.0	
Fluoride	mg/L	0.1	< 0.1				150.0	
Nitrite (N)	mg/L	0.1	< 1					
Nitrate (N)	mg/L	0.1	< 1					
Nitrate + Nitrite (N)	mg/L	0.1	< 1				1000.0	
Poly-Chlorinated Biphenyls (PCB's)	mg/L	0.00005	< 0.00005				0.3	
Aroclor	-		-					
Benzo(a)pyrene	mg/L	0.0005	< 0.0005				0.001	
Benzene	mg/L	0.05	< 0.05				0.5	
Carbon Tetrachloride	mg/L	0.05	< 0.05				0.5	
Monochlorobenzene (Chlorobenzene)	mg/L	0.8	< 0.8				8.0	
Chloroform	mg/L	1	< 1				10.0	
Dichlorobenzene,1,2-	mg/L	2	< 2				20.0	
Dichlorobenzene,1,4-	mg/L	0.05	< 0.05				0.5	
Dichloroethane,1,2-	mg/L	0.05	< 0.05				0.5	
Dichloroethylene,1,1-	mg/L	0.1	< 0.1				1.4	
Methyl Ethyl Ketone	mg/L	20	< 20				200.0	
Dichloromethane (Methylene Chloride)	mg/L	0.05	< 0.05				5.0	
Tetrachloroethylene	mg/L	0.3	< 0.3				3.0	
Trichloroethylene	mg/L	0.5	< 0.5				5.0	
Vinyl Chloride	mg/L	0.02	< 0.02				0.2	

1 . Elevated RL due to matrix interference

O. Reg. 558 - O. Reg. 558
Schedule 4 - Schedule 4 - Leachate Toxic Criteria

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 31-Jan-22
DATE REPORTED: 04-Feb-22
SAMPLE MATRIX: Soil/Leachate

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

Summary of Exceedances

O. Reg. 558 - O. Reg. 558
Schedule 4 - Schedule 4 - Leachate Toxic Criteria

R.L. = Reporting Limit
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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Christine Burke
Lab Manager

APPENDIX E

Laboratory Certificates of Analysis

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G104263-4

REPORT No. B22-01374

Rev. 1

Report To:

Pinchin Ltd
80 Tiverton Ct, Suite 110
Markham ON L3R 0G4
Attention: Amanda Brandt

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:

P.O. NUMBER: 296908.003
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
% Moisture	5	Richmond Hill	FAL	14-Jan-22	A-% moisture RH	
pH	6	Richmond Hill	HAZ	19-Jan-22	A-pH-02 (rh)	MOEE3530
Comment	4	Default Site	CS	18-Jan-22	C-Arochlor Comment	-
OC Pesticides	4	Kingston	CS	18-Jan-22	C-PESTCL-01 K	EPA 8080
PHC(F2-F4)	4	Kingston	KPR	17-Jan-22	C-PHC-S-001 (k)	CWS Tier 1
PHC(F2-F4)	3	Kingston	SmT	18-Jan-22	C-PHC-S-001 (k)	CWS Tier 1
VOC's	5	Richmond Hill	FAL	14-Jan-22	C-VOC-02 (rh)	EPA 8260
PHC(F1)	5	Richmond Hill	FAL	14-Jan-22	C-VPHS-01 (rh)	CWS Tier 1

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Steve Garrett
Director of Laboratory Services

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G104263-4

REPORT No. B22-01374

Rev. 1

Report To:

Pinchin Ltd
80 Tiverton Ct, Suite 110
Markham ON L3R 0G4
Attention: Amanda Brandt

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH201 S1	DUP 1	BH201 S2	DUP 2	O. Reg. 153	
	Sample I.D.		B22-01374-1	B22-01374-2	B22-01374-3	B22-01374-4	Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	Soil	
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units				8.08	7.90		
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	< 0.3	< 0.3			0.35	
Aroclor	-		-	-				
Acetone	µg/g	0.5	< 0.5	< 0.5			16	
Benzene	µg/g	0.02	< 0.02	< 0.02			0.21	
Bromodichloromethane	µg/g	0.02	< 0.02	< 0.02			13	
Bromoform	µg/g	0.02	< 0.02	< 0.02			0.27	
Bromomethane	µg/g	0.05	< 0.05	< 0.05			0.05	
Carbon Tetrachloride	µg/g	0.05	< 0.05	< 0.05			0.05	
Monochlorobenzene (Chlorobenzene)	µg/g	0.02	< 0.02	< 0.02			2.4	
Chloroform	µg/g	0.02	< 0.02	< 0.02			0.05	
Dibromochloromethane	µg/g	0.02	< 0.02	< 0.02			9.4	
Dichlorobenzene,1,2-	µg/g	0.05	< 0.05	< 0.05			3.4	
Dichlorobenzene,1,3-	µg/g	0.05	< 0.05	< 0.05			4.8	
Dichlorobenzene,1,4-	µg/g	0.05	< 0.05	< 0.05			0.083	
Dichlorodifluoromethane	µg/g	0.05	< 0.05	< 0.05			16	
Dichloroethane,1,1-	µg/g	0.02	< 0.02	< 0.02			3.5	
Dichloroethane,1,2-	µg/g	0.02	< 0.02	< 0.02			0.05	
Dichloroethylene,1,1-	µg/g	0.02	< 0.02	< 0.02			0.05	
Dichloroethene, cis-1,2-	µg/g	0.02	< 0.02	< 0.02			3.4	
Dichloroethene, trans-1,2-	µg/g	0.02	< 0.02	< 0.02			0.084	
Dichloropropane,1,2-	µg/g	0.02	< 0.02	< 0.02			0.05	
Dichloropropene, cis-1,3-	µg/g	0.02	< 0.02	< 0.02				
Dichloropropene, trans-1,3-	µg/g	0.02	< 0.02	< 0.02				

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Steve Garrett
Director of Laboratory Services

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C.O.C.: G104263-4

REPORT No. B22-01374

Rev. 1

Report To:

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80 Tiverton Ct, Suite 110
Markham ON L3R 0G4
Attention: Amanda Brandt

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH201 S1	DUP 1	BH201 S2	DUP 2	O. Reg. 153	
	Sample I.D.		B22-01374-1	B22-01374-2	B22-01374-3	B22-01374-4	Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	Soil	
Parameter	**Units**	**R.L.**						
Dichloropropene 1,3-cis+trans	µg/g	0.02	< 0.02	< 0.02			0.05	
Ethylbenzene	µg/g	0.05	< 0.05	< 0.05			2	
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02	< 0.02	< 0.02			0.05	
Hexane	µg/g	0.02	< 0.02	< 0.02			2.8	
Methyl Ethyl Ketone	µg/g	0.5	< 0.5	< 0.5			16	
Methyl Isobutyl Ketone	µg/g	0.5	< 0.5	< 0.5			1.7	
Methyl-t-butyl Ether	µg/g	0.05	< 0.05	< 0.05			0.75	
Dichloromethane (Methylene Chloride)	µg/g	0.05	< 0.05	< 0.05			0.1	
Styrene	µg/g	0.05	< 0.05	< 0.05			0.7	
Tetrachloroethane,1,1,1,2-	µg/g	0.02	< 0.02	< 0.02			0.058	
Tetrachloroethane,1,1,2,2-	µg/g	0.05	< 0.05	< 0.05			0.05	
Tetrachloroethylene	µg/g	0.05	< 0.05	< 0.05			0.28	
Toluene	µg/g	0.2	< 0.2	< 0.2			2.3	
Trichloroethane,1,1,1-	µg/g	0.02	< 0.02	< 0.02			0.38	
Trichloroethane,1,1,2-	µg/g	0.02	< 0.02	< 0.02			0.05	
Trichloroethylene	µg/g	0.05	< 0.05	< 0.05			0.061	
Trichlorofluoromethane	µg/g	0.02	< 0.02	< 0.02			4	
Vinyl Chloride	µg/g	0.02	< 0.02	< 0.02			0.02	
Xylene, m,p-	µg/g	0.03	< 0.03	< 0.03				
Xylene, o-	µg/g	0.03	< 0.03	< 0.03				
Xylene, m,p,o-	µg/g	0.03	< 0.03	< 0.03			3.1	
PHC F1 (C6-C10)	µg/g	10	< 10	< 10			55	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5			98	
PHC F3 (>C16-C34)	µg/g	10	146	240			300	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Steve Garrett
Director of Laboratory Services

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C.O.C.: G104263-4

REPORT No. B22-01374

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112 Commerce Park Drive
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Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH201 S1	DUP 1	BH201 S2	DUP 2	O. Reg. 153	
	Sample I.D.		B22-01374-1	B22-01374-2	B22-01374-3	B22-01374-4	Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	Soil	
Parameter	**Units**	**R.L.**						
PHC F4 (>C34-C50)	µg/g	10	273 [1]	453 [1]			2800	
PHC F4 (Gravimetric)	µg/g	50	1060	1250 [2]			2800	
% moisture	%		5.7	4.3				

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Note: Sample silica cleaned
3. Reanalyzed upon request from client

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

Steve Garrett
Director of Laboratory Services

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

C.O.C.: G104263-4

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DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH201 S5	BH202 S2	DUP 3	BH203 S1	O. Reg. 153	
	Sample I.D.		B22-01374-5	B22-01374-6	B22-01374-7	B22-01374-8	Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	Soil	
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.24		7.80			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3		< 0.3		< 0.3	0.35	
Aroclor	-			-		-		
Acetone	µg/g	0.5		< 0.5		< 0.5	16	
Benzene	µg/g	0.02		< 0.02		< 0.02	0.21	
Bromodichloromethane	µg/g	0.02		< 0.02		< 0.02	13	
Bromoform	µg/g	0.02		< 0.02		< 0.02	0.27	
Bromomethane	µg/g	0.05		< 0.05		< 0.05	0.05	
Carbon Tetrachloride	µg/g	0.05		< 0.05		< 0.05	0.05	
Monochlorobenzene (Chlorobenzene)	µg/g	0.02		< 0.02		< 0.02	2.4	
Chloroform	µg/g	0.02		< 0.02		< 0.02	0.05	
Dibromochloromethane	µg/g	0.02		< 0.02		< 0.02	9.4	
Dichlorobenzene,1,2-	µg/g	0.05		< 0.05		< 0.05	3.4	
Dichlorobenzene,1,3-	µg/g	0.05		< 0.05		< 0.05	4.8	
Dichlorobenzene,1,4-	µg/g	0.05		< 0.05		< 0.05	0.083	
Dichlorodifluoromethane	µg/g	0.05		< 0.05		< 0.05	16	
Dichloroethane,1,1-	µg/g	0.02		< 0.02		< 0.02	3.5	
Dichloroethane,1,2-	µg/g	0.02		< 0.02		< 0.02	0.05	
Dichloroethylene,1,1-	µg/g	0.02		< 0.02		< 0.02	0.05	
Dichloroethene, cis-1,2-	µg/g	0.02		< 0.02		< 0.02	3.4	
Dichloroethene, trans-1,2-	µg/g	0.02		< 0.02		< 0.02	0.084	
Dichloropropane,1,2-	µg/g	0.02		< 0.02		< 0.02	0.05	
Dichloropropene, cis-1,3-	µg/g	0.02		< 0.02		< 0.02		
Dichloropropene, trans-1,3-	µg/g	0.02		< 0.02		< 0.02		

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Steve Garrett
Director of Laboratory Services

C.O.C.: G104263-4

REPORT No. B22-01374

Rev. 1

Report To:

Pinchin Ltd
80 Tiverton Ct, Suite 110
Markham ON L3R 0G4
Attention: Amanda Brandt

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 13-Jan-22
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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH201 S5	BH202 S2	DUP 3	BH203 S1	O. Reg. 153	
	Sample I.D.		B22-01374-5	B22-01374-6	B22-01374-7	B22-01374-8	Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	Soil	
Parameter	**Units**	**R.L.**						
Dichloropropene 1,3-cis+trans	µg/g	0.02		< 0.02		< 0.02	0.05	
Ethylbenzene	µg/g	0.05		< 0.05		< 0.05	2	
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02		< 0.02		< 0.02	0.05	
Hexane	µg/g	0.02		< 0.02		< 0.02	2.8	
Methyl Ethyl Ketone	µg/g	0.5		< 0.5		< 0.5	16	
Methyl Isobutyl Ketone	µg/g	0.5		< 0.5		< 0.5	1.7	
Methyl-t-butyl Ether	µg/g	0.05		< 0.05		< 0.05	0.75	
Dichloromethane (Methylene Chloride)	µg/g	0.05		< 0.05		< 0.05	0.1	
Styrene	µg/g	0.05		< 0.05		< 0.05	0.7	
Tetrachloroethane,1,1,1,2-	µg/g	0.02		< 0.02		< 0.02	0.058	
Tetrachloroethane,1,1,2,2-	µg/g	0.05		< 0.05		< 0.05	0.05	
Tetrachloroethylene	µg/g	0.05		< 0.05		< 0.05	0.28	
Toluene	µg/g	0.2		< 0.2		< 0.2	2.3	
Trichloroethane,1,1,1-	µg/g	0.02		< 0.02		< 0.02	0.38	
Trichloroethane,1,1,2-	µg/g	0.02		< 0.02		< 0.02	0.05	
Trichloroethylene	µg/g	0.05		< 0.05		< 0.05	0.061	
Trichlorofluoromethane	µg/g	0.02		< 0.02		< 0.02	4	
Vinyl Chloride	µg/g	0.02		< 0.02		< 0.02	0.02	
Xylene, m,p-	µg/g	0.03		< 0.03		< 0.03		
Xylene, o-	µg/g	0.03		< 0.03		< 0.03		
Xylene, m,p,o-	µg/g	0.03		< 0.03		< 0.03	3.1	
PHC F1 (C6-C10)	µg/g	10		< 10		< 10	55	
PHC F2 (>C10-C16)	µg/g	5		< 5		< 5	98	
PHC F3 (>C16-C34)	µg/g	10		< 10		280	300	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

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Steve Garrett
Director of Laboratory Services

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G104263-4

REPORT No. B22-01374

Rev. 1

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Pinchin Ltd
80 Tiverton Ct, Suite 110
Markham ON L3R 0G4
Attention: Amanda Brandt

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DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH201 S5	BH202 S2	DUP 3	BH203 S1	O. Reg. 153	
	Sample I.D.		B22-01374-5	B22-01374-6	B22-01374-7	B22-01374-8	Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22	13-Jan-22	Soil	
Parameter	**Units**	**R.L.**						
PHC F4 (>C34-C50)	µg/g	10		< 10		505 [1]	2800	
PHC F4 (Gravimetric)	µg/g	50				1080 [2]	2800	
% moisture	%			12.4		5.4		

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Note: Sample silica cleaned
3. Reanalyzed upon request from client

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

Steve Garrett
Director of Laboratory Services

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH203 S2	BH203 S5	Field Trip		O. Reg. 153	
	Sample I.D.		B22-01374-9	B22-01374-10	B22-01374-11		Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22		Soil	
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		7.69	7.58				
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3					0.35	
Aroclor	-							
Acetone	µg/g	0.5			< 0.5		16	
Benzene	µg/g	0.02			< 0.02		0.21	
Bromodichloromethane	µg/g	0.02			< 0.02		13	
Bromoform	µg/g	0.02			< 0.02		0.27	
Bromomethane	µg/g	0.05			< 0.05		0.05	
Carbon Tetrachloride	µg/g	0.05			< 0.05		0.05	
Monochlorobenzene (Chlorobenzene)	µg/g	0.02			< 0.02		2.4	
Chloroform	µg/g	0.02			< 0.02		0.05	
Dibromochloromethane	µg/g	0.02			< 0.02		9.4	
Dichlorobenzene,1,2-	µg/g	0.05			< 0.05		3.4	
Dichlorobenzene,1,3-	µg/g	0.05			< 0.05		4.8	
Dichlorobenzene,1,4-	µg/g	0.05			< 0.05		0.083	
Dichlorodifluoromethane	µg/g	0.05			< 0.05		16	
Dichloroethane,1,1-	µg/g	0.02			< 0.02		3.5	
Dichloroethane,1,2-	µg/g	0.02			< 0.02		0.05	
Dichloroethylene,1,1-	µg/g	0.02			< 0.02		0.05	
Dichloroethene, cis-1,2-	µg/g	0.02			< 0.02		3.4	
Dichloroethene, trans-1,2-	µg/g	0.02			< 0.02		0.084	
Dichloropropane,1,2-	µg/g	0.02			< 0.02		0.05	
Dichloropropene, cis-1,3-	µg/g	0.02			< 0.02			
Dichloropropene, trans-1,3-	µg/g	0.02			< 0.02			

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

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Steve Garrett
Director of Laboratory Services

C.O.C.: G104263-4

REPORT No. B22-01374

Rev. 1

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Markham ON L3R 0G4
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DATE RECEIVED: 13-Jan-22
DATE REPORTED: 26-Jan-22
SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D.		BH203 S2	BH203 S5	Field Trip		O. Reg. 153	
	Sample I.D.		B22-01374-9	B22-01374-10	B22-01374-11		Tbl. 3 - RPI	
	Date Collected		13-Jan-22	13-Jan-22	13-Jan-22		Soil	
Parameter	**Units**	**R.L.**						
Dichloropropene 1,3-cis+trans	µg/g	0.02			< 0.02		0.05	
Ethylbenzene	µg/g	0.05			< 0.05		2	
Dibromoethane,1,2-(Ethylene Dibromide)	µg/g	0.02			< 0.02		0.05	
Hexane	µg/g	0.02			< 0.02		2.8	
Methyl Ethyl Ketone	µg/g	0.5			< 0.5		16	
Methyl Isobutyl Ketone	µg/g	0.5			< 0.5		1.7	
Methyl-t-butyl Ether	µg/g	0.05			< 0.05		0.75	
Dichloromethane (Methylene Chloride)	µg/g	0.05			< 0.05		0.1	
Styrene	µg/g	0.05			< 0.05		0.7	
Tetrachloroethane,1,1,1,2-	µg/g	0.02			< 0.02		0.058	
Tetrachloroethane,1,1,2,2-	µg/g	0.05			< 0.05		0.05	
Tetrachloroethylene	µg/g	0.05			< 0.05		0.28	
Toluene	µg/g	0.2			< 0.2		2.3	
Trichloroethane,1,1,1-	µg/g	0.02			< 0.02		0.38	
Trichloroethane,1,1,2-	µg/g	0.02			< 0.02		0.05	
Trichloroethylene	µg/g	0.05			< 0.05		0.061	
Trichlorofluoromethane	µg/g	0.02			< 0.02		4	
Vinyl Chloride	µg/g	0.02			< 0.02		0.02	
Xylene, m,p-	µg/g	0.03			< 0.03			
Xylene, o-	µg/g	0.03			< 0.03			
Xylene, m,p,o-	µg/g	0.03			< 0.03		3.1	
PHC F1 (C6-C10)	µg/g	10			< 10		55	
PHC F2 (>C10-C16)	µg/g	5					98	
PHC F3 (>C16-C34)	µg/g	10					300	

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

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Steve Garrett
Director of Laboratory Services

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G104263-4

REPORT No. B22-01374

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

	Client I.D. / Sample I.D. / Date Collected		BH203 S2 B22-01374-9 13-Jan-22	BH203 S5 B22-01374-10 13-Jan-22	Field Trip B22-01374-11 13-Jan-22		O. Reg. 153 Tbl. 3 - RPI Soil	
Parameter	**Units**	**R.L.**						
PHC F4 (>C34-C50)	µg/g	10					2800	
PHC F4 (Gravimetric)	µg/g	50					2800	
% moisture	%				0.0			

1. F4 Gravimetric analysis required as chromats did not return to baseline.
2. Note: Sample silica cleaned
3. Reanalyzed upon request from client

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

Steve Garrett
Director of Laboratory Services

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DATE RECEIVED: 13-Jan-22
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SAMPLE MATRIX: Soil

JOB/PROJECT NO.:
P.O. NUMBER: 296908.003
WATERWORKS NO.

Summary of Exceedances

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 3 - RPI Soil - Table 3 - Res./Parkland/Institutional Soil Std

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Steve Garrett
Director of Laboratory Services

Grain Size Distribution Chart

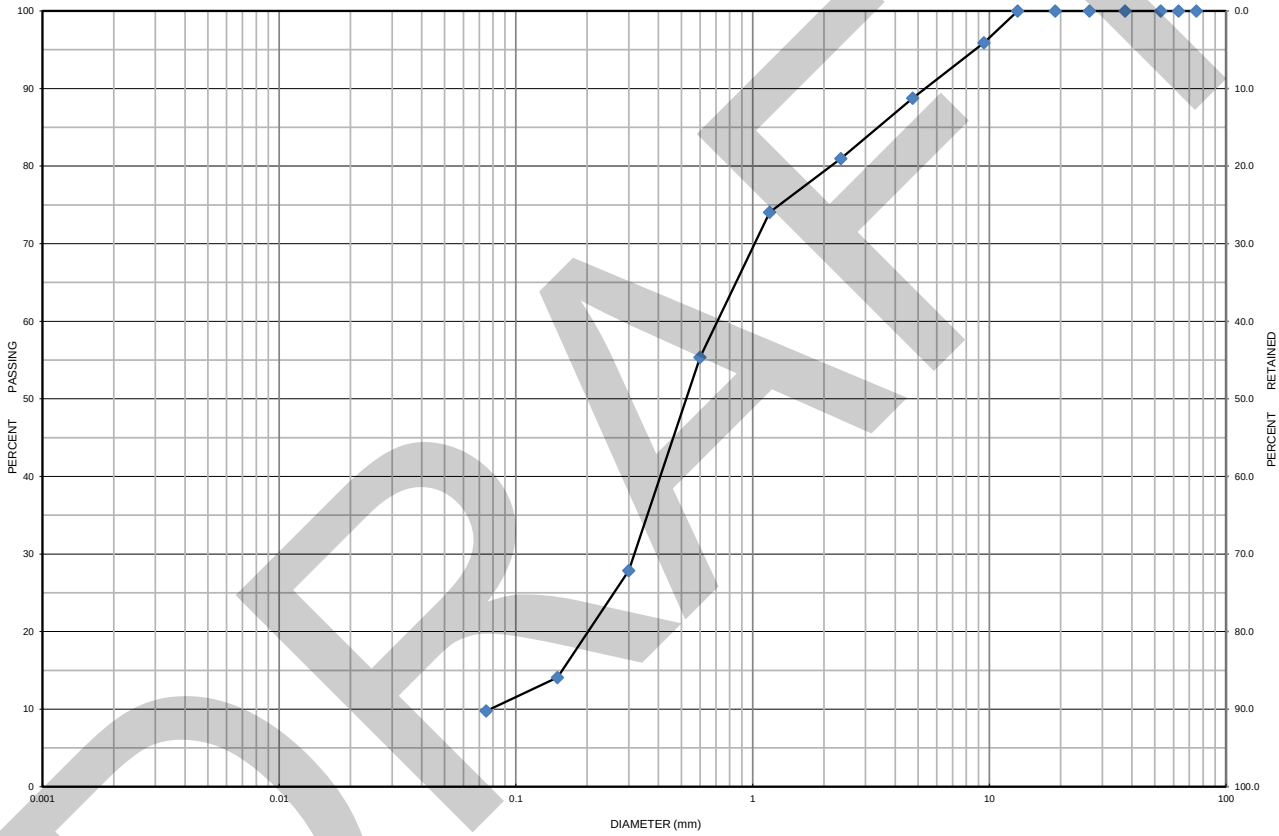
Project Number: *5305-001* **Client:** *Caduceon Environmental Laboratories*

Project Name: *Caduceon Environmental Laboratories*

Sample Date: *January 13, 2022* **Sampled By:** *Client* **Client Project No.:** *B22-01374*

Caduceon Sample No.: *BH 201 S5 (01374-5)* **Lab Sample No:** *S-22-0106*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Caduceon Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 201 S5 (01374-5)		11	79	10		2.4

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand some Gravel some Silt	SW	0.710	0.220	0.080	8.88	0.85

Additional information available upon request

Issued By: _____ *Date Issued:* *January 19, 2022*

(Senior Project Manager)

Cambium Inc. (Laboratory)
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194 Sophia St. | Peterborough | ON | K9H 1E5

Form: L6V.2 - Grad.Hydo

Grain Size Distribution Chart

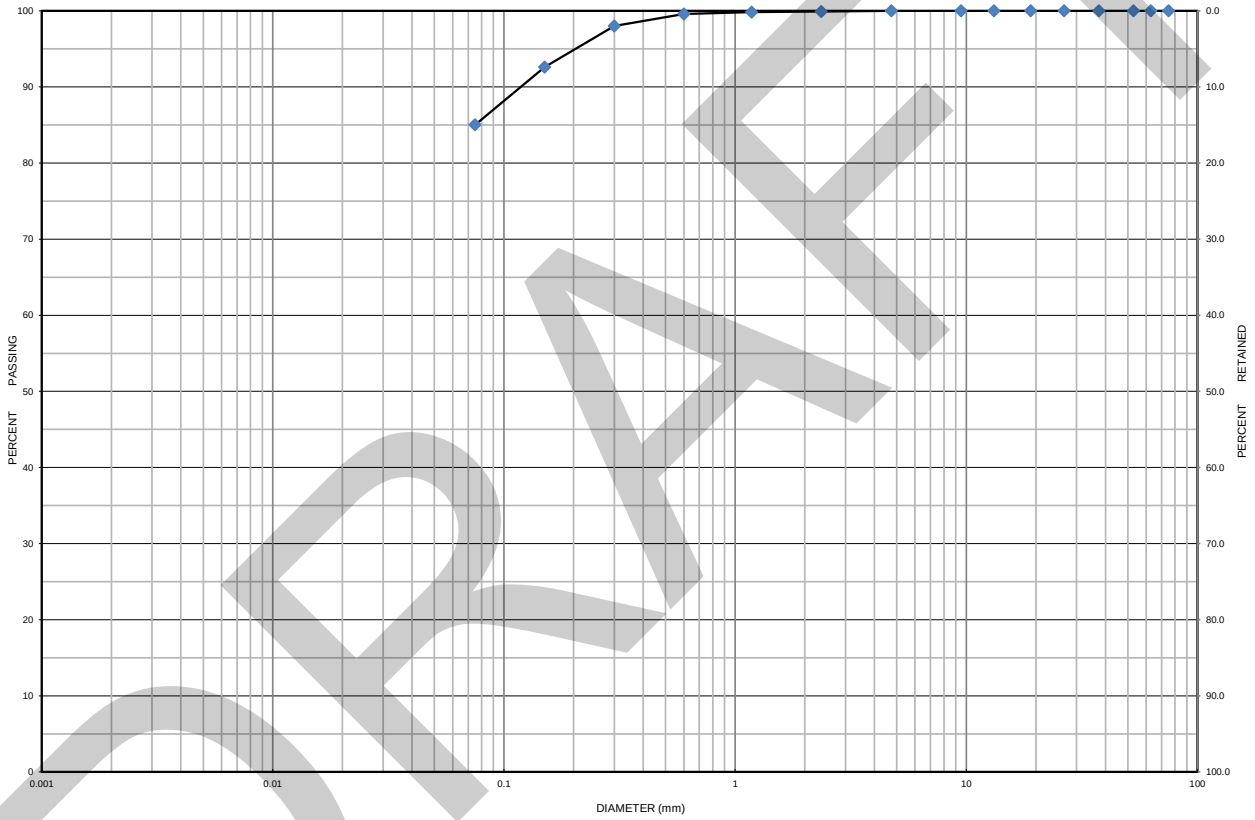
Project Number: *5305-001* **Client:** *Caduceon Environmental Laboratories*

Project Name: *Caduceon Environmental Laboratories*

Sample Date: *January 13, 2022* **Sampled By:** *Client* **Client Project No.:** *B22-01374*

Caduceon Sample No.: *Dup 3 (01374-7)* **Lab Sample No:** *S-22-0107*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Caduceon Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
Dup 3 (01374-7)		0	15	85		21.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt some Sand	ML	-	-	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *January 19, 2022*

(Senior Project Manager)

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Grain Size Distribution Chart

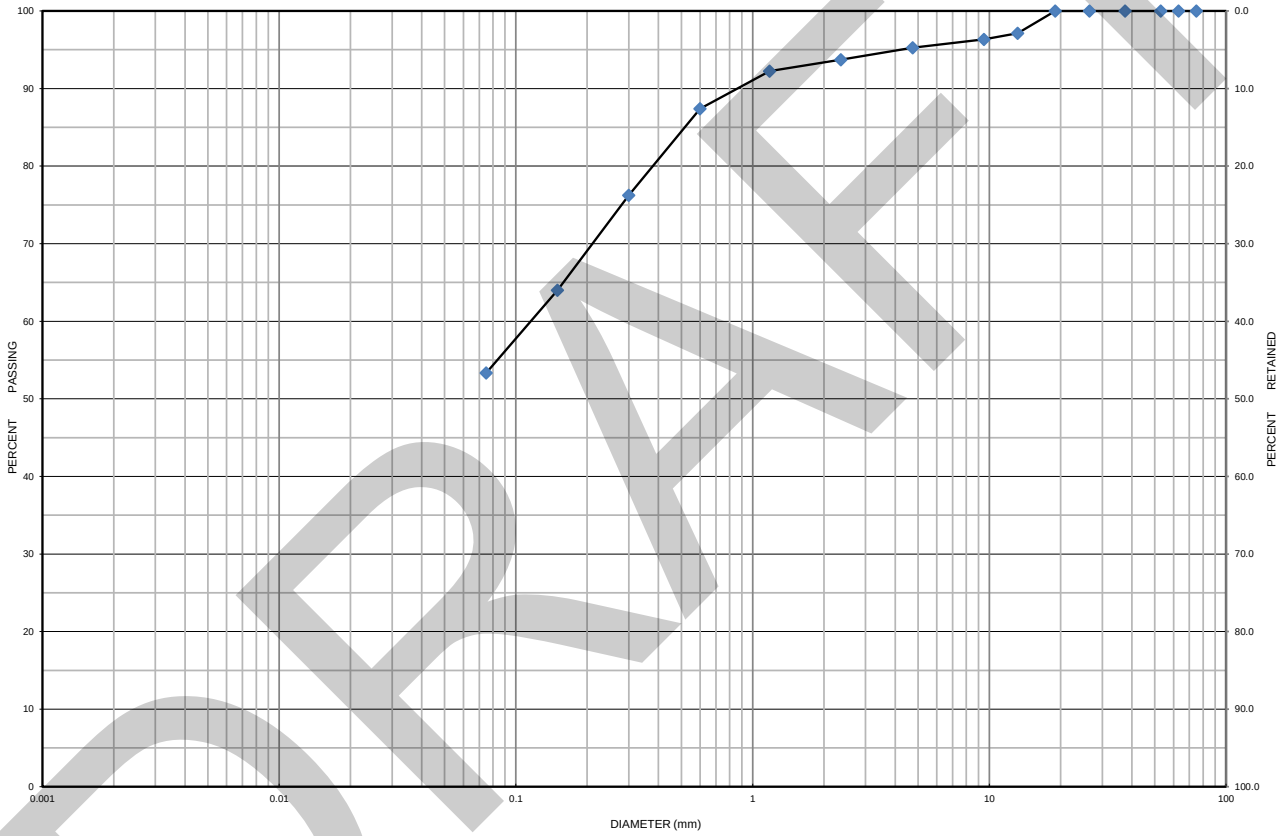
Project Number: *5305-001* **Client:** *Caduceon Environmental Laboratories*

Project Name: *Caduceon Environmental Laboratories*

Sample Date: *January 13, 2022* **Sampled By:** *Client* **Client Project No.:** *B22-01374*

Caduceon Sample No.: *BH 203 S5 (01374-10)* **Lab Sample No:** *S-22-0108*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Caduceon Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 203 S5 (01374-10)		5	42	53		18.5

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt and Sand trace Gravel	ML	0.120	-	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *January 19, 2022*

(Senior Project Manager)

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