Phase Two Environmental Site Assessment

130 Slater Street
Ottawa, Ontario

Prepared for:

KTS Properties
69 Rue Jean-Proulx, Unit 301
Gatineau, QC J8Z 1W2

June 4, 2024

Pinchin File: 334803.001

Issued To:	**KTS Properties**
Issued On:	**June 4, 2024**
Pinchin File:	**334803.001**
Issuing Office:	**Kanata, ON**

Alicia

Author:
Alicia McDonald, P.Eng., QP$_{\text{ESA}}$
Senior Project Manager
613.840.6147
amcdonald@pinchin.com

Scott Mather

Reviewer:
Scott Mather, P.Eng., QP$_{\text{ESA}}$
Director, Eastern Ontario
613.851.4098
smather@pinchin.com

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

1.0 EXECUTIVE SUMMARY

Pinchin Ltd. (Pinchin) was retained by KTS Properties (Client), to complete a Phase Two Environmental Site Assessment (Phase Two ESA) of the property located at 130 Slater Street in Ottawa, Ontario (hereafter referred to as the Site or Phase Two Property). The Phase Two Property is presently developed with 13-storey, multi-tenant commercial office/retail building (Site Building).

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 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*, which was last amended by Ontario Regulation 274/20 on July 1, 2020 (O. Reg. 153/04).

The objectives of this Phase Two ESA were to assess the soil and groundwater quality in relation to six 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 March 18, 2024 and March 27, 2024, and consisted of the following:

- Initial investigation of the APECs.

The initial APECs investigation included the advancement of four boreholes at the Phase Two Property, all of which were completed as groundwater monitoring wells to facilitate the sampling of groundwater and the assessment of groundwater flow. The boreholes were advanced to depths ranging from approximately 0.61 to 2.3 metres below ground surface (mbgs) where refusal was met on inferred bedrock. 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), polycyclic aromatic hydrocarbons (PAHs) and/or metals. The boreholes were subsequently advanced into the underlying bedrock to permit groundwater sampling. In addition, groundwater samples were collected from each of the newly-installed monitoring wells and submitted for laboratory analysis of VOCs, PHCs, PAHs and/or metals.

Based on Site-specific information, the applicable regulatory standards for the Phase Two Property were determined to be the *"Table 3: Full Depth Generic Site Condition Standards in a Non-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 3 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 3 Standards*, except for the following:

- The concentrations of PHC F1 (332 micrograms per gram (µg/g) vs. the *Table 3 Standard* of 65 µg/g) and PHCs F2 (357 µg/g vs. the *Table 3 Standard* of 150 µg/g) reported for soil sample MW4-S5, collected at borehole MW4 from a depth of 2.7 to 3.1 mbgs, exceeded the *Table 3 Standards*.

The laboratory results for the submitted groundwater samples indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 3 Standards*.

With respect to the identified soil parameter exceedances summarized above, soil remediation to reduce the concentrations of the above-listed parameters to levels below the *Table 3 Standards* is required, otherwise the completion of a Risk Assessment in accordance with O. Reg. 153/04 will be required to develop PSS for the parameters exceeding the *Table 3 Standards* before an RSC can be filed for 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 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 objectives of this Phase Two ESA were to assess the soil and groundwater 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*, *130 Slater Street, Ottawa, Ontario*”, completed by Pinchin for the Client and dated February 1, 2024. 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, and the Phase One Property and Phase Two Property have the same boundaries.

2.1 Site Description

This Phase Two ESA was completed for the property located at the municipal address of 130 Slater Street, Ottawa, Ontario. The Phase Two Property is 0.16 hectares (0.4 acres) in size and is bounded by Slater Street to the north, and commercial properties to the east, south and west. 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 Phase Two Property is developed with a 13-storey multi-tenant commercial office building (Site Building), with two basement levels. Outside of the Site Building, the Phase Two Property is developed with surface level asphalt-paved parking areas and access routes.

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 Drawing provided by the Client, Service Ontario Parcel Register	Lots 48 and 49 of Registered Plan 3922, Ottawa
Municipal Address	Client	130 Slater Street, Ottawa, Ontario, K1P 6E2
Parcel Identification Number (PIN)	Client	04115-0304 (LT)
Current Owner	Client	KTS Properties
Owner Contact Information	Client	15129931 Canada Inc. 265 Carling Avenue Suite 401 Ottawa, Ontario K1S 2E1
Current Occupants	Client	Multi-tenant commercial office/retail
Client	Authorization to Proceed Form for Pinchin Proposal	KTS Properties
Client Contact Information	Authorization to Proceed Form for Pinchin Proposal	Tanya Chowieri c/o KTS Properties 69 Rue Jean-Proulx, Unit 301 Gatineau, QC, J8Z 1W2
Site Area	Client	1,619 m^2 (0.4 acres)
Current Zoning	Client	MD S37 – Mixed-Use Downtown Zone
Centroid UTM Co-ordinates	Google Earth	445519 Easting
		5029917 Northing
		Zone 18T

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 15129931 Canada Inc., located at 265 Carling Avenue, Suite 401, in Ottawa, Ontario. Contact information for the Phase Two Property owner is provided in the preceding section.

Pinchin was retained by Ms. Tanya Chowieri of the Client to conduct the Phase Two ESA of the Site. Contact information for Ms. Chowieri 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 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 currently a commercial property located within the City of Ottawa and the proposed future land use is residential. It is Pinchin's understanding that drinking water for the Phase Two Property and surrounding properties within 250 metres of the Phase Two Property is supplied by the City of Ottawa, and there are no known drinking water supply wells within 250 metres of the Phase Two Property. Source water is obtained by the City of Ottawa from the Ottawa River.

The depth to bedrock at the boreholes completed at the Phase Two Property during the Phase Two ESA ranged from 0.6 to 2.3 metres below floor surface (mbfs) in the second-level basement, which is approximately 6.7 to 8.4 mbgs. As such, based on the available information, the depth to bedrock is interpreted to be greater than two mbgs over more than two-thirds of the Phase Two Property 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 two representative soil samples 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 one-third 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 3 Standards for:

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

As such, all analytical results have been compared to these *Table 3 Standards*.

3.0 BACKGROUND INFORMATION

3.1 Physical Setting

The elevation of the Phase Two Property, based on information obtained from the Ontario Base Map series, is approximately 70 m above mean sea level (mamsl). The general topography in the local and surrounding area is generally flat and the Phase Two Property is at a similar elevation to the adjacent/surrounding properties. No bedrock outcrops were observed on-Site or in the surrounding area. 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 the Ottawa River located approximately 600 m north-northwest of the Phase Two Property at an elevation of approximately 40 mamsl.

A review of the municipal plan for the City of Ottawa indicated that the Phase One Study Area is not located in whole or in part within a well head protection area or other designation identified by the City of Ottawa for the protection of groundwater.

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 "*Phase I Environmental Site Assessment, The National Building, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Slate Properties Inc., and dated October 21, 2005 (2005 Pinchin Phase I ESA Report).
- Report entitled "*Phase I Environmental Site Assessment, The National Building, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Slate Properties Inc., and dated May 8, 2009 (2009 Pinchin Phase I ESA Report);
- Report entitled "*Phase II Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Arcturus Realty Corporation, and dated January 19, 2010 (2010 Pinchin Phase II ESA Report);
- Report entitled "*Phase I Environmental Site Assessment Update, The National Building, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Slate Properties Inc., and dated April 26, 2011 (2011 Pinchin Phase I ESA Update Report);
- Report entitled "*Phase I Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Dream Office Management Corp., and dated May 9, 2017 (2017 Pinchin Phase I ESA Report); and
- Report entitled "*Phase I Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario*" prepared by Le Groupe Gesfor (Gesfor) for Groupe Mach and dated September 20, 2022 (2022 Gesfor Phase I ESA Report).

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

2005 and 2009 Pinchin Phase I ESA Reports

The Phase I ESAs completed by Pinchin in October 2005 and May 2009 consisted of historical reviews, a review of surrounding properties, a regulatory database search, and interviews as well as an exterior assessment of the Phase One Property.

The results of the 2005 and 2009 Pinchin Phase I ESA Reports indicated that there were no significant potential environmental concerns associated with the current or historical use of the Phase One Property and adjacent properties and as such, no further environmental assessment work was recommended.

2010 Pinchin Phase II ESA Report

The Phase II ESA completed by Pinchin in January 2010 was conducted in order to investigate the potential environmental concerns associated with a former aboveground storage tank (AST) and associated fuel pump removed from the second basement level of the Site Building in July 2008. The 2010 Pinchin Phase II ESA Report detailed the advancement of three boreholes located in the interior portion of the second basement level within the Site Building, in the vicinity of the former AST and associated fuel pump. Three soil samples were collected from the boreholes and submitted for laboratory analyses of petroleum hydrocarbons (PHCs) in the F1 to F4 fractions (F1-F4) and benzene, toluene, ethylbenzene and xylene (BTEX).

Criteria used for the evaluation of soil and groundwater laboratory analysis results were the generic Table 3 Standards (industrial/commercial/community land use in a non-potable groundwater environment), as stipulated in the former MECP document entitled "*Guideline for Use at Contaminated Sites in Ontario*", and dated March 9, 2004 (*2004 Table 3 Standards*).

The results of the laboratory analysis for the soil and groundwater samples indicated that the concentrations of the parameters tested (PHCs (F1-F4) and BTEX) were below the *2004 Table 3 Standards*.

Based on the results of the 2010 Pinchin Phase II ESA Report, no further work was warranted with respect to the environmental concerns associated with the boreholes.

Pinchin compared the values reported in the 2010 Pinchin Phase II ESA Report to the revised Table 3 (industrial/commercial/community land use in a non-potable groundwater condition) guidelines, as outlined in the MECP document entitled "*Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", and dated April 15, 2011 (*2011 Table 3 Standards*). Based on the results of the 2011 Pinchin Phase II ESA Report, it is Pinchin's opinion that the Phase One Property would comply with the *2011 Table 3 Standards*.

2011 Pinchin Phase I ESA Update and 2017 Pinchin Phase I ESA Reports

The Phase I ESA Update and ESA completed by Pinchin in April 2011 and May 2017 consisted of historical reviews, a review of surrounding properties, a regulatory database search, and interviews as well as an exterior assessment of the Phase One Property. In addition, Pinchin reviewed the above-noted reports prepared for the Phase One Property.

The results of the 2011 Pinchin Phase I ESA Update and 2017 Pinchin Phase I ESA Reports indicated that there were no significant potential environmental concerns associated with the current and historical use of the Phase One Property and adjacent properties and as such, no further environmental assessment work was recommended.

2022 Gesfor Phase I ESA Report

The Phase I ESA completed by Gesfor in September 2022 consisted of historical reviews, a review of surrounding properties, a regulatory database search, and interviews as well as an exterior assessment of the Phase One Property. In addition, Gesfor reviewed the above-noted reports prepared for the Phase One Property.

The results of the 2022 Gesfor Phase I ESA Report indicated that there were no significant potential environmental concerns associated with the current and historical use of the Phase One Property and adjacent properties and as such, no further environmental assessment work was recommended.

3.2.2 Pinchin Phase One ESA Summary

From December 19, 2023 through February 1, 2024, 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 three months 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 six 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 (on-Site PCAs) and Figure 5 (off-Site PCAs). APECs at the Phase Two Property are illustrated on Figure 6.

3.2.3 Use of Previous Analytical Data

The soil and groundwater data from the 2010 Pinchin Phase II ESA Report were obtained more than five years ago, and are considered too old and potentially unrepresentative of current conditions at the Phase Two Property. As such, no soil and groundwater quality data from 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, 130 Slater Street, Ottawa, Ontario*", dated March 14, 2024, 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 maximum depths ranging between approximately 6.1 and 7.6 mbgs.
- Retained Strata Drilling Group Inc. (Strata) to advance boreholes and complete monitoring well installations using a Pionjar^{TM} electric drill rig. Strata is licensed by the MECP in accordance with Ontario Regulation 903 (as amended) (O. Reg. 903) to undertake borehole drilling/well installation activities. Strata advanced four boreholes at the Phase Two Property to investigate the potential for soil contaminants associated with the APECs identified in the Phase One ESA. All four of the advanced boreholes were instrumented with a monitoring well in accordance with O. Reg. 903 for the purpose of monitoring hydrogeological conditions and groundwater quality on-Site.
- 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:
  - PHCs F1-F4;
  - VOCs;
  - PAHs; and/or
  - Metals.
- Developed each of the newly-installed monitoring wells prior to the collection of groundwater samples.
- Submitted one representative groundwater sample from each of the newly-installed monitoring wells for the chemical analysis of the following parameters:
  - PHCs F1-F4;
  - VOCs;
  - PAHs; and/or
  - Metals.
- Submitted one duplicate soil sample and one duplicate groundwater sample for chemical analysis of the above-noted parameters for quality assurance/quality control (QA/QC) purposes.
- Submitted one trip blank for the groundwater sampling program for the chemical analysis of VOCs for QA/QC purposes.
- Submitted two representative soil samples for the laboratory analysis of grain size and pH in order to confirm the appropriate MECP Site Condition Standards.
- Conducted groundwater monitoring at each of the newly-installed groundwater monitoring wells by measuring depth to groundwater from both top of casing and ground surface reference points, and assessing the presence/absence of non-aqueous phase liquid (NAPL) using an oil/water interface probe.
- Compared the soil and groundwater analytical results to the applicable criteria stipulated in the *Table 3 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 were soil and groundwater. Pinchin included the assessment of groundwater as part of the Phase Two ESA to investigate groundwater quality in relation to a former on-Site UST (APEC-1), historical on-Site printing operations and associated ink storage (APEC-2 and APEC-3), the application of road salt to parking areas on-Site (APEC-4), and potential subsurface contamination migrating from off-Site PCAs (APEC-5 and APEC-6). Note that due to the historical industrial land use at the Phase Two Property, the Phase Two Property is an enhanced investigation property requiring mandatory sampling and analysis of groundwater. 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 four 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.

For assessing the groundwater at the Phase Two Property for the presence of COPCs, groundwater monitoring wells were installed in all boreholes completed at the Phase Two Property to permit the collection of groundwater samples. Groundwater samples, comprising samples collected from each of the newly installed monitoring wells (i.e., MW1, MW2, MW3 and MW4) were submitted to the analytical laboratory for 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 6, 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 consists of one legal lot situated at the municipal address of 130 Slater Street, Ottawa, Ontario and is currently owned by 15129931 Canada Inc. The Phase One Property is located immediately southeast of Slater Street, approximately 40 m southwest of the intersection between Slater Street and Metcalfe Street. The Phase One Property is developed with a 13-storey multi-tenant commercial office/retail building (Site Building) possessing the municipal address of 130 Slater Street;
- The nearest surface water body is the Ottawa River located approximately 600 m north-northwest of the Phase One Property at an elevation of approximately 40 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;
- The adjacent and surrounding properties in the vicinity of the Phase One Property consist of commercial, residential and institutional land uses. The properties located northwest, northeast and southwest of the Phase One Property consist of commercial developments and associated roadways to beyond 200 m from the Phase One Property; and the properties located southeast of the Phase One Property consist of institutional developments, commercial developments and associated roadways to beyond 200 m from the Phase One Property;
- A total of eight PCAs were identified within the Phase One Study Area, consisting of four PCAs at the Phase One Property and four PCAs within the Phase One Study Area, outside of the Phase One Property. As shown on Figure 5, two of the off-Site PCAs are less than 10-L of glycol/water solution spilled into a catch basin at the property located adjacent to the northeast elevation of the Phase One Property on January 10, 2013 and an automotive repair/servicing facility with an associated UST was located approximately 40 m west of the Phase One Property in the 1963 FIP. Groundwater flow within the Phase One Study Area is interpreted to be to the northwest towards the Ottawa River and these off-Site PCAs are inferred to be down/transgradient of the Phase One Property. Given that these PCAs are located at down/transgradient properties, these off-Site PCAs are not considered to result in APECs at the Phase One Property. All other PCAs identified within the Phase One Study Area represent APECs at the Phase One Property. Figure 6 provides a detailed summary of the APECs and associated PCAs and COPCs;

- Underground utilities at the Phase One Property provide potable water, natural gas, electrical, telephone, and sewer services to the Site Building. These services enter the Site Building through subsurface conduits, with the exception of a pressurized natural gas line, which connects to meters located along the exterior of the Site Building;
- The Phase One Property and the surrounding properties located within the Phase One Study Area are located within alluvial deposits consisting of stratified gravel, sand, silt and clay. Bedrock is expected to consist of sedimentary rocks consisting of limestone, dolomite, shale, argillite, sandstone, quartzite, and/or grit; and
- The Phase One Property is relatively flat. Local groundwater flow is inferred to be to the north-northwest, based on the nearest surface water body.

The Phase One Property has a paved parking area located southeast of the Site Building. According to the Site Representatives, salt has historically been applied to the parking area for safety reasons during winter conditions to remove snow and ice, which represents a PCA at the Phase One Property. However, it is the opinion of the QP_{ESA} 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, this PCA does not need to be further 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

No notable constraints and limitations with respect to the SAP were documented during the field activities, and as such Pinchin has conducted the Phase Two ESA in a manner generally consistent with the SAP provided in Appendix B.

4.5 Impediments

Pinchin had full access to the Phase Two Property throughout the completion 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.

In addition, Pinchin's SOP for groundwater sampling using low-flow purging and sampling procedures follows the United States Environmental Protection Agency Region I document entitled *"Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells"* dated January 19, 2010 (Low Flow Sampling Protocol).

5.2 Drilling and Excavating

Pinchin retained Strata to advance a total of four boreholes (MW1 through MW4) at the Phase Two Property on March 18 to March 22, 2024 to investigate the potential presence of COPCs associated with the APECs identified in the Phase One ESA. All of the advanced boreholes (MW1 through MW4) were completed as monitoring wells in accordance with O. Reg. 903 for the purpose of monitoring hydrogeological conditions and groundwater quality on-Site. The boreholes were drilled to a maximum depth of 7.6 mbgs using a Pionjar™ electric drill rig. Upon completion of the drilling and monitoring well installations, Strata completed and filed a Water Well Record with the MECP for the well cluster in accordance with O. Reg. 903.

The locations of the boreholes and monitoring wells are provided on Figure 7. Section 6.10.2 includes a table summarizing the boreholes and monitoring wells 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. Well completion details and elevation data are provided in Table 4 and on the borehole logs provided 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 extraction of soil samples from the interior of the sampling device (where possible), rather than from areas in contact with the sampler walls.
- 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 0.61 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 5.61 centimetre (cm) outer 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 AGAT Laboratories (AGAT Labs) in Mississauga, Ontario. Formal chain of custody records were maintained between Pinchin and the staff at AGAT Labs.

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 fill material comprised of sand and gravel and/or sandy silt, to a maximum investigation depth of approximately 2.3 mbgs. Moist to wet soil conditions were generally observed between 0.46 and 2.3 mbgs.

No odours or staining were observed in the soil samples collected during the borehole drilling program, with the exception of soil sample S5 collected at borehole MW4 at a depth of 2.74 to 3.05 mbgs which exhibited PHC-like odours.

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 0.1 parts per million (ppm). The PID was calibrated prior to field use by the equipment supplier, Maxim Environmental and Safety Inc. (Maxim) according to Maxim’s standard operating procedures. In addition, the PID calibration was tested at the beginning of each day of drilling activities (beginning on the second day of drilling) against a Maxim-provided isobutylene gas standard with a concentration of 100 ppm. The gas standard was stored in a gas cylinder and delivered to the PID via a regulator valve. 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™ 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 Maxim according to Maxim’s standard operating procedures. In addition, the CGI calibration was tested at the beginning of each day of drilling activities (beginning on the second day of drilling) against a Maxim-provided hexane gas standard with a concentration of 400 ppm. The gas standard was stored in a gas cylinder and delivered to the CGI via a regulator valve. 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%.

In general, the soil samples with the highest measured vapour concentrations (i.e., “worst case”) from a given borehole were submitted for laboratory analysis. Sample depth and visual and olfactory observations of potential contaminants were also used in conjunction with the vapour concentrations in making the final selection of “worst case” soil samples for laboratory analysis.

5.5 Groundwater Monitoring Well Installation

Following soil sampling, Strata installed a groundwater monitoring well in boreholes MW1 through MW4, under the full-time monitoring of a Pinchin field representative. To accommodate the well installations, each borehole was cored into the underlying shale and limestone bedrock using the Piojar™ drill rig.

The monitoring wells were constructed with 32-millimetre (1 ¼ -inch) inner diameter (ID) flush-threaded schedule 40 polyvinyl chloride (PVC) risers followed by a 3.1 metre length of No. 10 slot PVC screen. Each well screen was sealed at the bottom using a threaded cap and each riser was sealed at the top with a lockable J-plug cap. Silica sand was placed around and above the screened interval to form a filter pack around the well screen. A layer of bentonite was placed above the silica sand and was extended to just below the ground surface. A bentonite seal was then placed between the riser and outer casing. A protective flush-mount cover was installed at the ground surface over each riser pipe and outer casing and cemented in place.

All monitoring wells were installed in accordance with O. Reg. 903. The monitoring well construction details are provided in Table 4 and on the borehole logs in Appendix C. Upon completion of the monitoring well installations, Strata completed and filed a Water Well Record with the MECP for the well cluster.

No additional soil sampling or groundwater sampling was completed during the well installations.

The monitoring wells were developed on March 26, 2024 in accordance with Pinchin's SOP for well development by removing a minimum of three to a maximum of seven standing water column volumes using a dedicated inertial pumps comprised of Waterra polyethylene tubing and foot valves. The well development activities were completed a minimum of 24 hours prior to the groundwater sampling activities.

Measures taken to minimize the potential for cross-contamination during well installation and well development included the following:

- The use of dedicated and disposable nitrile gloves for handling well materials during well installation and during well development.
- The use of dedicated inertial pumps for each well.

5.6 Groundwater Field Measurements of Water Quality Parameters

Water quality parameters were measured during the low-flow purging and sampling procedure completed on March 27, 2024 at monitoring wells MW1 through MW4.

Measurements of the water quality parameters oxidation-reduction potential, dissolved oxygen, temperature, specific conductance, pH and turbidity were made during purging using a flow-through cell and a Horiba™ water quality meter (Horiba Water Quality Meter). The Horiba Water Quality Meter was calibrated prior to use by the equipment supplier (Maxim) in accordance with the manufacturer's specifications.

Field-measured parameters were recorded from the Horiba Water Quality Meter at regular intervals in order to determine stabilized groundwater geochemical conditions and hence representative groundwater sampling conditions, in general accordance with the criteria stipulated in the Low Flow Sampling Protocol.

It should be noted that representative groundwater sampling conditions were determined by Pinchin personnel utilizing the field parameter stabilization criteria noted within the Low Flow Sampling Protocol.

Water quality parameters were measured during pre-sampling purging completed on March 27, 2024 at monitoring well MW2. Low flow purging and sampling methods could not be employed at this well due to the low yield of the formation in which the well was installed.

5.7 Groundwater Sampling

All monitoring wells installed by Pinchin as part of the Phase Two ESA were sampled. The monitoring wells were sampled a minimum of 24 hours after the completion of well development activities (see Section 5.5). Monitoring wells MW1, MW3 and MW4 were sampled in accordance with the Low Flow Sampling Protocol as described below.

Well purging was completed using a Geotech™ submersible bladder pump and Geotech™ controller powered by a 12-Volt battery. Compressed air was delivered to the bladder pump unit via 64-millimetre (1/4-inch) ID polyethylene tubing. Groundwater was returned to the surface from the bladder pump via dedicated 0.64-cm (1/4-inch) ID polyethylene tubing. A Horiba Water Quality Meter connected to a flow-through cell was used to monitor water quality parameters during groundwater purging to assess whether water quality parameter stabilization was achieved prior to sample collection. The flow rate of the bladder pump was adjusted to minimize drawdown of the water table and the introduction of sediment into the samples.

Once field parameter stabilization was achieved, groundwater samples were collected at each well using the bladder pump and dedicated polyethylene tubing by pumping groundwater directly into new laboratory-supplied sample bottles at a pumping rate of less than 0.2 litres per minute.

Monitoring well MW2 could not be sampled using the Low Flow Sampling Protocol because the well could not sustain a yield and was purged to dryness even when pumping at the lowest possible pumping rate. Following recovery after purging this well to dryness, groundwater samples for volatile parameters (i.e., VOCs and PHCs F1) and metals analysis were collected using a dedicated inertial pump comprised of Waterra polyethylene tubing and a foot valve, and groundwater samples for PHCs (F2-F4) and PAHs analysis were collected using a peristaltic pump and dedicated 0.64-cm (1/4-inch) ID polyethylene tubing.

Groundwater samples for metals analyses were field-filtered prior to preservation using dedicated 0.45 micron in-line filters. As appropriate, laboratory sample bottles were pre-filled by AGAT Labs with preservatives intended to preserve the collected groundwater samples prior to analysis.

Following sample collection, the sample bottles were placed into dedicated coolers with ice for storage pending transport to AGAT Labs. Formal chain of custody records were maintained between Pinchin and the staff at AGAT Labs.

5.8 Sediment Sampling

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

5.9 Analytical Testing

All collected soil and groundwater samples were delivered to AGAT Labs for analysis. AGAT Labs 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 AGAT Labs. BV Labs 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 two 205-L drums that were stored in the basement of the Site Building.

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.

Excess water produced during well purging activities and bedrock coring activities were containerized in 205-L drums that were also stored in the basement of the Site Building.

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

5.11 Quality Assurance and Quality Control Measures

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

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

Soil and groundwater 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, PAHs, metals, inorganics, pH and grain size: 120 or 250 mL unpreserved clear glass wide-mouth jars with a Teflon^{TM}–lined lid.

The following groundwater sample containers and preservatives were used:

- VOCs and PHCs F1: 40 mL clear glass vials with septum-lids, pre-charged with sodium bisulphate preservative.

- PHCs F2-F4: 250 mL amber glass bottles with Teflon^{TM}–lined lids, pre-charged with sodium bisulphate preservative.
- PAHs: 250 mL unpreserved amber glass bottles with Teflon^{TM}–lined lids.
- Inorganics: 500 mL unpreserved high density polyethylene (HDPE) bottles.
- Metals (excluding hexavalent chromium and mercury): 125 mL acid-rinsed HDPE bottles, pre-charged with nitric acid preservative.
- Hexavalent chromium: 125 mL acid-rinsed HDPE bottles, pre-charged with ammonium sulphate/ammonium hydroxide preservative.
- Mercury: 125 mL clear glass bottles with Teflon^{TM}–lined lids, pre-charged with hydrochloric acid preservative.

Groundwater samples submitted for metals analyses (including hexavalent chromium and mercury) were field-filtered using dedicated 0.45 micron filters.

Trip blank water samples for VOC parameter analysis were provided by AGAT Labs in 40 mL clear glass vials filled with VOC-free water.

Each soil, groundwater 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 BV Labs for analysis. Formal chain of custody records of the sample submissions were maintained between Pinchin and the staff at BV Labs.

5.11.2 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.

During groundwater sampling activities, the Geotech™ bladder pump used for purging and sampling was cleaned before initial use and between well locations by flushing with a solution of Alconox™ detergent and potable water followed by flushing with distilled water. New bladders were also installed in the pump before initial use and between well locations. During groundwater monitoring activities, the oil/water interface probe used to measure water levels and the Horiba Water Quality Meter used for groundwater field parameter measurements were cleaned with a solution of Alconox™ detergent and potable water followed by a distilled water rinse prior to initial use and between well locations.

5.11.3 Field Quality Control Measures

One field duplicate soil sample was 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 “MW3-S1” and its corresponding field duplicate “DUP-1” were submitted for laboratory analysis of VOCs, PHCs, and metals.

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

- Groundwater sample “MW1” and its corresponding field duplicate “DUP-1” were submitted for laboratory analysis of PHCs, BTEX and PAHs.
- Groundwater sample “MW4” and its corresponding field duplicate “DUP-2” were submitted for laboratory analysis of VOCs and metals.

One laboratory-prepared trip blank was analyzed for VOC parameters to comply with the requirement that one trip blank is analyzed for each submission of groundwater samples for VOC parameter analysis.

The calibrations of the RKI Eagle 2™ CGI used for field screening and the Horiba Water Quality Meter used for water quality parameter measurements were checked by the equipment supplier (Maxim) prior to use in the field by Pinchin.

Maxim completed the calibration checks in accordance with the equipment manufacturers’ specifications and/or Maxim’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.

5.11.4 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 concrete floor in the second-level basement at the Phase Two Property is underlain by silt and sand fill materials to a maximum depth of approximately 1.2 mbfs. The native soil underlying the surficial soil fill materials is generally comprised of sandy clay to a depth of approximately 2.3 mbfs, where refusal was met on inferred bedrock. The water table is within this underlying bedrock unit which represents an unconfined aquifer.

Based on geological data published by the Ontario Geological Survey, bedrock is expected to consist of sedimentary rocks consisting of limestone, dolomite, shale, argillite, sandstone, quartzite, and/or grit.

No groundwater impacts were identified in the unconfined aquifer and, as such, assessment of groundwater quality at deeper depths was not required.

6.2 Groundwater Elevations and Flow Direction

The wells screens in each monitoring well installed by Pinchin were of a consistent length (i.e., 3.05 metres). All monitoring wells were installed at depth intervals intended to investigate groundwater quality in the shallow groundwater zone within the unconfined aquifer. Given that PHCs were a COPC for groundwater at the Phase Two Property, the monitoring wells were installed at the Phase Two Property such that the well screens intersected the water table.

The following summarizes the findings of a groundwater monitoring event completed on March 27, 2024:

- The depths to groundwater measured within the on-Site monitoring wells installed within the unconfined aquifer ranged from 0.69 mbfs at monitoring well MW4 to 6.20 mbfs at monitoring well MW3.
- No NAPL thicknesses were measured with the oil/water interface probe in any of the groundwater monitoring wells.

There is insufficient information available for Pinchin to assess the potential for temporal variability in groundwater depths at the Phase Two Property. The water table depths are general deep enough that interaction of the water table with buried utilities is unlikely; however, the water table at MW4 is only 0.69 mbfs and the water table at this well location has the potential to interact with buried utilities, although any such interaction would likely be limited given the known low rate of groundwater flow in the limestone bedrock. However, this cannot be confirmed as the depths of the utilities at and adjacent to the Phase

Two Property are unknown. Regardless, groundwater impacts have not been identified on the Phase Two Property.

6.3 Fine-Medium Soil Texture

Two soil samples collected from the boreholes advanced at the Phase Two Property were submitted for 75 micron single-sieve grain size analysis. The soil samples selected for analysis were considered to be representative of the two primary stratigraphic units observed at the borehole locations, which were a sand fill unit and a native silty clay till unit. As indicated in Table 3, both soil samples were classified as coarse-textured (60.6% and 62.4% coarse-grained soil, respectively).

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 one-third 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.

6.4 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 ranged from 0 ppm by volume (ppm$_v$) in several of the collected soil samples to a maximum of 150 ppm$_v$ in soil sample MW4-S3 collected from borehole MW4 at a depth of approximately 1.2 to 1.8 mbgs. Soil vapour headspace values measured with the PID ranged from 0.0 ppm$_v$ in several of the collected soil samples to a maximum of 1 ppm$_v$ in soil sample MW2-S1, collected from borehole MW2 at a depth of approximately 0.3 to 0.6 mbgs.

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

6.5 Soil Quality

A total of four boreholes were advanced at the Phase Two Property at the locations shown on Figure 7 in order to assess for the presence of subsurface impacts resulting from the APECs identified in the Pinchin Phase One ES. 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 3 Standards* and the following subsections provide a discussion of the findings.

6.5.1 VOCs

The soil sample analytical results for VOCs, along with the corresponding *Table 3 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 3 Standards*.

6.5.2 PHCs F1-F4

The soil sample analytical results for PHCs F1-F4, along with the corresponding *Table 3 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 3 Standards*, except for the following:

- The concentrations of PHC F1 (332 µg/g vs. the *Table 3 Standard* of 65 µg/g) and PHCs F2 (357 µg/g vs. the *Table 3 Standard* of 150 µg/g) reported for soil sample MW4-S5, collected at borehole MW4 from a depth of 2.7 to 3.1 mbgs, exceeded the *Table 3 Standards*.

6.5.3 PAHs

The soil sample analytical results for PAHs, along with the corresponding *Table 3 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 3 Standards*.

6.5.4 Metals

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

6.5.5 General Comments on Soil Quality

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

Given that groundwater sampling at the Phase Two Property has not identified any impacts related to PHCs F1-F4 parameters (see Section 6.7), 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 show no evidence of NAPL in the subsurface at the Site. All reported soil sample concentrations either meet the *Table 3 Standards* or are above the *Table 3 Standards* but well below their corresponding free-product thresholds, where applicable. In addition, no evidence of NAPL was observed during borehole drilling.

6.6 Groundwater Quality

Groundwater samples were collected from monitoring wells MW1, MW2, MW3 and MW4 and submitted for analysis of the COPCs to assess for the presence of subsurface impacts within the APECs identified in the Pinchin Phase One ESA. The locations of the monitoring wells are shown on Figure 7. The groundwater sample collection depths and laboratory analysis are summarized in Table 7. All groundwater samples collected for metals analysis were filtered in the field using dedicated, disposable 0.45 micron in-line filters prior to preservation in accordance with the *Analytical Protocol.*

The groundwater sample analytical results were compared to the *Table 3 Standards* and the following subsections provide a discussion of the findings.

6.6.1 VOCs

The groundwater analytical results for VOCs, along with the corresponding *Table 3 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of VOCs in the groundwater samples submitted for analysis were below the *Table 3 Standards*.

6.6.2 PHCs F1-F4

The groundwater analytical results for PHCs F1-F4, along with the corresponding *Table 3 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of PHCs F1-F4 in the groundwater samples submitted for analysis met the *Table 3 Standards.*

6.6.3 PAHs

The groundwater analytical results for PAHs, along with the corresponding *Table 3 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of PAHs in the groundwater samples submitted for analysis met the *Table 3 Standards*.

6.6.4 Metals

The groundwater analytical results for metals and inorganic parameters, along with the corresponding *Table 3 Standards*, are presented in Table 7. As indicated in Table 7, all reported concentrations of metals and inorganics parameters in the groundwater samples submitted for analysis met the *Table 3 Standards*.

6.6.5 General Comments on Groundwater Quality

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

As discussed in Section 6.6.5, soil sampling at the Phase Two Property did not identify any impacts related to PHCs F1-F4 parameters. As such, there is no evidence that the soil at the Phase Two Property is acting as a contaminant source for the groundwater.

During the groundwater monitoring activities, no NAPL thicknesses were measured in any of the on-Site monitoring wells.

6.7 Sediment Quality

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

6.8 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 and groundwater samples to assess the suitability of field sampling methods and laboratory performance.
- A trip blank water sample to assess whether ambient conditions during transport of groundwater sample containers from the analytical laboratory to the Phase Two Property and back to the analytical laboratory may have biased the groundwater sample results with respect to volatile constituents.

In addition to the above, laboratory quality control activities and sample checks employed by BV Labs 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 QA/QC samples are discussed in the following subsections.

6.8.1 Soil Duplicate Results

During borehole soil sampling activities, one soil duplicate sample pair, consisting of soil sample "MW3-S1" and its corresponding field duplicate "DUP-1", were submitted for laboratory analysis of VOCs, PHCs, and metals.

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:

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

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 MW3-S1/DUP-1, collected from borehole MW3 at a depth of 0.3 to 0.9 mbgs, exceeded the corresponding performance standard of 30% for the analytical results reported for lead (RPD of 35%).

The primary cause of the elevated RPD values and discrepancies observed in the analytical results for soil sample pairing MW3-S1/DUP-1 is inferred to be heterogeneity in the matrix of the fill materials from which the samples were collected. Pinchin notes that fill 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 pairing are below the corresponding *Table 3 Standards* so the apparent lack of precision is not considered a concern. Based on Pinchin's review of the calculated RPD values 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.

6.8.2 Groundwater Sample Duplicate Results

During groundwater sampling activities, a total of two separate groundwater duplicate sample pairs were submitted for laboratory analysis. The sample pairings and corresponding laboratory analyses are as follows:

- Groundwater sample "MW1" and its corresponding field duplicate "DUP-1" were submitted for laboratory analysis of PHCs, BTEX and PAHs.
- Groundwater sample "MW4" and its corresponding field duplicate "DUP-2" were submitted for laboratory analysis of VOCs and metals.

The calculated RPDs for the original and field duplicate groundwater 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 groundwater sample results as well.

Each of the calculated RPDs met the corresponding performance standard.

Based on Pinchin's review of the calculated RPD values for the submitted groundwater sample duplicate 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.

6.8.3 Groundwater Trip Blank Results

A trip blank sample, consisting of VOC-free water contained within a set of VOC sample vials, was prepared by AGAT Labs and accompanied the VOC groundwater sample containers during transportation to the Phase Two Property and was stored in the cooler with the VOC groundwater samples in the field and during transportation back to AGAT Labs. The trip blank sample was submitted to AGAT Labs for chemical analysis for VOCs during the groundwater sampling activities completed as part of this Phase Two ESA.

As indicated in Table 7, the concentrations of the VOC parameters analyzed in the 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 groundwater sampling, did not positively bias the VOCs parameter analytical results for the groundwater samples.

6.8.4 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.

6.8.5 Laboratory Certificates of Analysis

Pinchin has reviewed the laboratory Certificates of Analysis provided by BV Labs 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 H.
- All of the analytical data reported in the Certificates of Analysis have been summarized, in full, in Tables 3 and 7.

6.8.6 Laboratory Comments Regarding Sample Analysis

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

No comments were noted by AGAT Labs on the laboratory Certificates of Analysis for the submitted soil or groundwater samples.

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

- The temperatures of the submitted soil and groundwater samples upon receipt met the sample preservation requirements of the *Analytical Protocol* of 5 ± 3ºC (i.e., between 2 and 8ºC).
- The custody seal was present and intact on all submissions.

6.8.7 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 and groundwater 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 and groundwater at the Phase Two Property meets the applicable MECP Site Condition Standards.

6.9 Phase Two Conceptual Site Model

The Phase Two Property is developed with a 13-storey, multi-tenant commercial office/retail building complete with a two-level basement. The Phase Two Property is bounded by Slater Street to the north and commercial properties to the 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 6, 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.

6.9.1 Potentially Contaminating Activities

The Phase One ESA identified a total of eight PCAs within the Phase One Study Area. These PCAs consisted of four PCAs at the Phase Two Property and four PCAs within the Phase One Study Area, outside of the Phase Two Property. Each of the on-Site PCAs and two of the off-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. Identified on-Site and off-Site PCAs are summarized in Table 2 and their locations are shown on Figure 4 (on-Site PCAs) and Figure 5 (off-Site PCAs).

6.9.2 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 6. The Phase Two ESA included an assessment of soil and groundwater quality within each of the APECs.

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

APEC	Boreholes Advanced	Soil Sample Submission	Monitoring Wells Sampled	Groundwater Sample Submission
APEC-1	BH1	PHCs, BTEX, PAHs	MW1	PHCs, BTEX, PAHs
APEC-2	BH2, BH3, BH4	PHCs, VOCs, metals	MW2, MW3, MW4	PHCs, VOCs, metals
APEC-3	BH2, BH3, BH4	PHCs, VOCs, metals	MW2, MW3, MW4	PHCs, VOCs, metals
APEC-4	Not Applicable – See Below	EC, SAR	Not Applicable – See Below	Na, Cl-
APEC-5	Not Applicable	Not Applicable	MW4	PHCs, VOCs, metals
APEC-6	Not Applicable	Not Applicable	BH3	VOCs

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

<u>APEC-1</u>

A former 16,380-Litre (L) UST and fuel pump were located on the second basement level within the Site Building and removed in 2008. The former UST represented a PCA that required investigation as part of the Phase Two ESA. The subsurface investigation of APEC-1 completed by Pinchin as part of the Phase Two ESA included new borehole/groundwater monitoring well (MW1). The soil and groundwater samples submitted from the boreholes completed within APEC-1 met the *Table 3 Standards*.

<u>APEC-2</u>

A printing facility has been located in the first and second basement levels within the Site Building since at least 1980. The printing facility represented a PCA that required investigation as part of the Phase Two ESA. The subsurface investigation of APEC-2 completed by Pinchin as part of the Phase Two ESA included new boreholes/groundwater monitoring wells MW2, MW3 and MW4. The soil and groundwater samples submitted from the boreholes completed within APEC-2 met the *Table 3 Standards*, with the exception soil sample MW4-S5 collected from borehole MW4 which exceeded the *Table 3 Standards* for PHCs F1 and F2.

APEC-3

During the Phase One Site reconnaissance, bulk storage of inks was identified in the first basement level within the Bradda Printing Services Inc. tenant space. The bulk storage of ink represents a PCA at the Phase Two Property that required further investigation. The subsurface investigation of APEC-3 completed by Pinchin as part of the Phase Two ESA included new boreholes/groundwater monitoring wells MW2, MW3 and MW4. The soil and groundwater samples submitted from the boreholes completed within APEC-3 met the *Table 3 Standards*, with the exception soil sample MW4-S5 collected from borehole MW4 which exceeded the *Table 3 Standards* for PHCs F1 and F2.

APEC-4

The Phase Two Property has a paved parking area located on the central and south portions of the Site. It is suspected that salt had historically been applied to the parking areas and access routes for safety reasons during winter conditions to remove snow and ice, which represents a PCA at the Phase One Property. The COPCs associated with this APEC include EC and SAR in soil. However, it is the opinion of the QP_{ESA} supervising the Phase One and Two ESAs that, although salt-related parameters such as SAR and EC in soil, and sodium and chloride in groundwater may be present at concentrations exceeding the applicable site condition standards (i.e., *Table 3 Standards*), the exemption provided in Section 49.1 of O. Reg. 153/04 can been applied. As such, the above-noted parameters in soil and groundwater would be deemed to meet the site condition standards and do not need to be further assessed as part of this Phase Two ESA.

APEC-5

A former printing facility was located adjacent to the northeast elevation of the Phase One Property in the 1963 FIP. The former printing facility represented a PCA that required investigation as part of the Phase Two ESA. The subsurface investigation of APEC-5 completed by Pinchin as part of the Phase Two ESA included new groundwater monitoring well MW4. The groundwater samples submitted from the monitoring well completed within APEC-5 met the *Table 3 Standards*.

APEC-6

A dry cleaning facility was listed approximately 30 m northwest of the Phase One Property in the 1975 city directory. The subsurface investigation of APEC-6 completed by Pinchin as part of the Phase Two ESA included new groundwater monitoring well MW3. The groundwater samples submitted from the monitoring well completed within APEC-6 met the *Table 3 Standards*.

6.9.3 Subsurface Structures and Utilities

Underground utilities at the Phase One Property provide potable water, natural gas, electrical, telephone, and sewer services to the Site Building. These services enter the Site Building through subsurface conduits, with the exception of a pressurized natural gas line, which connects to meters located along the exterior of the Site Building. Interaction of the groundwater at the Phase Two Property with buried utilities is possible given that the water table in some areas of the Phase Two Property is located at approximate depths shallower than 1 mbfs in the basement of the Site Building. However, given that no groundwater impacts were identified at the Phase Two Property, preferential migration of contaminants along utilities is not considered to be a concern.

6.9.4 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 fill (sand and gravel with some silty sand) of unknown origin to a maximum depth of approximately 1.2 mbfs. The native soil underlying the surficial soil fill materials is generally comprised of sandy clay to a depth of approximately 2.3 mbfs, where refusal was met on inferred bedrock. The water table is within this underlying bedrock unit which represents an unconfined aquifer.

Hydrogeological Characteristics

The groundwater flow direction in the unconfined aquifer at the Phase Two Property is inferred to be towards the south.

The hydraulic conductivity of the unconfined aquifer at the Phase Two Property (i.e., the limestone bedrock unit) ranges from 10^{-9} metres/second to 10^{-7} metres/second, and groundwater flow velocity is estimated to be approximately 3 to 30 metres/year.

Depth to Bedrock

The depth to bedrock at the boreholes completed at the Phase Two Property during the Phase Two ESA ranged from 0.6 to 2.3 metres below floor surface (mbfs) in the second-level basement, which is approximately 6.7 to 8.4 mbgs.

Depth to Water Table

The water table at the Phase Two Property is located primarily within the underlying limestone bedrock aquifer that has been interpreted to be an unconfined aquifer. The depth to the water table across the Phase Two Property ranges from approximately 7 to 12 mbgs.

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

Site Condition Standards for non-potable groundwater use have been applied to the Phase Two Property given that the following conditions specified in Section 35 of O. Reg. 153/04 have been met:

- The Phase Two Property and all properties within 250 metres of the Phase Two Property are supplied by a municipal drinking water system.
- The Phase Two Property is not located within a well head protection area or other designation identified by the City of Ottawa for the protection of groundwater.
- There are no wells located at the Phase Two Property or within the Phase One Study Area that are used or intended for use as a water source for human consumption or agriculture.
- The City of Ottawa has been advised in writing of the intention to use non-potable Site Condition Standards at the Phase Two Property and a response was not received within 30 days of submitting the notification.

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.

Based on a review of the depths to bedrock and the spatial distribution of the borehole locations, the depth to bedrock is interpreted to be greater than 2.0 mbgs over more than one-third of the Phase Two Property. 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 retrofit on the existing Site Building.

6.9.5 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 3: Full Depth Generic Site Condition Standards for Use in a Non-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 3 Standards*) for:
  - Coarse-textured soils; and
  - Residential/parkland/institutional property use.

6.9.6 Contaminants Exceeding Applicable Site Condition Standards in Soil

PHCs

Soil with concentrations of PHCs F1/F2 exceeding the *Table 3 Standards* was identified at borehole MW4 located in the northeast portion of the Phase Two Property at depths between approximately 2.7 and 3.1 mbgs.

A number of factors can govern the transport and fate of contaminants in subsurface environments, including dilution, adsorption, advection and dispersion, volatilization, geochemical dynamics, and chemical or biological transformation (microbial attenuation). The soil with concentrations of PHCs F1/F2 exceeding the *Table 3 Standards* is located at depths of between approximately 2.7 and 3.1 mbgs, in the silt seams of the shallow shale bedrock. As such, these soils may serve as a future source of groundwater contaminants but it should be noted that the groundwater within this area of the Phase Two Property do not currently exceed the *Table 3 Standards* for these parameters.

In the absence of future remediation, it is expected that geochemical factors which would reduce the PHCs F1/F2 concentrations at the Phase Two Property will be generally limited to microbial attenuation (based on the organic nature of PHCs F1/F2) and to a lesser degree, volatilization (based on the volatile nature of PHCs F1 and the semi-volatile nature of PHCs F2). However, the rate of attenuation of the PHCs F1/F2 concentrations at the Phase Two Property cannot be accurately quantified and, would be anticipated to persist for some period of time at the Phase Two Property.

6.9.7 Contaminants Exceeding Applicable Site Condition Standards in Groundwater

All groundwater samples collected during the Phase Two ESA met the applicable *Table 3 Standards* for the parameters analyzed.

6.9.8 Meteorological and Climatic Conditions

The Phase Two Property is either covered by pavement or by the Site Building, which is expected to limited the influence of meteorological and climatic conditions on contaminant distribution and migration in the subsurface, especially given that the water table is located at depths of approximately 7 to 12 mbgs at the Phase Two Property. As such, it is the QP's opinion that meteorological or climatic conditions have not influenced the distribution or migration of the contaminants at the Phase Two Property.

6.9.9 Soil Vapour Intrusion

Volatile parameters (i.e., PHCs F1 and F2) were identified at concentrations exceeding the *Table 3 Standards*. However, it is Pinchin's understanding that the impacted soil will be remediated prior to redevelopment. As such, soil vapour intrusion into buildings at the Phase Two Property is not considered a concern.

6.9.10 Contaminant Exposure Assessment

Potential exposure pathways and receptors were evaluated for the Phase Two Property. The exposure pathways and receptors which are considered are as follows:

- GW1 – The protection of drinking water for humans.
- GW2 – The protection of indoor air sourced from vapours originating from groundwater for humans in an overlying building.
- GW3 – The protection of the aquatic environment in the nearest surface water body.

- S1 – High-frequency, high-intensity, human health direct contact exposure scenario equivalent to that of surface soil at a residential/parkland/institutional or agricultural/other site (children and pregnant women are present).
- S2 – Lower-frequency and lower-intensity, human health direct contact exposure scenario without children present and used at commercial/industrial/community sites or at depth at residential/parkland/institutional or agricultural/other sites.
- S3 – Low-frequency, high-intensity, human health direct contact exposure scenario without children present that is protective of a worker digging in the soil. It is used for subsurface soils at commercial/industrial/community sites.
- S-IA – The protection of indoor air sourced from vapours originating from soil for humans in an overlying building.
- S-OA – The protection of outdoor air sourced from vapours originating from soil, using a volatilization model combined with atmospheric mixing for humans.
- S-Odour – Soil concentrations that will not result in unacceptable odours from direct sniffing of the soil.
- S-GW1 – The protection of drinking water for humans via leaching of soil.
- S-GW3 – The protection of the aquatic environment in the nearest surface water body via leaching of soil.
- Plants and Soil Organisms (P&O) – Soil values protective of direct contact exposure scenario for plants and soil-dwelling organisms.
- Mammals and Birds (M&B) – Soil values protective of direct contact exposure scenario for some representative mammalian and avian species.

In considering the current and proposed land use scenarios and future redevelopment activities (i.e., digging, construction, etc.), all exposure pathway/receptor scenarios are considered applicable, with the exception of:

- S-GW1 and GW1 pathways, as the Phase Two Property is in a non-potable water scenario, rendering the potable groundwater pathways as incomplete.

6.9.11 Applicability of Section 49.1 Exemptions

The Phase One Property has a paved parking area located east of the Site Building. According to the Site Representative, salt has historically been applied to the parking area for safety reasons during winter conditions to remove snow and ice. It is the opinion of the QP_{ESA} 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 be applied. As such, these parameters would be deemed to meet the Site Condition Standards and were not 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 residential land use.

The Phase Two ESA completed by Pinchin included the advancement of four boreholes at the Phase Two Property, all of which were completed as groundwater monitoring wells to facilitate the sampling of groundwater.

Based on Site-specific information, the applicable regulatory standards for the Phase Two Property were determined to be the *Table 3 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, BTEX, PHCs, PAHs and/or metals parameters. In addition, groundwater samples were collected from the four newly-installed monitoring wells, and submitted for laboratory analysis of VOCs, BTEX, PHCs, PAHs, and/or metals parameters.

The laboratory results for the soil samples submitted during the Phase Two ESA indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 3 Standards*, with the exception of the following:

- The concentrations of PHC F1 (332 µg/g vs. the *Table 3 Standard* of 65 µg/g) and PHCs F2 (357 µg/g vs. the *Table 3 Standard* of 150 µg/g) reported for soil sample MW4-S5, collected at borehole MW4 from a depth of 2.7 to 3.1 mbgs, exceeded the *Table 3 Standards*.

The laboratory results for all groundwater samples submitted during the Phase Two ESA indicated that all reported concentrations for the parameters analyzed met the corresponding *Table 3 Standards*.

With respect to the identified soil parameter exceedances summarized above, soil remediation to reduce the concentrations of the above-listed parameters to levels below the *Table 3 Standards* is required, otherwise the completion of a Risk Assessment in accordance with O. Reg. 153/04 will be required to develop PSS for the parameters exceeding the *Table 3 Standards* before an RSC can be filed for the Phase Two Property.

7.1 Signatures

This Phase Two ESA was undertaken under the supervision of Alicia McDonald, P.Eng., 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 KTS Properties (Client) in order to investigate potential environmental impacts at 130 Slater Street in Ottawa, 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:

- "*Phase I Environmental Site Assessment, The National Building, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Slate Properties Inc., and dated October 21, 2005.
- "*Phase I Environmental Site Assessment, The National Building, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Slate Properties Inc., and dated May 8, 2009.
- "*Phase II Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Arcturus Realty Corporation, and dated January 19, 2010.
- "*Phase I Environmental Site Assessment Update, The National Building, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Slate Properties Inc., and dated April 26, 2011.
- "*Phase I Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario*" prepared by Pinchin for Dream Office Management Corp., and dated May 9, 2017.
- "*Phase I Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario*" prepared by Le Groupe Gesfor for Groupe Mach, and dated September 20, 2022.
- 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.
- 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.
- Pinchin Ltd. Phase One Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario. Prepared for KTS Properties, February 1, 2024.

- 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.
- U.S. Environmental Protection Agency - Region 1. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. Revised January 19, 2010.

\\PIN-KGN-FS01\job\334000s\0334803.000 KATASA,130SlaterStOttawa,EDR,ONE\0334803.001 KATASA,130SlaterStOttawa,EDR,TWO\Deliverables\334803.001 Report Phase Two ESA 130 Slater St Ottawa KTS Jun 2024.docx

Template: Master Report for RSC Phase Two ESA Report – Impacted Site, EDR, October 16, 2020

9.0 FIGURES AND TABLES

PROJECT NAME: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

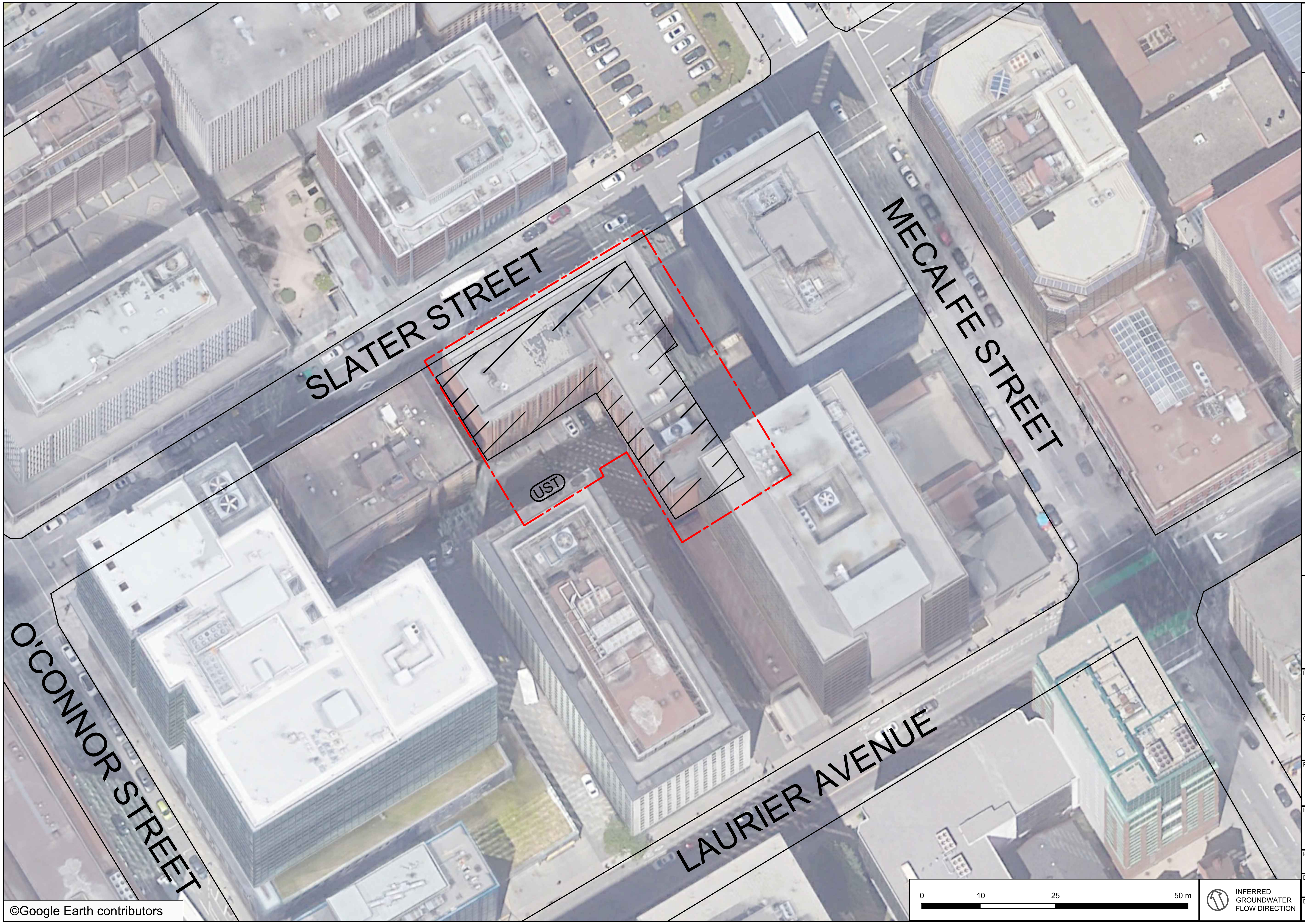
CLIENT NAME: KTS PROPERTIES

PROJECT LOCATION: 130 SLATER STREET, OTTAWA, ONTARIO

FIGURE NAME: KEY MAP

FIGURE NUMBER: 1

PROJECT NUMBER:	SCALE:	DRAWN BY:	REVIEWED BY:	DATE:
334803.001	1:15,000	NJ	AK	JUNE 2024



N

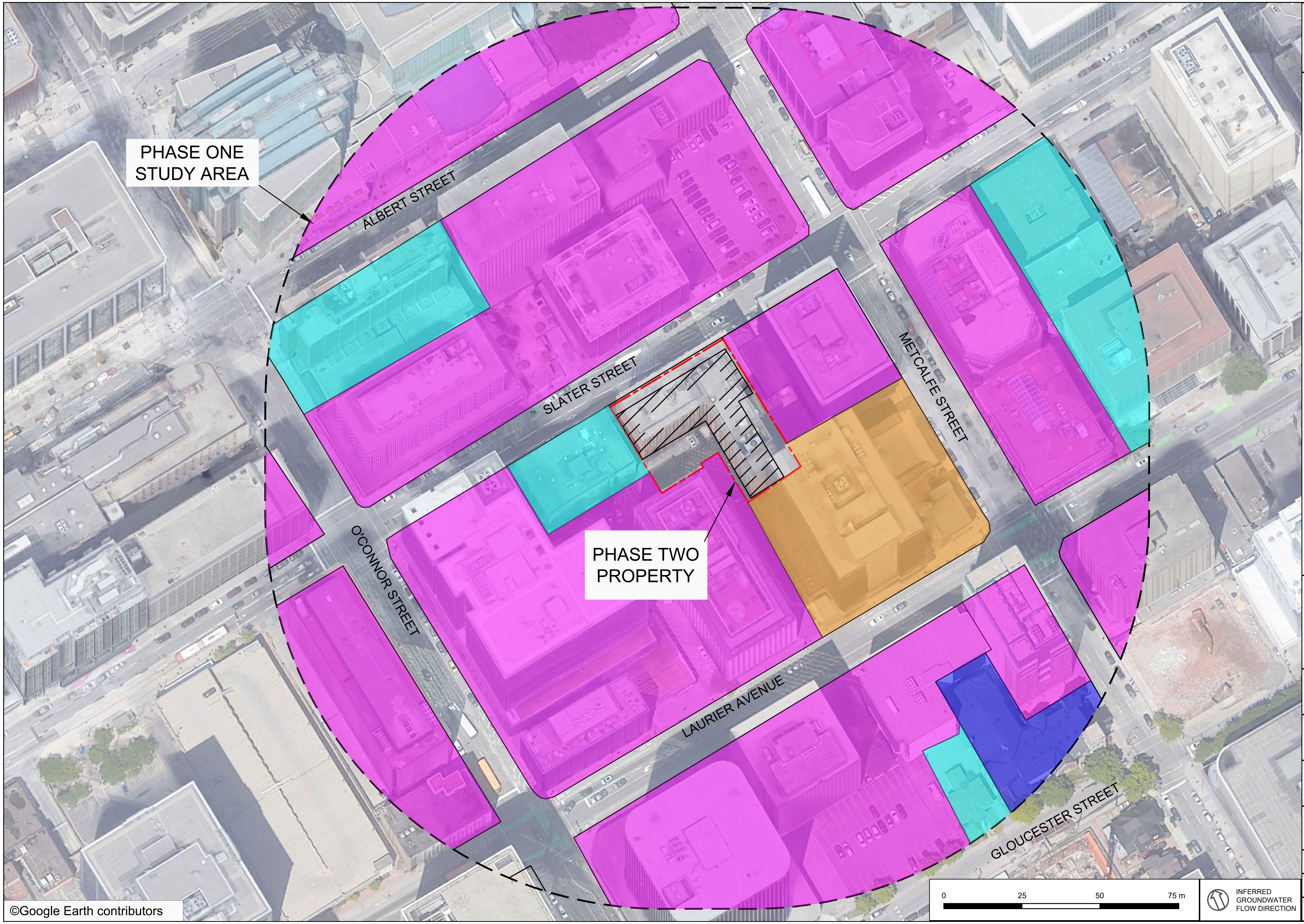
LEGEND

- -·- SITE BOUNDARY
- ▨ SITE BUILDING
- UST FORMER UNDERGROUND STORAGE TANK

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

PINCHIN

PROJECT NAME: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT	
CLIENT NAME: KTS PROPERTIES	
PROJECT LOCATION: 130 SLATER STREET, OTTAWA, ONTARIO	
FIGURE NAME: PHASE TWO PROPERTY	
PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: JUNE 2024	FIGURE NUMBER: 2



N

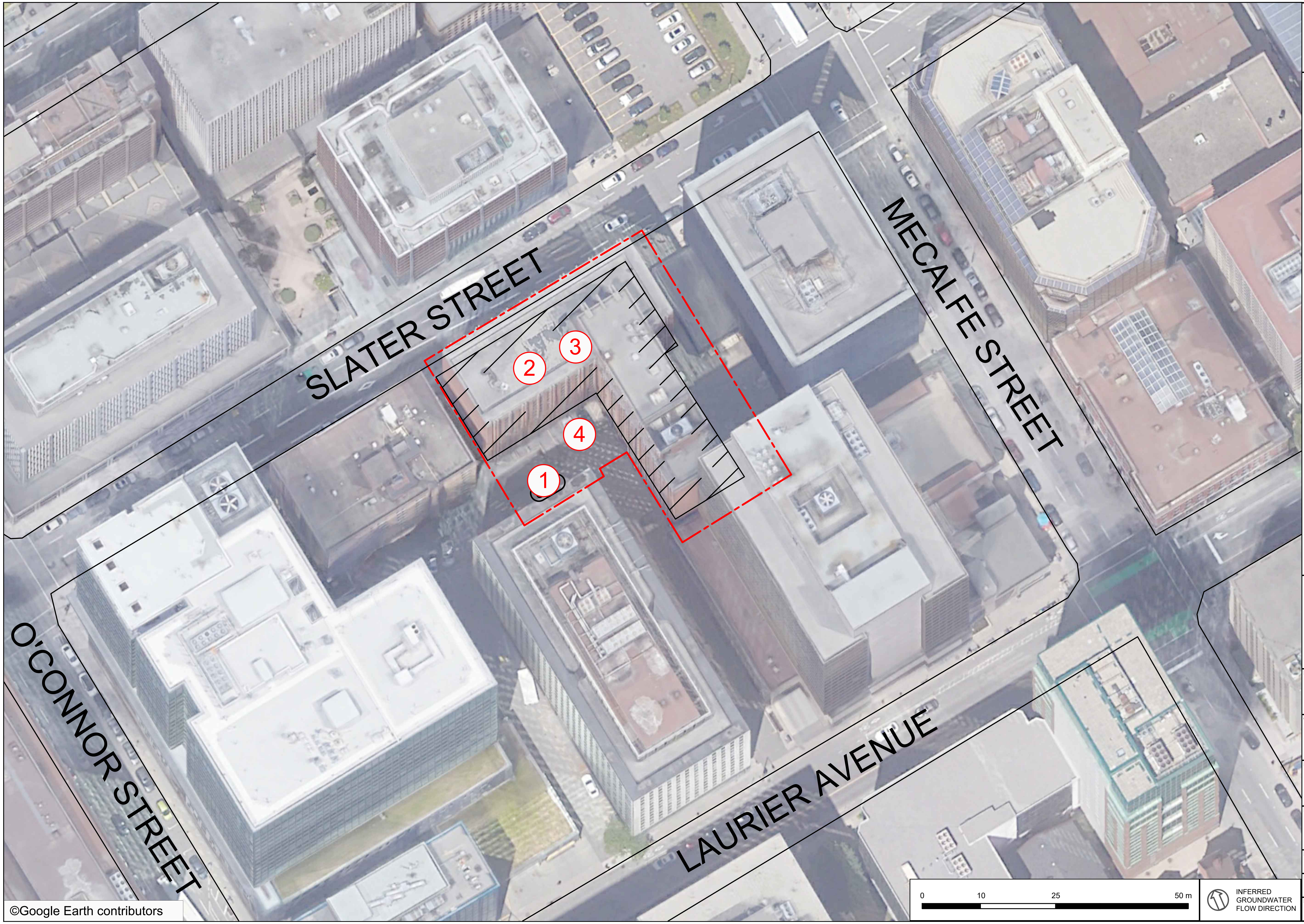
LEGEND

- —·— SITE BOUNDARY
- ▨ SITE BUILDING
- 🟦 COMMERICIAL
- 🟪 MULTI-TENANT COMMERCIAL
- 🟩 INSTITUTIONAL
- 🟧 COMMERCIAL/COMMUNITY
- 🟦 COMMUNITY

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

PINCHIN

PROJECT NAME: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT	
CLIENT NAME: KTS PROPERTIES	
PROJECT LOCATION: 130 SLATER STREET, OTTAWA, ONTARIO	
FIGURE NAME: PHASE ONE STUDY AREA	
PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: JUNE 2024	FIGURE NUMBER: 3



N

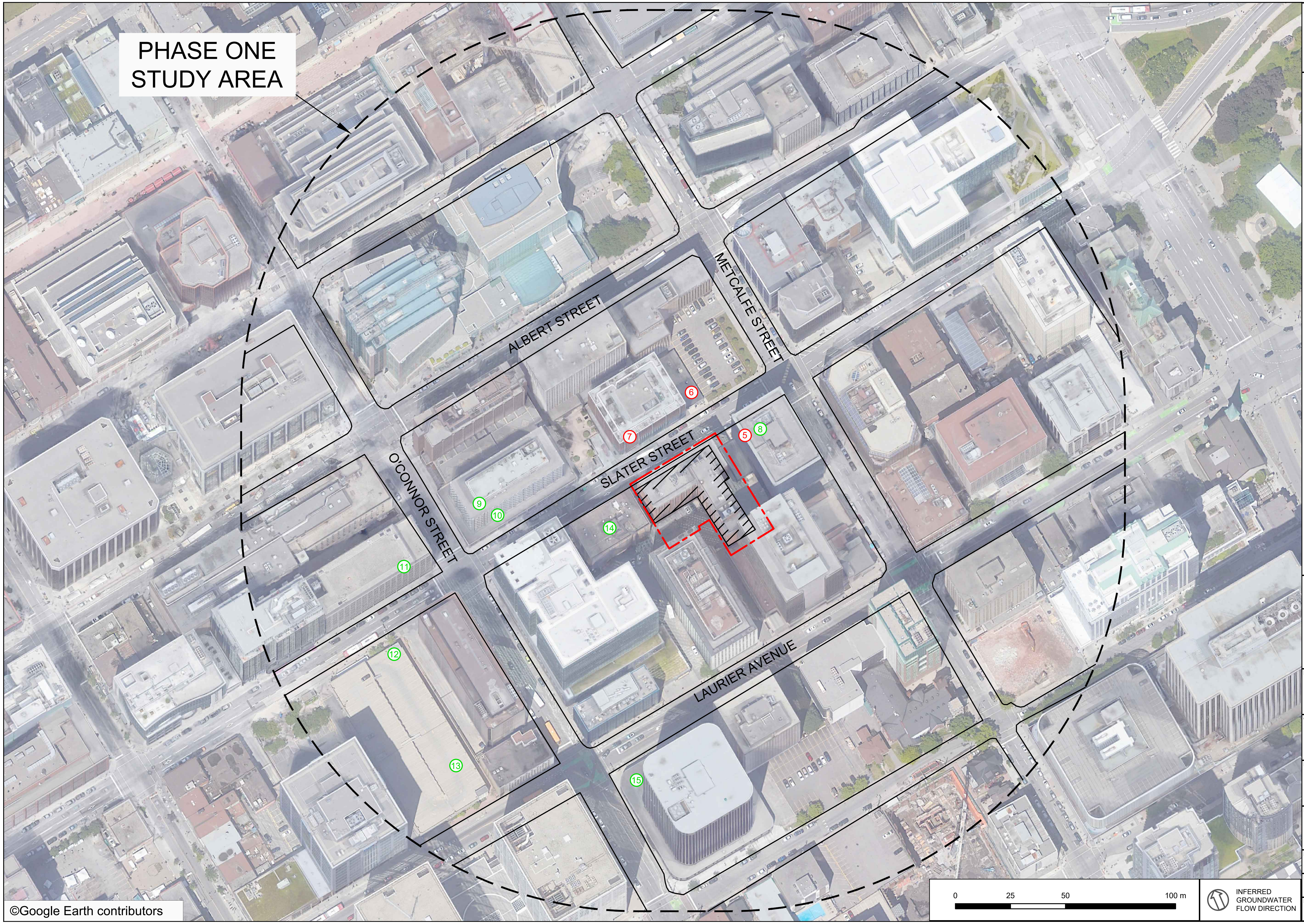
LEGEND

- SITE BOUNDARY
- ▨ SITE BUILDING
- UST FORMER UNDERGROUND STORAGE TANK
- # PCA RESULTS IN AN APEC
- # PCA DOES NOT RESULT IN AN APEC

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

PINCHIN

PROJECT NAME: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT	
CLIENT NAME: KTS PROPERTIES	
PROJECT LOCATION: 130 SLATER STREET, OTTAWA, ONTARIO	
FIGURE NAME: ON-SITE POTENTIALLY CONTAMINATING ACTIVITIES	
PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: JUNE 2024	FIGURE NUMBER: 4



N

LEGEND

- SITE BOUNDARY
- ▨ SITE BUILDING
- PHASE ONE STUDY AREA BOUNDARY
- (#) PCA RESULTS IN AN APEC
- (#) PCA DOES NOT RESULT IN AN APEC

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

PINCHIN

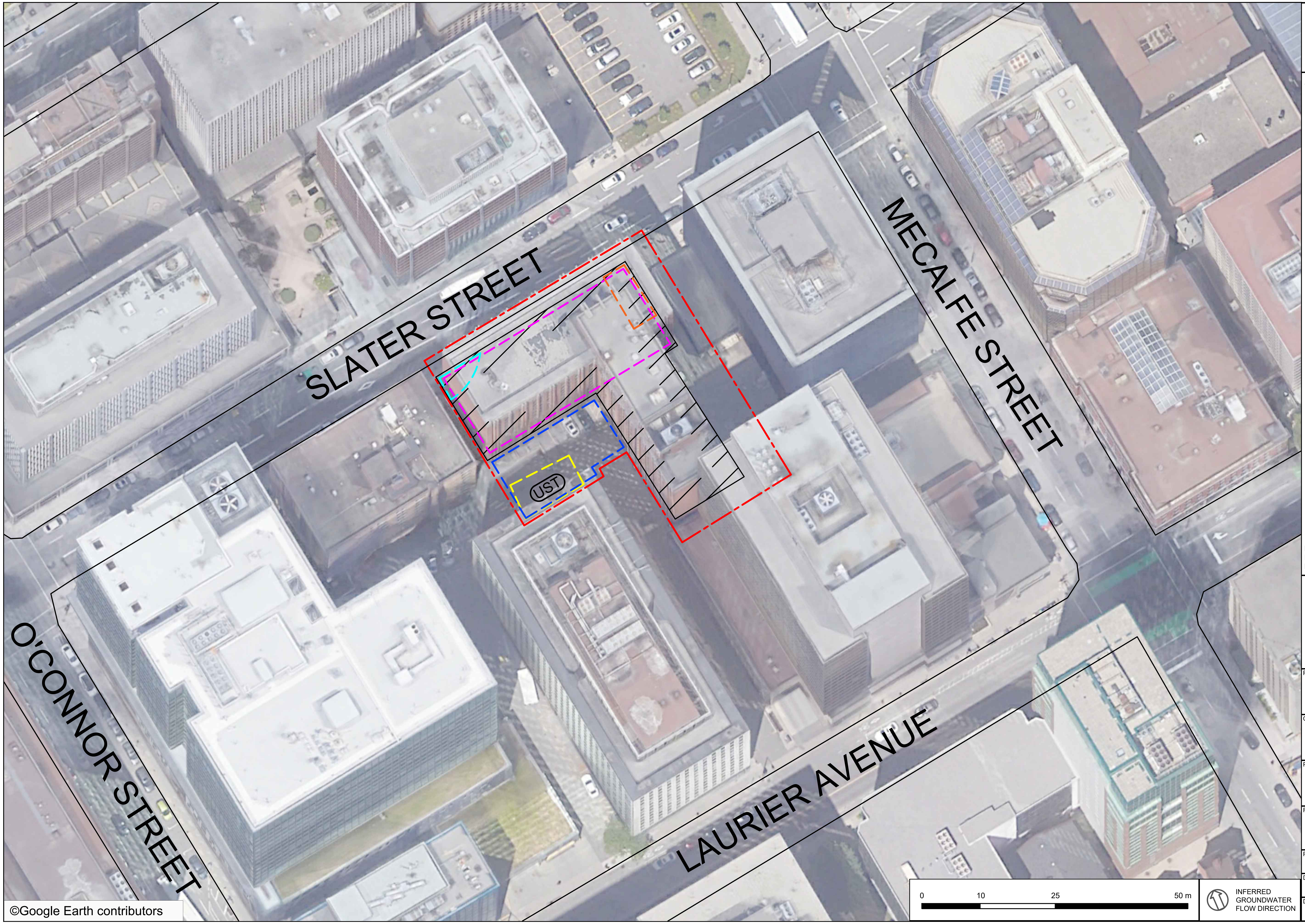
PROJECT NAME:
PHASE TWO
ENVIRONMENTAL
SITE ASSESSMENT

CLIENT NAME:
KTS PROPERTIES

PROJECT LOCATION:
130 SLATER STREET,
OTTAWA, ONTARIO

FIGURE NAME:
OFFSITE POTENTIALLY
CONTAMINATING ACTIVITIES

PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: JUNE 2024	FIGURE NUMBER: 5



N

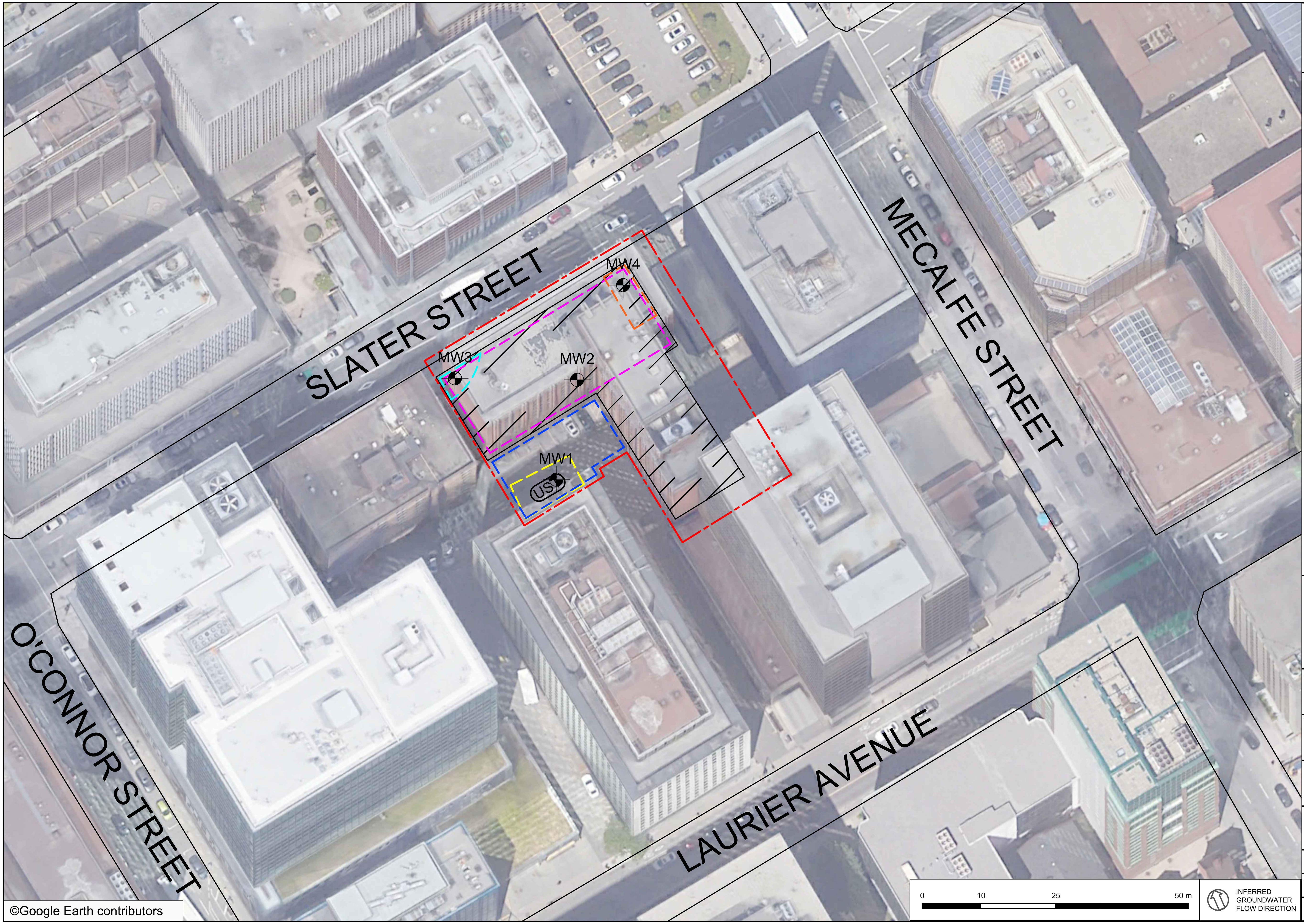
LEGEND

- SITE BOUNDARY
- ▨ SITE BUILDING
- UST FORMER UNDERGROUND STORAGE TANK
- 🟨 APEC-1
- 🟪 APEC-2 AND APEC-3
- 🟦 APEC-4
- 🟧 APEC-5 AND APEC-6
- ☐ APEC-7

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

PINCHIN

PROJECT NAME: PHASE TWO ENVIRONMENTAL SITE ASSESSMENT	
CLIENT NAME: KTS PROPERTIES	
PROJECT LOCATION: 130 SLATER STREET, OTTAWA, ONTARIO	
FIGURE NAME: AREAS OF POTENTIAL ENVIRONMENTAL CONCERN	
PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: JUNE 2024	FIGURE NUMBER: 6



N

LEGEND

- 🟥 SITE BOUNDARY
- ▨ SITE BUILDING
- UST FORMER UNDERGROUND STORAGE TANK
- 🟨 APEC-1
- 🟪 APEC-2 AND APEC-3
- 🟦 APEC-4
- 🟧 APEC-5 AND APEC-6
- ☐ APEC-7
- ⊕ MONITORING WELL

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

PINCHIN

PROJECT NAME:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT

CLIENT NAME:
KTS PROPERTIES

PROJECT LOCATION:
130 SLATER STREET,
OTTAWA, ONTARIO

FIGURE NAME:
BOREHOLE AND MONITORING WELL LOCATION PLAN

PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: JUNE 2024	FIGURE NUMBER: 7

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	A former 16,380-Litre (L) underground storage tank (UST) and fuel pump were located on the second basement level within the Site Building and removed in 2008	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-2	A printing facility has been located on the Phase One Property since at least 1980	Other - Industrial Operations	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-3	Vegetable-based inks are located on the first basement level within the Bradda Printing Services Inc. tenant space	Item 31 - Ink Manufacturing, Processing and Bulk Storage	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil
PCA-4	Salt has historically been applied to the parking area southeast of the Site Building for safety reasons during winter conditions to remove snow and ice	Other - Road Salting Activities	On-Site	NA – On-Site PCA	NA - On-Site PCA	Yes	Soil and Groundwater
PCA-5	A former printing facility was located adjacent to the northeast elevation of the Phase One Property in the 1963 FIP	Other - Industrial Operations	Off-Site	Adjacent to the northeast elevation of the Phase One Property	Transgradient	Yes	Soil
PCA-6	A dry-cleaning facility (i.e., Paragon Cleaners) was listed approximately 30 m northeast of the Phase One Property in the 1975 city directory	Item 37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Off-Site	30	Transgradient	Yes	Groundwater
PCA-7	The building located at 125 Slater Street was identified as being heated by fuel oil-fired boiler system in the 1963 FIP	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	15	Downgradient	Yes	Soil and Groundwater
PCA-8	The Ontario Spills database indicated that less than 10-L of glycol/water solution was spilled into a catch basin at the property located adjacent to the northeast elevation of the Phase One Property on January 10, 2013	Other - Spill	Off-Site	Adjacent to the northeast elevation of the Phase One Property	Transgradient	No	Not Applicable
PCA-9	An automotive repair/servicing facility with an associated UST, located approximately 40 m west of the Phase One Property, was identified in the 1963 FIP	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	40	Transgradient/ Downgradient	No	Not Applicable

PCA-10	An automotive repair/servicing facility with an associated UST, located approximately 40 m west of the Phase One Property, was identified in the 1963 FIP	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	40	Transgradient/Downgradient	No	Not Applicable
PCA-11	A UST at the northwest corner of the intersection of Slater Street and O'Connor Street was identified in the 1963 FIP	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	100	Transgradient	No	Not Applicable
PCA-12	A UST was identified at the rear of the building located at 261-263 Laurier Avenue in the 1963 FIP	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	130	Transgradient	No	Not Applicable
PCA-13	'Campbell Motors Ottawa Limited' was identified at 261-263 Laurier Avenue in the 1963 FIP	Item 27 - Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles	Off-Site	130	Transgradient	No	Not Applicable
PCA-14	The building located at 140 Slater Street was identified as being heated by fuel oil-fired boiler system in the 1963 FIP	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	15	Transgradient	No	Not Applicable
PCA-15	An 'City Services Ltd.' RFO equipped with three USTs was identified at the southwest corner of Laurier Avenue and O'Connor Street in the 1963 FIP	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	100	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 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 (Former heating oil underground storage tank (UST) and fuel pump within the Site Building)	A former 16,380-Litre (L) UST and fuel pump were located on the second basement level within the Site Building and removed in 2008.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs	Soil and Groundwater
APEC-2 (Printing facility located on-Site since at least 1980)	A printing facility has been located in the first and second basement levels within the Site Building since at least 1980.	Other – Industrial Operations	On-Site	PHCs BTEX VOCs Metals As, Sb, Se Cr (VI), Hg	Soil and Groundwater
APEC-3 (Inks associated with the on-Site printing facility)	Vegetable-based inks are located in the first basement level within the Bradda Printing Services Inc. tenant space.	Item 31 - Ink Manufacturing, Processing and Bulk Storage	On-Site	PHCs BTEX VOCs Metals As, Sb, Se Cr (VI), Hg	Soil

Table 1 - Table of Areas of Potential Environmental Concern

APEC-4 (Salt application to access routes on-Site)	South portion of the Phase One Property	Other – Road Salting Activities	On-Site	Electrical conductivity, SAR Na, Cl-	Soil and Groundwater
APEC-5 (A former printing facility was located adjacent to the Phase One Property in the 1963 Fire Insurance Plan (FIP))	A former printing facility was located adjacent to the northeast elevation of the Phase One Property in the 1963 FIP.	Other – Industrial Operations	Off-Site	PHCs BTEX PAHs VOCs Metals As, Sb, Se Cr (VI), Hg	Soil and Groundwater
APEC-6 (A dry cleaning facility was listed approximately 30 m northwest of the Phase One Property in the 1975 city directory)	A dry cleaning facility was listed approximately 30 m northwest of the Phase One Property in the 1975 city directory	Item 37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Off-Site	VOCs	Groundwater

Table 1 - Table of Areas of Potential Environmental Concern

APEC-7 (The building located at 125 Slater Street was identified as being heated by fuel oil-fired boiler system in the 1963 FIP)		Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs PAHs VOCs	Groundwater

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

TABLE 3
SOIL BULK ANALYTICAL RESULTS
KTS Properties
130 Slater Street, Ottawa, Ontario

Sample Location	**MECP Table 3 SCS (R/P/I-F)**	MW1	MW1	MW2	MW3	MW3	MW4
Sample Designation		MW1-S1	MW1-S2	MW2-S1	MW3-S1	DUP-1	MW4-S3
Sample Collection Date (dd/mm/yyyy)		03/18/2024	03/18/2024	03/19/2024	03/20/2024	03/20/2024	03/21/2024
Laboratory Certificate No.		24P132434	24P132434	24P132434	24P132434	24P132434	24P132434
Date of Laboratory Analysis (dd/mm/yyyy-dd/mm/yyyy)		25/03/2024 - 28/03/2024	25/03/2024 - 28/03/2024	25/03/2024 - 28/03/2024	25/03/2024 - 28/03/2024	25/03/2024 - 28/03/2024	25/03/2024 - 28/03/2024
Laboratory Sample No.		5756116	5756117	5756118	5756121	5756124	5756122
Sample Depth (mbgs)		0.3 - 0.9	0.9 - 1.7	0.3 - 0.6	0.3 - 0.9	0.3 - 0.9	1.2 - 1.8
Miscellaneous Parameters							
pH (pH Units)	NV	-	6.88	-	-	-	-
Sieve #200 <0.075 mm (%)	NV	-	39.44	-	-	-	-
Sieve #200 >0.075 mm (%)	NV	-	60.56	-	-	-	-
Soil Texture	NV	-	COARSE	-	-	-	-
Petroleum Hydrocarbons (PHCs)							
PHCs F1 (C_6 - C_{10})	65	5	-	<5	<5	<5	<5
PHCs F2 (>C_{10} - C_{16})	150	<10	-	<10	<10	<10	<10
PHCs F3 (>C_{16} - C_{34})	1300	<50	-	<50	<50	<50	<50
PHCs F4 (>C_{34} - C_{50})	5600	<50	-	<50	<50	<50	<50
Volatile Organic Compounds							
Acetone	28	-	-	<0.50	<0.50	<0.50	<0.50
Benzene	0.17	-	-	<0.02	<0.02	<0.02	<0.02
Bromodichloromethane	13	-	-	<0.05	<0.05	<0.05	<0.05
Bromoform	0.26	-	-	<0.05	<0.05	<0.05	<0.05
Bromomethane	0.05	-	-	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	0.12	-	-	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	2.7	-	-	<0.05	<0.05	<0.05	<0.05
Chloroform	0.18	-	-	<0.04	<0.04	<0.04	<0.04
Dibromochloromethane	9.4	-	-	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	4.3	-	-	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	6	-	-	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	0.097	-	-	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	25	-	-	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	11	-	-	<0.02	<0.02	<0.02	<0.02
1,2-Dichloroethane	0.05	-	-	<0.03	<0.03	<0.03	<0.03
1,1-Dichloroethylene	0.05	-	-	<0.05	<0.05	<0.05	<0.05
cis-1,2-Dichloroethylene	30	-	-	<0.02	<0.02	<0.02	<0.02
trans-1,2-Dichloroethylene	0.75	-	-	<0.05	<0.05	<0.05	<0.05
1,2-Dichloropropane	0.085	-	-	<0.03	<0.03	<0.03	<0.03
1,3-Dichloropropene (Total)	0.083	-	-	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	15	-	-	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	0.05	-	-	<0.04	<0.04	<0.04	<0.04
Hexane	34	-	-	<0.05	<0.05	<0.05	<0.05
Methyl Ethyl Ketone	44	-	-	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	4.3	-	-	<0.50	<0.50	<0.50	<0.50
Methyl t-Butyl Ether (MTBE)	1.4	-	-	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	0.96	-	-	<0.05	<0.05	<0.05	<0.05
Styrene	2.2	-	-	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	0.05	-	-	<0.04	<0.04	<0.04	<0.04
1,1,2,2-Tetrachloroethane	0.05	-	-	<0.05	<0.05	<0.05	<0.05
Tetrachloroethylene	2.3	-	-	<0.05	<0.05	<0.05	<0.05
Toluene	6	-	-	<0.05	<0.05	<0.05	<0.05
1,1,1-Trichloroethane	3.4	-	-	<0.05	<0.05	<0.05	<0.05
1,1,2-Trichloroethane	0.05	-	-	<0.04	<0.04	<0.04	<0.04
Trichloroethylene	0.52	-	-	<0.03	<0.03	<0.03	<0.03
Trichlorofluoromethane	5.8	-	-	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	0.022	-	-	<0.02	<0.02	<0.02	<0.02
Xylenes (Total)	25	-	-	<0.05	<0.05	<0.05	<0.05
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	58	<0.05	-	-	-	-	-
Acenaphthylene	0.17	<0.05	-	-	-	-	-
Anthracene	0.74	<0.05	-	-	-	-	-
Benzo(a)anthracene	0.63	<0.05	-	-	-	-	-
Benzo(a)pyrene	0.3	<0.05	-	-	-	-	-
Benzo(b)fluoranthene	0.78	<0.05	-	-	-	-	-
Benzo(ghi)perylene	7.8	<0.05	-	-	-	-	-
Benzo(k)fluoranthene	0.78	<0.05	-	-	-	-	-
Chrysene	7.8	<0.05	-	-	-	-	-
Dibenzo(a,h)anthracene	0.1	<0.05	-	-	-	-	-

TABLE 3

SOIL BULK ANALYTICAL RESULTS

KTS Properties

130 Slater Street, Ottawa, Ontario

Fluoranthene	0.69	<0.05	-	-	-	-	-
Fluorene	69	<0.05	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.48	<0.05	-	-	-	-	-
1- & 2-Methylnaphthalene	3.4	<0.05	-	-	-	-	-
Naphthalene	0.75	<0.05	-	-	-	-	-
Phenanthrene	7.8	<0.05	-	-	-	-	-
Pyrene	78	<0.05	-	-	-	-	-
Metals							
Antimony	7.5	-	-	<0.8	<0.8	<0.8	<0.8
Arsenic	18	-	-	4	5	4	2
Barium	390	-	-	247	243	200	106
Beryllium	5	-	-	<0.5	<0.5	<0.5	<0.5
Boron (Total)	120	-	-	8	7	6	5
Boron (Hot Water Soluble)	1.5	-	-	0.49	0.38	0.34	0.14
Cadmium	1.2	-	-	<0.5	<0.5	<0.5	<0.5
Chromium (Total)	160	-	-	34	15	17	15
Chromium (Hexavalent)	10	-	-	<0.2	<0.2	<0.2	<0.2
Cobalt	22	-	-	10.2	7.3	6.8	5.8
Copper	180	-	-	20	16.3	15.1	11.4
Lead	120	-	-	15	10	7	6
Mercury	1.8	-	-	<0.10	<0.10	<0.10	<0.10
Molybdenum	6.9	-	-	4.7	3.6	2.9	1.1
Nickel	130	-	-	28	25	20	14
Selenium	2.4	-	-	<0.8	<0.8	<0.8	<0.8
Silver	25	-	-	<0.5	<0.5	<0.5	<0.5
Thallium	1	-	-	<0.5	<0.5	<0.5	<0.5
Uranium	23	-	-	1.18	1.33	1.08	0.86
Vanadium	86	-	-	36.7	23.2	25	26.1
Zinc	340	-	-	44	20	21	21

Notes:
MECP Table 3 SCS (R/P/I-F):
Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, for Residential/Parkland/Institutional Property Use and Medium/Fine-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
mS/cm	milliSiemens per centimetre
NA	Not Applicable
NV	No Value
TEQ	Toxic Equivalency Quotient

TABLE 3
SOIL BULK ANALYTICAL RESULTS
KTS Properties
130 Slater Street, Ottawa, Ontario

Sample Location	**MECP Table 3 SCS (R/P/I-F)**	MW4	MW4
Sample Designation		MW4-S4	MW4-S5
Sample Collection Date (dd/mm/yyyy)		03/21/2024	03/22/2024
Laboratory Certificate No.		24P132434	24Z132732
Date of Laboratory Analysis (dd/mm/yyyy-dd/mm/yyyy)		25/03/2024 - 28/03/2024	27/03/2024 - 28/03/2024
Laboratory Sample No.		5756123	5760502
Sample Depth (mbgs)		1.8 - 2.3	2.7 - 3.1
Miscellaneous Parameters			
pH (pH Units)	NV	7.14	-
Sieve #200 <0.075 mm (%)	NV	37.60	-
Sieve #200 >0.075 mm (%)	NV	62.40	-
Soil Texture	NV	COARSE	-
Petroleum Hydrocarbons (PHCs)			
PHCs F1 (C_6 - C_{10})	65	-	**332**
PHCs F2 (>C_{10} - C_{16})	150	-	**357**
PHCs F3 (>C_{16} - C_{34})	1300	-	320
PHCs F4 (>C_{34} - C_{50})	5600	-	<50
Volatile Organic Compounds			
Acetone	28	-	-
Benzene	0.17	-	<0.02
Bromodichloromethane	13	-	-
Bromoform	0.26	-	-
Bromomethane	0.05	-	-
Carbon Tetrachloride	0.12	-	-
Chlorobenzene	2.7	-	-
Chloroform	0.18	-	-
Dibromochloromethane	9.4	-	-
1,2-Dichlorobenzene	4.3	-	-
1,3-Dichlorobenzene	6	-	-
1,4-Dichlorobenzene	0.097	-	-
Dichlorodifluoromethane	25	-	-
1,1-Dichloroethane	11	-	-
1,2-Dichloroethane	0.05	-	-
1,1-Dichloroethylene	0.05	-	-
cis-1,2-Dichloroethylene	30	-	-
trans-1,2-Dichloroethylene	0.75	-	-
1,2-Dichloropropane	0.085	-	-
1,3-Dichloropropene (Total)	0.083	-	-
Ethylbenzene	15	-	0.33
Ethylene Dibromide	0.05	-	-
Hexane	34	-	-
Methyl Ethyl Ketone	44	-	-
Methyl Isobutyl Ketone	4.3	-	-
Methyl t-Butyl Ether (MTBE)	1.4	-	-
Methylene Chloride	0.96	-	-
Styrene	2.2	-	-
1,1,1,2-Tetrachloroethane	0.05	-	-
1,1,2,2-Tetrachloroethane	0.05	-	-
Tetrachloroethylene	2.3	-	-
Toluene	6	-	0.42
1,1,1-Trichloroethane	3.4	-	-
1,1,2-Trichloroethane	0.05	-	-
Trichloroethylene	0.52	-	-
Trichlorofluoromethane	5.8	-	-
Vinyl Chloride	0.022	-	-
Xylenes (Total)	25	-	5.76
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	58	-	<0.05
Acenaphthylene	0.17	-	<0.05
Anthracene	0.74	-	<0.05
Benzo(a)anthracene	0.63	-	<0.05
Benzo(a)pyrene	0.3	-	<0.05
Benzo(b)fluoranthene	0.78	-	<0.05
Benzo(ghi)perylene	7.8	-	<0.05
Benzo(k)fluoranthene	0.78	-	<0.05
Chrysene	7.8	-	<0.05
Dibenzo(a,h)anthracene	0.1	-	<0.05

TABLE 3

SOIL BULK ANALYTICAL RESULTS

KTS Properties

130 Slater Street, Ottawa, Ontario

Fluoranthene	0.69	-	<0.05
Fluorene	69	-	<0.05
Indeno(1,2,3-cd)pyrene	0.48	-	<0.05
1- & 2-Methylnaphthalene	3.4	-	0.18
Naphthalene	0.75	-	<0.05
Phenanthrene	7.8	-	0.10
Pyrene	78	-	<0.05
Metals			
Antimony	7.5	-	-
Arsenic	18	-	-
Barium	390	-	-
Beryllium	5	-	-
Boron (Total)	120	-	-
Boron (Hot Water Soluble)	1.5	-	-
Cadmium	1.2	-	-
Chromium (Total)	160	-	-
Chromium (Hexavalent)	10	-	-
Cobalt	22	-	-
Copper	180	-	-
Lead	120	-	-
Mercury	1.8	-	-
Molybdenum	6.9	-	-
Nickel	130	-	-
Selenium	2.4	-	-
Silver	25	-	-
Thallium	1	-	-
Uranium	23	-	-
Vanadium	86	-	-
Zinc	340	-	-

Notes:

MECP Table 3 SCS (R/P/I-F):
Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, for Residential/Parkland/Institutional Property Use and Medium/Fine-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
mS/cm	milliSiemens per centimetre
NA	Not Applicable
NV	No Value
TEQ	Toxic Equivalency Quotient

TABLE 4

GROUNDWATER MONITORING WELL ELEVATIONS AND CONSTRUCTION DETAILS

KTS Properties

130 Slater Street, Ottawa, Ontario

Monitoring Well	Top of Pipe Elevation (mamsl)	Ground Surface Elevation (mamsl)	Well Construction Details						
			Total Well Depth (mbgs)	Stick-Up Height (metres)	Well Diameter (centimetres)	Screen Slot Size	Monitoring Well Screen Interval (mbgs)	Screen length (metres)	Sealant thickness (metres)
MW1	NM	NM	7.5	-0.09	3.2	010	4.4 - 7.5	3.1	4.1
MW2	NM	NM	7.5	-0.08	3.2	010	4.4 - 7.5	3.1	4.1
MW3	NM	NM	7.6	-0.10	3.2	010	4.5 - 7.6	3.1	4.2
MW4	NM	NM	6.3	-0.19	3.2	010	3.2 - 6.3	3.1	2.9

Notes:

mamsl	metres above mean sea level
mbgs	metres below ground surface

TABLE 5
GROUNDWATER MONITORING DATA
KTS Properties
130 Slater Street, Ottawa, Ontario

Monitoring Well	Monitoring Well Screen Interval (mbgs)	Top of Pipe Elevation (mamsl)	Ground Surface Elevation (mamsl)	Stick-Up Height (metres)	Date of Monitoring (dd/mm/yyyy)	Measured Depth to Groundwater from Top of Pipe (mbtop)	Visual / Olfactory Observations
MW1	4.4 - 7.5	NM	NM	-0.09	27-03-2024	5.84	No sheen or odours
MW2	4.4 - 7.5	NM	NM	-0.08	27-03-2024	5.88	No sheen or odours
MW3	4.5 - 7.6	NM	NM	-0.10	27-03-2024	6.20	No sheen or odours
MW4	3.2 - 6.3	NM	NM	-0.19	27-03-2024	0.69	No sheen or odours

Notes:

mamsl	metres above mean sea level
mbgs	metres below ground surface
mbtop	metres below top of pipe
NM	Not Measured

TABLE 6
GROUNDWATER MONITORING - NON-AQUEOUS PHASE LIQUIDS
KTS Properties
130 Slater Street, Ottawa, Ontario

Monitoring Well	Top of Pipe Elevation (mamsl)	Date of Monitoring (dd/mm/yyyy)	LNAPL					DNAPL				
			Measured Depth to Bottom of LNAPL from Top of Pipe (metres)	Measured Depth to Top of LNAPL from Top of Pipe (metres)	LNAPL Thickness (metres)	Top of LNAPL Elevation (mamsl)	Bottom of LNAPL Elevation (mamsl)	Measured Depth to Bottom of DNAPL from Top of Pipe (metres)	Measured Depth to Top of DNAPL from Top of Pipe (metres)	DNAPL Thickness (metres)	Top of DNAPL Elevation (mamsl)	Bottom of DNAPL Elevation (mamsl)
MW1	NM	27-03-2024	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2	NM	27-03-2024	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW3	NM	27-03-2024	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW4	NM	27-03-2024	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

DNAPL	Dense Non-Aqueous Phase Liquid
LNAPL	Light Non-Aqueous Phase Liquid
mamsl	Metres Above Mean Sea Level
mbgs	Metres Below Ground Surface
ND	Not Detected

TABLE 7
GROUNDWATER ANALYTICAL RESULTS
KTS Properties
130 Slater Street, Ottawa, Ontario

Sample Location	**MECP Table 3 SCS (C)**	MW1	MW1	MW2	MW3	MW4	MW4	-
Sample Designation		MW1	DUP-1	MW2	MW3	MW4	DUP-2	Trip Blank
Sample Collection Date (dd/mm/yyyy)		27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024	27/03/2024
Laboratory Certificate No.		24Z134306	24Z134306	24Z134306	24Z134306	24Z134306	24Z134306	24Z134306
Date of Laboratory Analysis (dd/mm/yyyy)		01/04/2024 - 03/04/2024	01/04/2024 - 03/04/2024	01/04/2024 - 03/04/2024	01/04/2024 - 03/04/2024	01/04/2024 - 03/04/2024	01/04/2024 - 03/04/2024	01/04/2024
Laboratory Sample No.		5769697	5769708	5769698	5769700	5769703	5769708	5769709
Well Screen Depth Interval (mbgs)		4.4 - 7.5	4.4 - 7.5	4.4 - 7.5	4.5 - 7.6	3.2 - 6.3	3.2 - 6.3	NA
Petroleum Hydrocarbons (PHCs)								
PHCs F1 (C_6 - C_{10})	750	<25	<25	<25	<25	<25	-	-
PHCs F2 ($>C_{10}$ - C_{16})	150	<100	<100	<100	<100	<100	-	-
PHCs F3 ($>C_{16}$ - C_{34})	500	<100	<100	<100	<100	<100	-	-
PHCs F4 ($>C_{34}$ - C_{50})	500	<100	<100	<100	<100	<100	-	-
Volatile Organic Compounds								
Acetone	130000	-	-	191	<1.0	<1.0	<1.0	<1.0
Benzene	44	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	85000	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	380	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	5.6	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Carbon Tetrachloride	0.79	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	630	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
Chloroform	2.4	-	-	1.65	<0.20	1.50	0.56	<0.20
Dibromochloromethane	82000	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	4600	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	9600	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	8	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorodifluoromethane	4400	-	-	<0.40	<0.40	<0.40	<0.40	<0.40
1,1-Dichloroethane	320	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
1,2-Dichloroethane	1.6	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethylene	1.6	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
cis-1,2-Dichloroethylene	1.6	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
trans-1,2-Dichloroethylene	1.6	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	16	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
1,3-Dichloropropene (Total)	5.2	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Ethylbenzene	2300	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	0.25	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
Hexane	51	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Ethyl Ketone	470000	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl Isobutyl Ketone	140000	-	-	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl t-Butyl Ether (MTBE)	190	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Methylene Chloride	610	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
Styrene	1300	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,1,2-Tetrachloroethane	3.3	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	3.2	-	-	<0.10	<0.10	<0.10	<0.10	<0.10
Tetrachloroethylene	1.6	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	18000	<0.20	<0.20	<0.20	<0.20	0.34	0.35	<0.20
1,1,1-Trichloroethane	640	-	-	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	4.7	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	1.6	-	-	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	2500	-	-	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	0.5	-	-	<0.17	<0.17	<0.17	<0.17	<0.17
Xylenes (Total)	4200	<0.20	<0.20	<0.20	<0.20	<0.20	0.59	<0.20
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	600	<0.20	<0.20	-	-	<0.20	-	-
Acenaphthylene	1.8	<0.20	<0.20	-	-	<0.20	-	-
Anthracene	2.4	<0.10	<0.10	-	-	<0.10	-	-
Benzo(a)anthracene	4.7	<0.20	<0.20	-	-	<0.20	-	-
Benzo(a)pyrene	0.81	<0.1	<0.1	-	-	<0.1	-	-
Benzo(b)fluoranthene	0.75	<0.10	<0.10	-	-	<0.10	-	-
Benzo(ghi)perylene	0.2	<0.20	<0.20	-	-	<0.20	-	-
Benzo(k)fluoranthene	0.4	<0.10	<0.10	-	-	<0.10	-	-
Chrysene	1	<0.10	<0.10	-	-	<0.10	-	-
Dibenzo(a,h)anthracene	0.52	<0.20	<0.20	-	-	<0.20	-	-
Fluoranthene	130	<0.20	<0.20	-	-	<0.20	-	-
Fluorene	400	<0.20	<0.20	-	-	<0.20	-	-
Indeno(1,2,3-cd)pyrene	0.2	<0.20	<0.20	-	-	<0.20	-	-
1- & 2-Methylnaphthalene	1800	<0.20	<0.20	-	-	<0.20	-	-
Naphthalene	1400	<0.20	<0.20	-	-	<0.20	-	-
Phenanthrene	580	<0.10	<0.10	-	-	<0.10	-	-
Pyrene	68	<0.20	<0.20	-	-	<0.20	-	-
Metals								
Antimony	20000	-	-	2.7	<1.0	1.2	<1.0	-
Arsenic	1900	-	-	1.8	1.4	2	3.9	-
Barium	29000	-	-	317	100	297	291	-
Beryllium	67	-	-	<0.50	<0.50	<0.50	<0.50	-
Boron (Total)	45000	-	-	317	530	104	91.1	-
Cadmium	2.7	-	-	<0.20	<0.20	<0.20	<0.20	-
Chromium (Total)	810	-	-	<2.0	<2.0	<2.0	<2.0	-
Chromium (Hexavalent)	140	-	-	<2.000	<2.000	<2.000	<2.000	-
Cobalt	66	-	-	2.84	<0.50	0.8	<0.50	-
Copper	87	-	-	2.8	<1.0	4	3.4	-
Lead	25	-	-	<0.50	<0.50	3.33	3.72	-
Mercury	0.29	-	-	<0.02	<0.02	<0.02	<0.02	-
Molybdenum	9200	-	-	29.3	5.26	21.5	23.5	-
Nickel	490	-	-	17	2.3	3.6	3.3	-
Selenium	63	-	-	6.7	4.8	<1.0	<1.0	-
Silver	1.5	-	-	<0.20	<0.20	<0.20	<0.20	-
Sodium	2300000	-	-	-	-	-	-	-
Thallium	510	-	-	<0.30	<0.30	<0.30	<0.30	-
Uranium	420	-	-	18.9	5.27	8.46	7.81	-
Vanadium	250	-	-	0.53	0.57	3.61	3.83	-
Zinc	1100	-	-	12.6	<5.0	6	<5.0	-

Notes:

MECP Table 3 SCS (C) :

Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, for All Types of Property Use and Coarse-Textured Soils

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

TABLE 8
MAXIMUM CONCENTRATIONS IN SOIL
KTS Properties
130 Slater Street, Ottawa, Ontario

Parameter	Maximum Concentration	MECP Table 3 SCS (R/P/I-F)	Sample Designation	Sample Location	Sample Depth (mbgs)
Petroleum Hydrocarbons (PHCs)					
PHCs F1 (C_6 - C_{10})	332	65	MW4-S5	MW4	2.7 - 3.1
PHCs F2 (>C_{10} - C_{16})	357	150	MW4-S5	MW4	2.7 - 3.1
PHCs F3 (>C_{16} - C_{34})	320	1300	MW4-S5	MW4	2.7 - 3.1
PHCs F4 (>C_{34} - C_{50})	<50	5600	Multiple Samples	Multiple Samples	Multiple Samples
Volatile Organic Compounds					
Acetone	<0.5	28	Multiple Samples	Multiple Samples	Multiple Samples
Benzene	<0.02	0.17	Multiple Samples	Multiple Samples	Multiple Samples
Bromodichloromethane	<0.05	13	Multiple Samples	Multiple Samples	Multiple Samples
Bromoform	<0.05	0.26	Multiple Samples	Multiple Samples	Multiple Samples
Bromomethane	<0.05	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Carbon Tetrachloride	<0.05	0.12	Multiple Samples	Multiple Samples	Multiple Samples
Chlorobenzene	<0.05	2.7	Multiple Samples	Multiple Samples	Multiple Samples
Chloroform	<0.04	0.18	Multiple Samples	Multiple Samples	Multiple Samples
Dibromochloromethane	<0.05	9.4	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichlorobenzene	<0.05	4.3	Multiple Samples	Multiple Samples	Multiple Samples
1,3-Dichlorobenzene	<0.05	6	Multiple Samples	Multiple Samples	Multiple Samples
1,4-Dichlorobenzene	<0.05	0.097	Multiple Samples	Multiple Samples	Multiple Samples
Dichlorodifluoromethane	<0.05	25	Multiple Samples	Multiple Samples	Multiple Samples
1,1-Dichloroethane	<0.02	11	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichloroethane	<0.03	0.05	Multiple Samples	Multiple Samples	Multiple Samples
1,1-Dichloroethylene	<0.05	0.05	Multiple Samples	Multiple Samples	Multiple Samples
cis-1,2-Dichloroethylene	<0.02	30	Multiple Samples	Multiple Samples	Multiple Samples
trans-1,2-Dichloroethylene	<0.05	0.75	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichloropropane	<0.03	0.085	Multiple Samples	Multiple Samples	Multiple Samples
1,3-Dichloropropene (Total)	<0.05	0.083	Multiple Samples	Multiple Samples	Multiple Samples
Ethylbenzene	0.33	15	MW4-S5	MW4	2.7 - 3.1
Ethylene Dibromide	<0.04	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Hexane	<0.05	34	Multiple Samples	Multiple Samples	Multiple Samples
Methyl Ethyl Ketone	<0.5	44	Multiple Samples	Multiple Samples	Multiple Samples
Methyl Isobutyl Ketone	<0.5	4.3	Multiple Samples	Multiple Samples	Multiple Samples
Methyl t-Butyl Ether (MTBE)	<0.05	1.4	Multiple Samples	Multiple Samples	Multiple Samples
Methylene Chloride	<0.05	0.96	Multiple Samples	Multiple Samples	Multiple Samples
Styrene	<0.05	2.2	Multiple Samples	Multiple Samples	Multiple Samples
1,1,1,2-Tetrachloroethane	<0.04	0.05	Multiple Samples	Multiple Samples	Multiple Samples
1,1,2,2-Tetrachloroethane	<0.05	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Tetrachloroethylene	<0.05	2.3	Multiple Samples	Multiple Samples	Multiple Samples
Toluene	0.42	6	MW4-S5	MW4	2.7 - 3.1
1,1,1-Trichloroethane	<0.05	3.4	Multiple Samples	Multiple Samples	Multiple Samples
1,1,2-Trichloroethane	<0.04	0.05	Multiple Samples	Multiple Samples	Multiple Samples
Trichloroethylene	<0.03	0.52	Multiple Samples	Multiple Samples	Multiple Samples
Trichlorofluoromethane	<0.05	5.8	Multiple Samples	Multiple Samples	Multiple Samples
Vinyl Chloride	<0.02	0.022	Multiple Samples	Multiple Samples	Multiple Samples
Xylenes (Total)	5.76	25	MW4-S5	MW4	2.7 - 3.1
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	<0.05	58	Multiple Samples	Multiple Samples	Multiple Samples
Acenaphthylene	<0.05	0.17	Multiple Samples	Multiple Samples	Multiple Samples
Anthracene	<0.05	0.74	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(a)anthracene	<0.05	0.63	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(a)pyrene	<0.05	0.3	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(b)fluoranthene	<0.05	0.78	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(ghi)perylene	<0.05	7.8	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(k)fluoranthene	<0.05	0.78	Multiple Samples	Multiple Samples	Multiple Samples
Chrysene	<0.05	7.8	Multiple Samples	Multiple Samples	Multiple Samples
Dibenzo(a,h)anthracene	<0.05	0.1	Multiple Samples	Multiple Samples	Multiple Samples
Fluoranthene	<0.05	0.69	Multiple Samples	Multiple Samples	Multiple Samples
Fluorene	<0.05	69	Multiple Samples	Multiple Samples	Multiple Samples
Indeno(1,2,3-cd)pyrene	<0.05	0.48	Multiple Samples	Multiple Samples	Multiple Samples
1- & 2-Methylnaphthalene	0.18	3.4	MW4-S5	MW4	2.7 - 3.1
Naphthalene	<0.05	0.75	Multiple Samples	Multiple Samples	Multiple Samples
Phenanthrene	0.1	7.8	MW4-S5	MW4	2.7 - 3.1
Pyrene	<0.05	78	Multiple Samples	Multiple Samples	Multiple Samples
Metals					
Antimony	<0.8	7.5	Multiple Samples	Multiple Samples	Multiple Samples
Arsenic	5	18	MW3-S1	MW3	0.3 - 0.9
Barium	247	390	MW2-S1	MW2	0.3 - 0.6
Beryllium	<0.5	5	Multiple Samples	Multiple Samples	Multiple Samples
Boron (Total)	8	120	MW2-S1	MW2	0.3 - 0.6
Boron (Hot Water Soluble)	0.49	1.5	MW2-S1	MW2	0.3 - 0.6
Cadmium	<0.5	1.2	Multiple Samples	Multiple Samples	Multiple Samples
Chromium (Total)	34	160	MW2-S1	MW2	0.3 - 0.6
Chromium (Hexavalent)	<0.2	10	Multiple Samples	Multiple Samples	Multiple Samples
Cobalt	10.2	22	MW2-S1	MW2	0.3 - 0.6
Copper	20	180	MW2-S1	MW2	0.3 - 0.6
Lead	15	120	MW2-S1	MW2	0.3 - 0.6
Mercury	<0.1	1.8	Multiple Samples	Multiple Samples	Multiple Samples
Molybdenum	4.7	6.9	MW2-S1	MW2	0.3 - 0.6
Nickel	28	130	MW2-S1	MW2	0.3 - 0.6
Selenium	<0.8	2.4	Multiple Samples	Multiple Samples	Multiple Samples
Silver	<0.5	25	Multiple Samples	Multiple Samples	Multiple Samples
Thallium	<0.5	1	Multiple Samples	Multiple Samples	Multiple Samples
Uranium	1.33	23	MW3-S1	MW3	0.3 - 0.9
Vanadium	36.7	86	MW2-S1	MW2	0.3 - 0.6
Zinc	44	340	MW2-S1	MW2	0.3 - 0.6

Notes:

Units	All units in micrograms per gram, unless otherwise noted
mbgs	metres below ground surface
mS/cm	milliSiemens per centimetre

TABLE 9
MAXIMUM CONCENTRATIONS IN GROUNDWATER
KTS Properties
130 Slater Street, Ottawa, Ontario

Parameter	Maximum Concentration	MECP Table 3 SCS (C)	Sample Designation	Sample Location	Sample Depth (mbgs)
Petroleum Hydrocarbons (PHCs)					
PHCs F1 (C_6 - C_{10})	<25	750	Multiple Samples	Multiple Samples	Multiple Samples
PHCs F2 (>C_{10} - C_{16})	<100	150	Multiple Samples	Multiple Samples	Multiple Samples
PHCs F3 (>C_{16} - C_{34})	<100	500	Multiple Samples	Multiple Samples	Multiple Samples
PHCs F4 (>C_{34} - C_{50})	<100	500	Multiple Samples	Multiple Samples	Multiple Samples
Volatile Organic Compounds					
Acetone	191	130000	MW2	MW2	4.4 - 7.5
Benzene	<0.2	44	Multiple Samples	Multiple Samples	Multiple Samples
Bromodichloromethane	<0.2	85000	Multiple Samples	Multiple Samples	Multiple Samples
Bromoform	<0.1	380	Multiple Samples	Multiple Samples	Multiple Samples
Bromomethane	<0.2	5.6	Multiple Samples	Multiple Samples	Multiple Samples
Carbon Tetrachloride	<0.2	0.79	Multiple Samples	Multiple Samples	Multiple Samples
Chlorobenzene	<0.1	630	Multiple Samples	Multiple Samples	Multiple Samples
Chloroform	1.65	2.4	MW2	MW2	4.4 - 7.5
Dibromochloromethane	<0.1	82000	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichlorobenzene	<0.1	4600	Multiple Samples	Multiple Samples	Multiple Samples
1,3-Dichlorobenzene	<0.1	9600	Multiple Samples	Multiple Samples	Multiple Samples
1,4-Dichlorobenzene	<0.1	8	Multiple Samples	Multiple Samples	Multiple Samples
Dichlorodifluoromethane	<0.4	4400	Multiple Samples	Multiple Samples	Multiple Samples
1,1-Dichloroethane	<0.3	320	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichloroethane	<0.2	1.6	Multiple Samples	Multiple Samples	Multiple Samples
1,1-Dichloroethylene	<0.3	1.6	Multiple Samples	Multiple Samples	Multiple Samples
cis-1,2-Dichloroethylene	<0.2	1.6	Multiple Samples	Multiple Samples	Multiple Samples
trans-1,2-Dichloroethylene	<0.2	1.6	Multiple Samples	Multiple Samples	Multiple Samples
1,2-Dichloropropane	<0.2	16	Multiple Samples	Multiple Samples	Multiple Samples
1,3-Dichloropropene (Total)	<0.3	5.2	Multiple Samples	Multiple Samples	Multiple Samples
Ethylbenzene	<0.1	2300	Multiple Samples	Multiple Samples	Multiple Samples
Ethylene Dibromide	<0.1	0.25	Multiple Samples	Multiple Samples	Multiple Samples
Hexane	<0.2	51	Multiple Samples	Multiple Samples	Multiple Samples
Methyl Ethyl Ketone	<1	470000	Multiple Samples	Multiple Samples	Multiple Samples
Methyl Isobutyl Ketone	<1	140000	Multiple Samples	Multiple Samples	Multiple Samples
Methyl t-Butyl Ether (MTBE)	<0.2	190	Multiple Samples	Multiple Samples	Multiple Samples
Methylene Chloride	<0.3	610	Multiple Samples	Multiple Samples	Multiple Samples
Styrene	<0.1	1300	Multiple Samples	Multiple Samples	Multiple Samples
1,1,1,2-Tetrachloroethane	<0.1	3.3	Multiple Samples	Multiple Samples	Multiple Samples
1,1,2,2-Tetrachloroethane	<0.1	3.2	Multiple Samples	Multiple Samples	Multiple Samples
Tetrachloroethylene	<0.2	1.6	Multiple Samples	Multiple Samples	Multiple Samples
Toluene	0.35	18000	DUP-2	MW4	3.2 - 6.3
1,1,1-Trichloroethane	<0.3	640	Multiple Samples	Multiple Samples	Multiple Samples
1,1,2-Trichloroethane	<0.2	4.7	Multiple Samples	Multiple Samples	Multiple Samples
Trichloroethylene	<0.2	1.6	Multiple Samples	Multiple Samples	Multiple Samples
Trichlorofluoromethane	<0.4	2500	Multiple Samples	Multiple Samples	Multiple Samples
Vinyl Chloride	<0.17	0.5	Multiple Samples	Multiple Samples	Multiple Samples
Xylenes (Total)	0.59	4200	DUP-2	MW4	3.2 - 6.3
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	<0.2	600	Multiple Samples	Multiple Samples	Multiple Samples
Acenaphthylene	<0.2	1.8	Multiple Samples	Multiple Samples	Multiple Samples
Anthracene	<0.1	2.4	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(a)anthracene	<0.2	4.7	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(a)pyrene	<0.1	0.81	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(b)fluoranthene	<0.1	0.75	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(ghi)perylene	<0.2	0.2	Multiple Samples	Multiple Samples	Multiple Samples
Benzo(k)fluoranthene	<0.1	0.4	Multiple Samples	Multiple Samples	Multiple Samples
Chrysene	<0.1	1	Multiple Samples	Multiple Samples	Multiple Samples
Dibenzo(a,h)anthracene	<0.2	0.52	Multiple Samples	Multiple Samples	Multiple Samples
Fluoranthene	<0.2	130	Multiple Samples	Multiple Samples	Multiple Samples
Fluorene	<0.2	400	Multiple Samples	Multiple Samples	Multiple Samples
Indeno(1,2,3-cd)pyrene	<0.2	0.2	Multiple Samples	Multiple Samples	Multiple Samples
Methylnaphthalene 2-(1-)	<0.2	1800	Multiple Samples	Multiple Samples	Multiple Samples
Naphthalene	<0.2	1400	Multiple Samples	Multiple Samples	Multiple Samples
Phenanthrene	<0.1	580	Multiple Samples	Multiple Samples	Multiple Samples
Pyrene	<0.2	68	Multiple Samples	Multiple Samples	Multiple Samples
Metals					
Antimony	2.7	20000	MW2	MW2	4.4 - 7.5
Arsenic	3.9	1900	DUP-2	MW4	3.2 - 6.3
Barium	317	29000	MW2	MW2	4.4 - 7.5
Beryllium	<0.5	67	Multiple Samples	Multiple Samples	Multiple Samples
Boron	530	45000	MW3	MW3	4.5 - 7.6
Cadmium	<0.2	2.7	Multiple Samples	Multiple Samples	Multiple Samples
Chromium (Total)	<2	810	Multiple Samples	Multiple Samples	Multiple Samples
Chromium (Hexavalent)	<2	140	Multiple Samples	Multiple Samples	Multiple Samples
Cobalt	2.84	66	MW2	MW2	4.4 - 7.5
Copper	4	87	MW4	MW4	3.2 - 6.3
Lead	3.72	25	DUP-2	MW4	3.2 - 6.3
Mercury	<0.02	0.29	Multiple Samples	Multiple Samples	Multiple Samples
Molybdenum	29.3	9200	MW2	MW2	4.4 - 7.5
Nickel	17	490	MW2	MW2	4.4 - 7.5
Selenium	6.7	63	MW2	MW2	4.4 - 7.5
Silver	<0.2	1.5	Multiple Samples	Multiple Samples	Multiple Samples
Sodium	<0	2300000	Multiple Samples	Multiple Samples	Multiple Samples
Thallium	<0.3	510	Multiple Samples	Multiple Samples	Multiple Samples
Uranium	18.9	420	MW2	MW2	4.4 - 7.5
Vanadium	3.83	250	DUP-2	MW4	3.2 - 6.3
Zinc	12.6	1100	MW2	MW2	4.4 - 7.5
Inorganics					
Chloride	41	2300000	MW1	MW1	4.4 - 7.5
Cyanide (Free)	52	66	MW1	MW1	4.4 - 7.5

Notes:

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

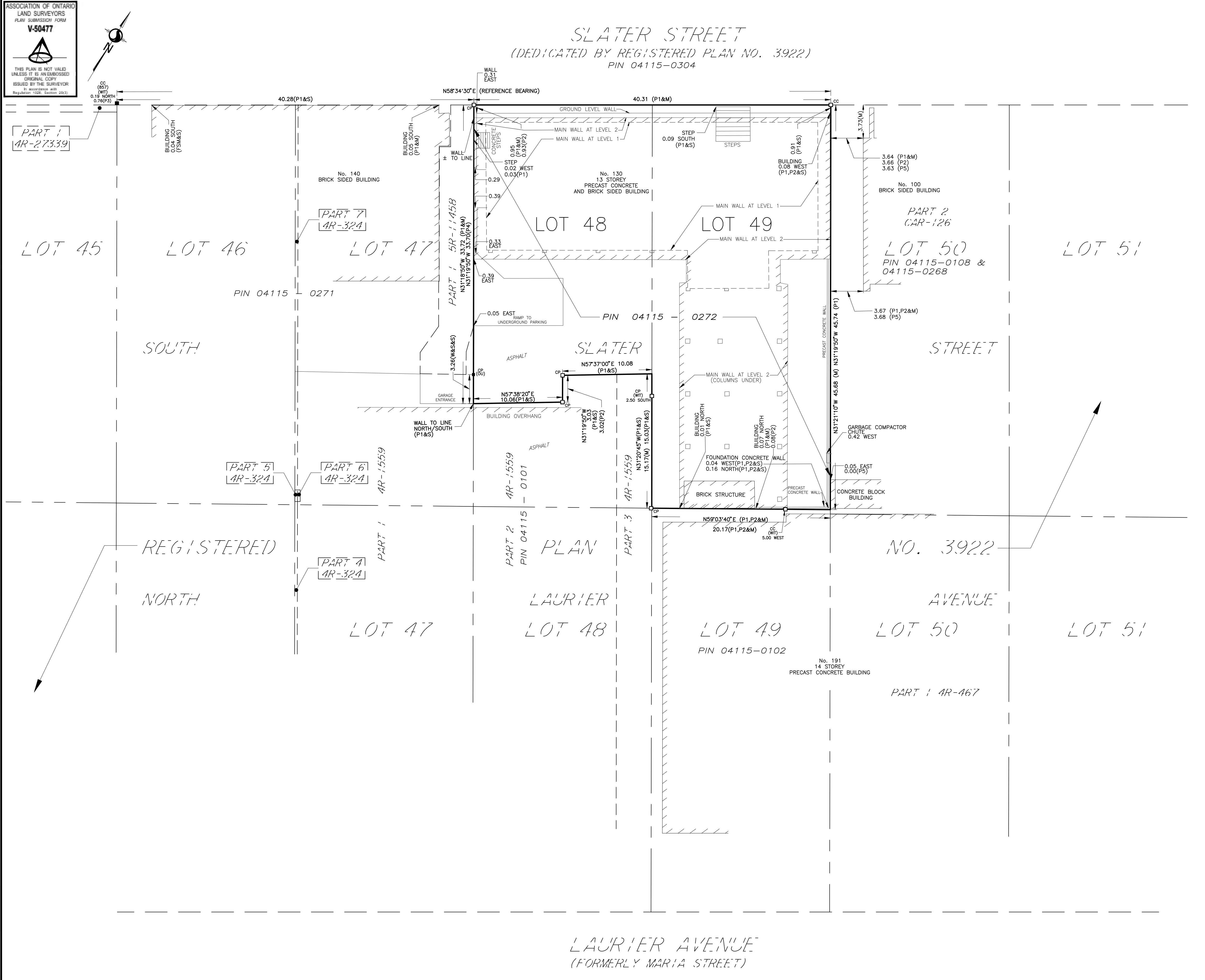
10.0 APPENDICES

APPENDIX A

Legal Survey

6 December 2023 12:27 PM

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-50477
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3)



SURVEYOR'S REAL PROPERTY REPORT

PART 1 - PLAN OF SURVEY

LOT 49 AND PART OF LOT 48
SOUTH SLATER STREET
REGISTERED PLAN No. 3922

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

Stantec Geomatics Ltd.

METRIC CONVERSION

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

GRID SCALE CONVERSION

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 1.0000.

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE SOUTHERN LIMIT OF SLATER STREET HAVING A BEARING OF N 58° 34' 30" E AS SHOWN ON PLAN BY WEBSTER & SIMMONDS SURVEYING LTD. DATED APRIL 21, 1999.

NOTE

THIS PLAN OF SURVEY IS TO BE READ IN CONJUNCTION WITH THE REPORT SUMMARY NOTED AS PART 2 HEREON.
THIS REPORT CAN ONLY BE UPDATED BY THIS OFFICE. NO ADDITIONAL PRINTS OF THIS ORIGINAL REPORT WILL BE ISSUED SUBSEQUENT TO THE DATE OF CERTIFICATION.
ALL TIES ARE MINIMUM UNLESS OTHERWISE NOTED.
ALL TIES TO CURVED BOUNDARY ARE RADIAL TO ARC.
RISK OF UNDERGROUND SERVICES, MONUMENTATION PLANTED ACCORDINGLY.

PART 2

This Report was prepared for KATASA GROUP and the undersigned accepts no responsibility for the use by other parties.

1. REGISTERED RIGHTS-OF-WAY/EASEMENTS

No rights-of-way or easements were found to be registered against the subject property.

2. PROPERTY IMPROVEMENTS

This is a foundation survey only.

3. COMPLIANCE WITH MUNICIPAL ZONING BYLAWS

Compliance is not certified by this report.

4. ADDITIONAL REMARKS

None.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
INST	"	INSTRUMENT
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
P1	"	PLAN BY WEBSTER & SIMMONDS SURVEYING LTD. DATED 21 APRIL, 1999.
P2	"	PLAN CAR-126
P3	"	PLAN 5R-11458
P4	"	PLAN 4R-1559
P5	"	SURVEYOR'S REAL PROPERTY REPORT BY FAIRHALL, MOFFATT & WOODLAND LIMITED. DATED APRIL 12, 2000.

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 5th DAY OF DECEMBER, 2023.

December 06, 2023
DATE

R.G. BENNETT
ONTARIO LAND SURVEYOR

SRO MAP COORD.=367675, 5031484

Stantec

Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 300
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420
stantec.com

DRAWN: ZF	CHECKED: CT	PM: CT	FIELD: AW	PROJECT No.: 161614767-110

This plan was signed with a scanned signature as a result of the Emergency Order related to the COVID-19 pandemic.

W:\active\161614767\SRPR\drawing\161614767-110_d1_c3d.dwg

APPENDIX B

Sampling and Analysis Plan

DRAFT

Sampling and Analysis Plan for Phase Two Environmental Site Assessment

130 Slater Street
Ottawa, Ontario

Prepared for:

130 Slater Street LP
265 Carling Avenue, Unit 401
Ottawa, ON K1S 2E1

Attn: Tanya Chowieri
Owner

March 14, 2024

Pinchin File: 334803.001

Issued To:	**130 Slater Street LP**
Contact:	**Tanya Chowieri** **Owner**
Issued On:	**March 14, 2024**
Pinchin File:	**334803.001**
Issuing Office:	**Kanata, ON**
Primary Pinchin Contact:	**Alicia McDonald,** **Senior Project Manager**

Author:
Alicia McDonald, P.Eng., QPESA
Senior Project Manager
613.840.6147
amcdonald@pinchin.com

Reviewer:
Scott Mather, P.Eng., QPESA
Director, Eastern Ontario
613.851.4098
smather@pinchin.com

TABLE OF CONTENTS

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 130 Slater Street in Ottawa, Ontario (hereafter referred to as the Site or Phase Two Property). The Phase Two Property is presently developed with one 13-storey, multi-tenant commercial office/retail building (Site Building). 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 130 Slater Street LP (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*, which was last amended by Ontario Regulation 407/19 on December 4, 2019 (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 *"Phase Two Environmental Site Assessment, 130 Slater Street, Ottawa, Ontario"*, prepared for the Client, dated February 14, 2024.

2.0 AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

The objectives of the Phase Two ESA will be to assess soil and groundwater quality at the Phase Two Property in relation to six 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 report entitled "*Phase One Environmental Site Assessment Report, 130 Slater Street, Ottawa, 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 to 4.

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 and groundwater), 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 five boreholes, all of which will be completed as groundwater monitoring wells. The proposed borehole and groundwater monitoring well locations are provided on Figure 5.

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

- Boreholes and/or groundwater monitoring wells 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, monitoring well screen intervals and the sampling frequency.
- Number of samples per borehole or groundwater monitoring well to be collected and submitted for laboratory analysis.

Note that the soil sampling depth intervals (i.e., borehole depths), monitoring well screen intervals and sampling frequency are based on Pinchin's current knowledge of subsurface conditions, including the estimated depth to groundwater of 6.1 metres below ground surface (mbgs), 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 three soil samples for grain size analysis.
- Elevation surveying of the ground surface elevations of all monitoring well locations, and the top of pipe elevations for all groundwater monitoring wells.
- Depth to water measurements of all newly-installed groundwater monitoring wells, including assessment for non-aqueous phase liquid. Depth to water measurements will be made during well development and groundwater sampling, and approximately one month following groundwater sampling.
- Completion of groundwater sampling using low-flow purging and sampling methods as per SOP-EDR023 (see Section 6.0), unless well yields are too low to permit this method to be used. For well(s) where low flow sampling cannot be employed, groundwater sampling will be conducted using the well volume method described in SOP-EDR008.

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 and groundwater 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 Association of 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 following non-dedicated sampling and monitoring equipment will be used during completion of the Phase Two ESA:

- Interface probe.
- Water level tape.
- Spatula for soil sampling.
- Hollow-stem augers.
- Split-spoon samplers.
- Submersible pump.
- Flow-through cell for groundwater sampling.

All of the above-listed 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 filled by the analytical laboratory with VOC-free distilled water and shipped with the groundwater 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.

One trip blank will accompany each submission to the laboratory. Each trip blank will be submitted for analysis of VOCs. 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 and groundwater 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

Water quality instruments used to measure field parameters during groundwater sampling will be calibrated in accordance with the procedures described in SOP-EDR016. Calibration checks will also be made at the frequency specified in SOP-EDR016.

Records of the calibration and calibration checks of the probes/instruments used for water quality parameter measurements, including any calibration sheets provided by the equipment supplier, will be retained in Pinchin's project file.

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).
- Monitoring well installation (SOP-EDR007).
- Monitoring well development (SOP-EDR017).
- Field measurement of water quality indicators (SOP-EDR016).
- Groundwater sampling (SOP-EDR008 and/or SOP-EDR023).
- 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 and monitoring well locations in all APECs will be selected following a judgemental sampling system. Boreholes and monitoring wells 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:

- Boreholes and monitoring wells will be completed at the former heating oil underground storage tank location in the second basement level of the Site Building (APEC-1).
- Boreholes and monitoring wells will be completed within the footprint of the current on-Site printing facility (APEC-2 and APEC-3).
- Monitoring wells intended to assess groundwater impacts from a historical off-Site dry cleaner and a historical off-Site printing facility will be installed along the property boundary closest to the PCAs (APEC-5 and APEC-6).

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 130 Slater Street LP (Client) in order to investigate potential environmental impacts at 130 Slater Street in Ottawa, 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.

\\PIN-KGN-FS01\job\334000s\0334803.000 KATASA,130SlaterStOttawa,EDR,ONE\0334803.001 KATASA,130SlaterStOttawa,EDR,TWO\Deliverables\SAP\334803.001 SAP 130 Slater St Ottawa Mar 2024.docx

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

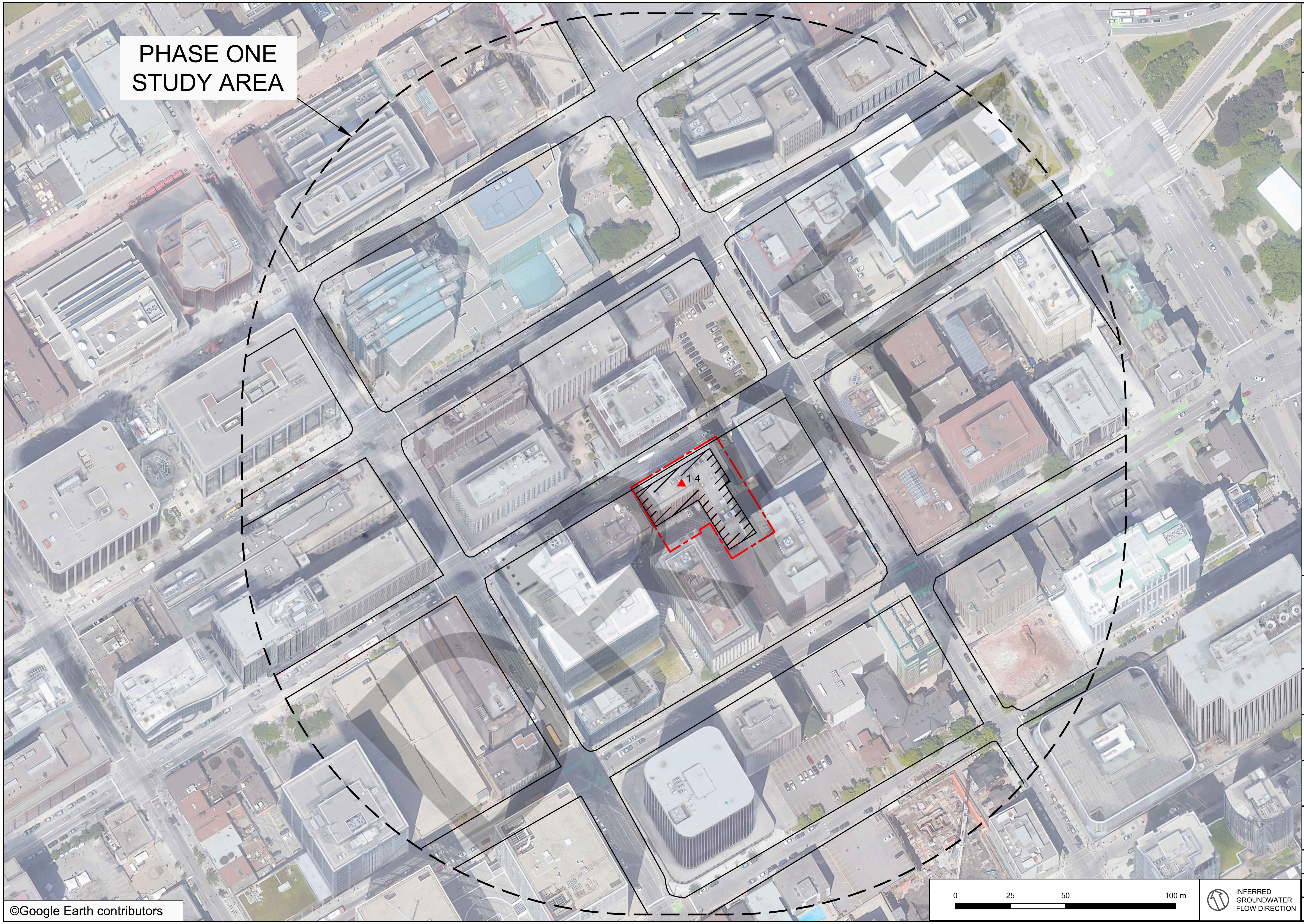
APPENDIX I

Figures

PINCHIN

PROJECT NAME:	SAMPLING AND ANALYSIS PLAN
CLIENT NAME:	KTS PROPERTIES
PROJECT LOCATION:	130 SLATER STREET, OTTAWA, ONTARIO
FIGURE NAME:	KEY MAP
FIGURE NUMBER	1

PROJECT NUMBER:	SCALE:	DRAWN BY:	REVIEWED BY:	DATE:
334803.001	1:15,000	NJ	AK	MARCH 2024



N

LEGEND

🟥	SITE BOUNDARY
▨	SITE BUILDING
----	PHASE ONE STUDY AREA BOUNDARY
▲	PCA
PCA	POTENTIALLY CONTAMINATING ACTIVITIES

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

INFERRED GROUNDWATER FLOW DIRECTION

PINCHIN

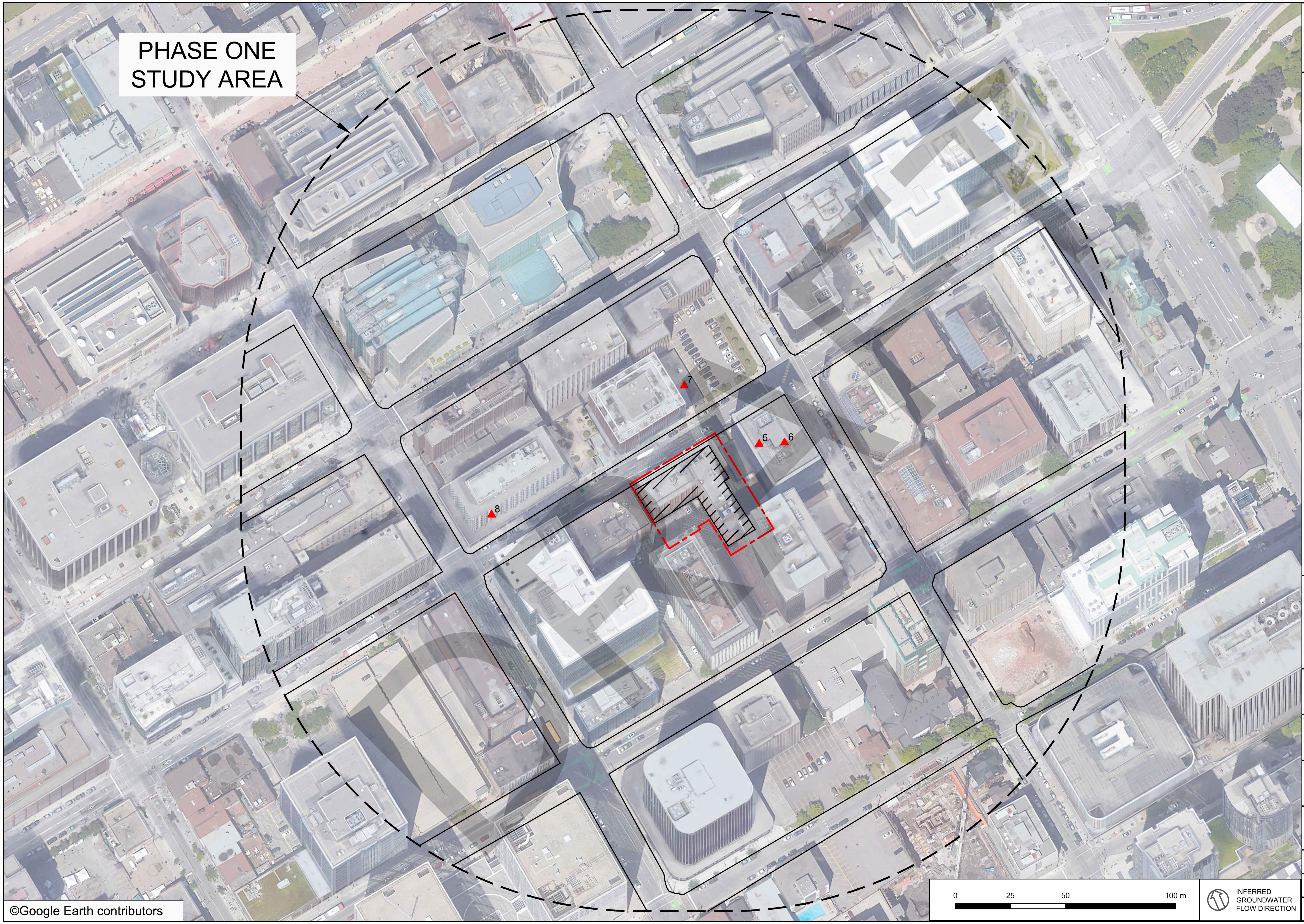
PROJECT NAME:
SAMPLING AND ANALYSIS PLAN

CLIENT NAME:
KTS PROPERTIES

PROJECT LOCATION:
130 SLATER STREET,
OTTAWA, ONTARIO

FIGURE NAME:
ON-SITE POTENTIALLY CONTAMINATING ACTIVITIES

PROJECT NUMBER:	SCALE:
334803.001	AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: MARCH 2024	FIGURE NUMBER: 2



©Google Earth contributors

N

LEGEND

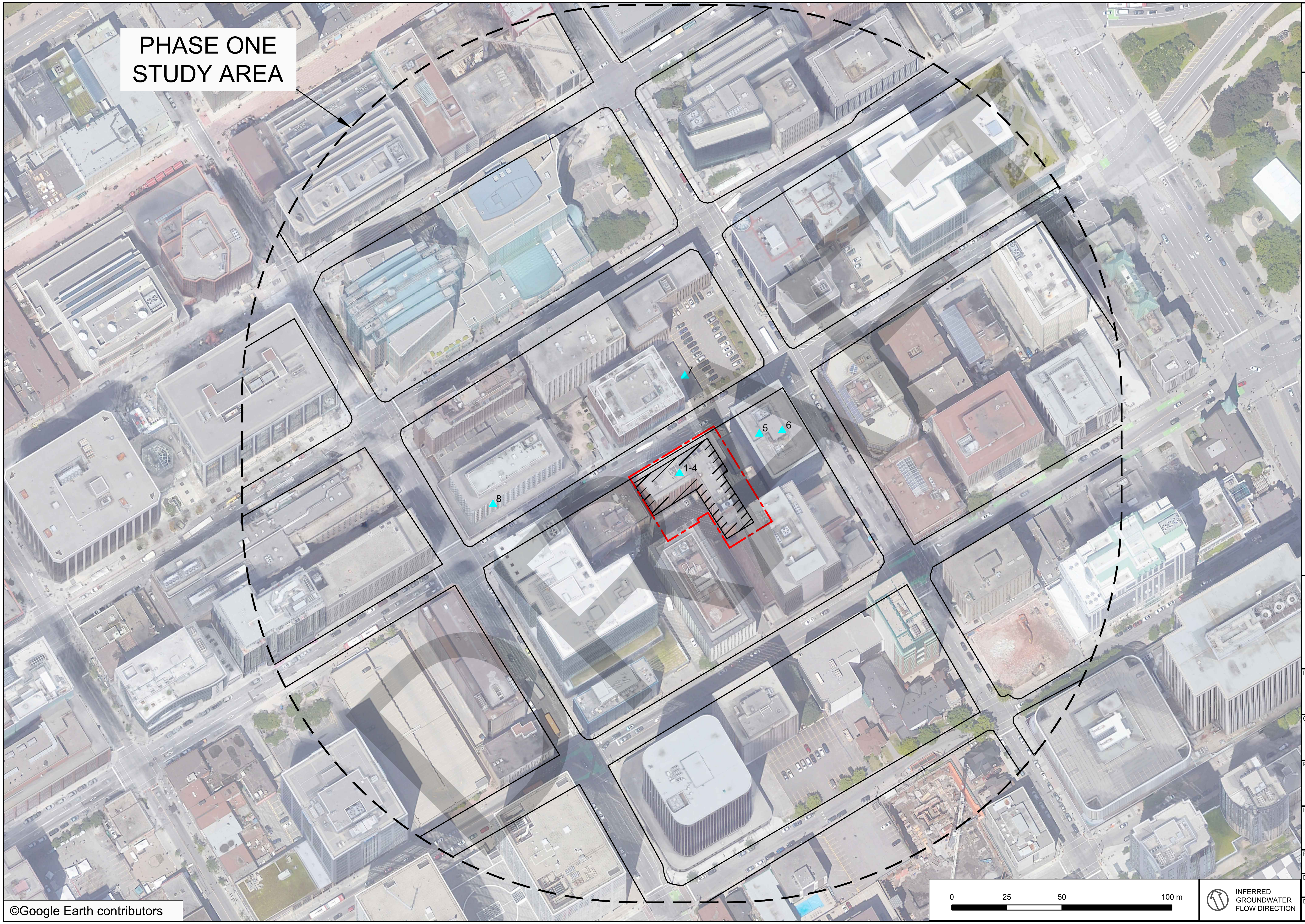
- SITE BOUNDARY
- ▨ SITE BUILDING
- PHASE ONE STUDY AREA BOUNDARY
- ▲ PCA

PCA POTENTIALLY CONTAMINATING ACTIVITIES

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

PINCHIN

PROJECT NAME: SAMPLING AND ANALYSIS PLAN	
CLIENT NAME: KTS PROPERTIES	
PROJECT LOCATION: 130 SLATER STREET, OTTAWA, ONTARIO	
FIGURE NAME: OFFSITE POTENTIALLY CONTAMINATING ACTIVITIES	
PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: MARCH 2024	FIGURE NUMBER: 3



N

LEGEND

- ---- SITE BOUNDARY
- ▨ SITE BUILDING
- ---- PHASE ONE STUDY AREA BOUNDARY
- ▲ APEC
- APEC AREA OF POTENTIAL ENVIRONMENTAL CONCERN

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

PINCHIN

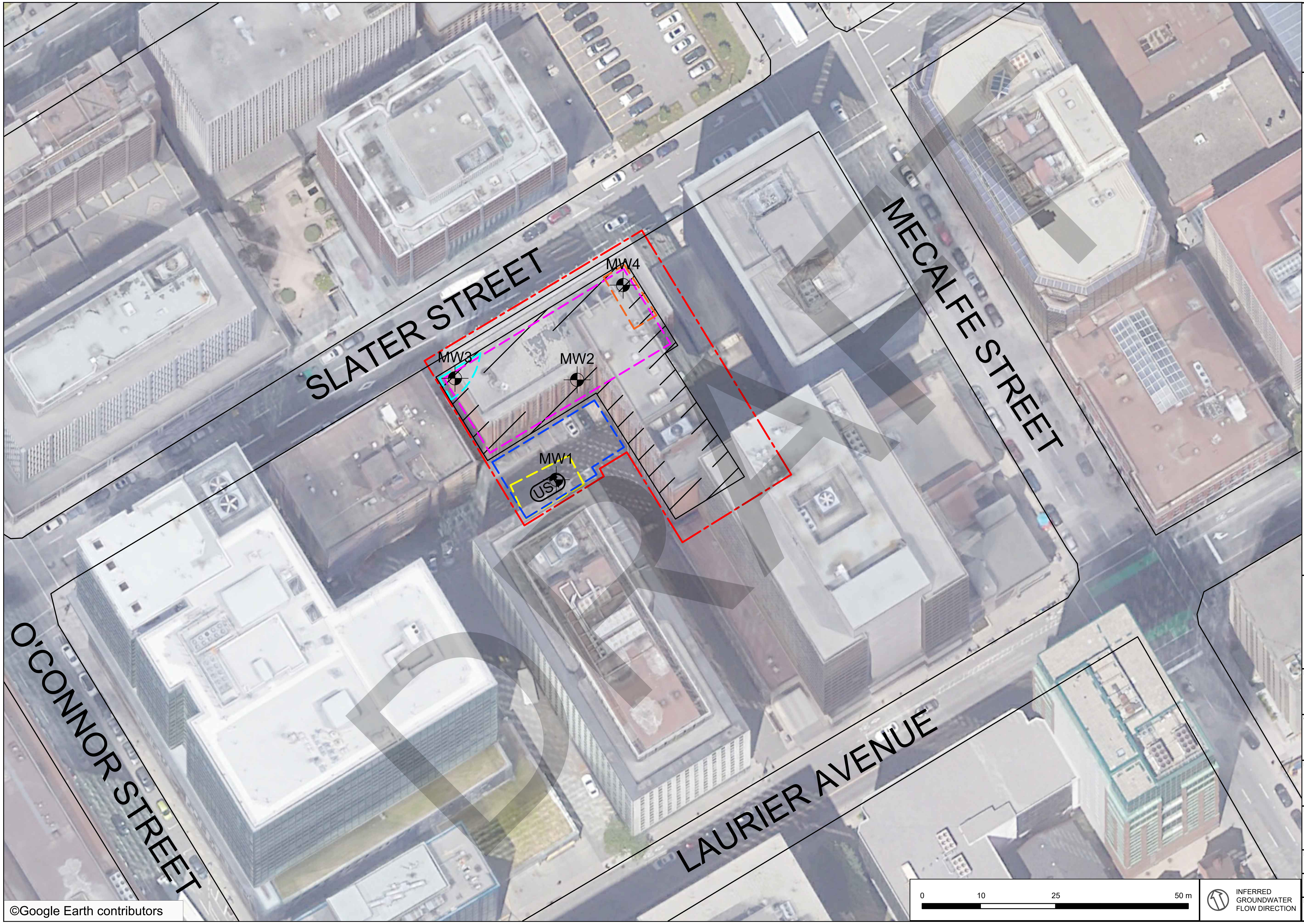
PROJECT NAME:
SAMPLING AND ANALYSIS PLAN

CLIENT NAME:
KTS PROPERTIES

PROJECT LOCATION:
130 SLATER STREET, OTTAWA, ONTARIO

FIGURE NAME:
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

PROJECT NUMBER: 334803	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: MARCH 2024	FIGURE NUMBER: 4



N

LEGEND

- · -	SITE BOUNDARY
▨	SITE BUILDING
UST	FORMER UNDERGROUND STORAGE TANK
☐	APEC-1
☐	APEC-2 AND APEC-3
☐	APEC-4
☐	APEC-5 AND APEC-6
☐	APEC-7
⌖	MONITORING WELL

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

PINCHIN

PROJECT NAME:
SAMPLING AND ANALYSIS PLAN

CLIENT NAME:
KTS PROPERTIES

PROJECT LOCATION:
130 SLATER STREET, OTTAWA, ONTARIO

FIGURE NAME:
BOREHOLE AND MONITORING WELL LOCATION PLAN

PROJECT NUMBER: 334803.001	SCALE: AS SHOWN
DRAWN BY: NJ	REVIEWED BY: AK
DATE: MARCH 2024	FIGURE NUMBER: 5

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 (Former heating oil underground storage tank (UST) and fuel pump within the Site Building)	A former 16,380-Litre (L) UST and fuel pump were located on the second basement level within the Site Building and removed in 2008.	Item 28 - Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs BTEX PAHs	Soil and Groundwater
APEC-2 (Printing facility located on-Site since at least 1980)	A printing facility has been located in the first and second basement levels within the Site Building since at least 1980.	Other – Industrial Operations	On-Site	PHCs BTEX VOCs Metals As, Sb, Se Cr (VI), Hg	Soil and Groundwater
APEC-3 (Inks associated with the on-Site printing facility)	Vegetable-based inks are located in the first basement level within the Bradda Printing Services Inc. tenant space.	Item 31 - Ink Manufacturing, Processing and Bulk Storage	On-Site	PHCs BTEX VOCs Metals As, Sb, Se Cr (VI), Hg	Soil

Table 1 - Table of Areas of Potential Environmental Concern

APEC-4 (Salt application to access routes on-Site)	South portion of the Phase One Property	Other – Road Salting Activities	On-Site	Electrical conductivity, SAR Na, Cl-	Soil and Groundwater
APEC-5 (A former printing facility was located adjacent to the Phase One Property in the 1963 Fire Insurance Plan (FIP))	A former printing facility was located adjacent to the northeast elevation of the Phase One Property in the 1963 FIP.	Other – Industrial Operations	Off-Site	PHCs BTEX PAHs VOCs Metals As, Sb, Se Cr (VI), Hg	Soil and Groundwater
APEC-6 (A dry cleaning facility was listed approximately 30 m northwest of the Phase One Property in the 1975 city directory)	A dry cleaning facility was listed approximately 30 m northwest of the Phase One Property in the 1975 city directory	Item 37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Off-Site	VOCs	Soil and Groundwater

Table 1 - Table of Areas of Potential Environmental Concern

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	BTEX	VOCs	PAHs	PCBs	Metals	Hydrides (As, Sb, Se)	Boron (HWS)	Chromium VI	Mercury	Methyl Mercury	ABNs	Dioxins/Furans	OCPs	Sodium	Chloride	Cyanide	EC	SAR						
MW1	1	Soil	●	●		●																1	0 - 3.1	NA	Continous/Soil cores every 0.6 m	Judgemental	Assess soil and groundwater quality in relation to a former on-Site fuel oil UST (PCA-1)
		Groundwater	●	●		●																1	NA	4.5 - 7.6	NA	Judgemental	
MW2	2	Soil	●		●			●	●	●	●	●										1	0 - 3.1	NA	Continous/Soil cores every 0.6 m	Judgemental	Assess soil and groundwater quality in relation to on-Site printing facility (PCA-2)
		Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	
MW3		Soil	●		●			●	●	●	●	●										1	0 - 3.1	NA	Continous/Soil cores every 0.6 m	Judgemental	
		Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	
MW4		Soil	●		●			●	●	●	●	●										1	0 - 3.1		Continous/Soil cores every 0.6 m	Judgemental	
		Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	
MW2	3	Soil	●		●			●	●	●	●	●										1	0 - 3.1	NA	Continous/Soil cores every 0.6 m	Judgemental	Assess soil and groundwater quality in relation to on-Site bulk ink storage (PCA-3)
		Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	
MW3		Soil	●		●			●	●	●	●	●										1	0 - 3.1	NA	Continous/Soil cores every 0.6 m	Judgemental	
		Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	
MW4		Soil	●		●			●	●	●	●	●										1	0 - 3.1	NA	Continous/Soil cores every 0.6 m	Judgemental	
		Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	
MW4	5	Groundwater	●		●			●	●	●	●	●										1	NA	4.5 - 7.6	NA	Judgemental	Assess groundwater quality in relation to a former off-Site printing facility (PCA-5)
MW4	6	Groundwater			●																	1	NA	4.5 - 7.6	NA	Judgemental	Assess groundwater quality in relation to a former off-Site dry cleaning facility (PCA-6)
MW3	7	Groundwater	●	●		●																1	NA	4.5 - 7.6	NA	Judgemental	Assess groundwater quality in relation to former off-Site heating oil tanks (PCA-7)

PHCs	Petroleum Hydrocarbons (Fraction 1 to Fraction 4)
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
VOCs	Volatile Organic Compounds
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
As, Sb, Se	Arsenic, Antimony, Selenium
Boron (HWS)	Hot Water Soluble Boron
Chromium VI	Hexavalent Chromium
ABNs	Acid/Base/Neutral Compounds
OCPs	Organochlorine Pesticides
EC	Electrical Conductivity
SAR	Sodium Adsorption Ratio

APEC	Area of Potential Environmental Concern
COPCs	Contaminants of Potential Concern
m	Metres
mbgs	Metres Below Ground Surface
NA	Not Applicable
PCA	Potentially Contaminating Activity
SOP	Standard Operating Procedure
UST	Underground Storage Tank
mbfs	Metres Below Floor Surface

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:	May 6, 2022
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
005	May 6, 2022	Annual update Update Corp Health & Safety wording and links, update formatting as required	Terry Duffy Abby Mitchell

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 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:

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

4.0 PROCEDURE

4.1 Equipment and Supplies

1. 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;
2. Combustible gas indicator (CGI) capable of operating in methane-elimination and/or photo-ionization detector (PID);
3. (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
4. Calibration equipment (e.g., calibration gas, regulators, tubing, calibration bags, etc. as provided by the equipment supplier).

4.1.1 PPE Requirements

Known PPE that will be required when completing the work of this SOP include:

1. Standard field PPE (hard hat, hi-vis vest/clothing, safety glasses and boots, nitrile gloves);

2. If handling samples containing sharp debris (glass, metal), leather gloves should be worn over the nitrile gloves;
3. In dusty Site conditions, and/or where strong vapours occur or are anticipated, a respirator with appropriate filter cartridges should be used.

4.2 Documentation

4.2.1 Project Hazard Assessment (PHA)

Project Supervisor(s) and field staff must complete a Project Hazard Assessment (PHA) prior to conducting field work in accordance with the Pinchin Health and Safety Program Section 3.2 Project Hazard Assessments.

4.3 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 (do not place directly under/over heater vent). 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.

4.4 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.

4.5 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.

4.6 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:

1. 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
2. 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.

4.7 Health and Safety

4.7.1 Pinchin's Corporate Health and Safety Program

1. All work activities under this SOP will be completed in a safe manner following the requirements of Pinchin's Corporate Health and Safety Program, client site requirements and current legislation.
2. Pinchin Employees conducting work under this SOP must meet the job competency requirements as outlined in Section 2.03 Job Competency of the Pinchin's Corporate Health and Safety Program.

4.7.2 Training Requirements

Training requirements for this SOP include, but may not be limited to, the following:

1. Site Orientation as required by client.
2. Specific training as outlined in Pinchin's Corporate Health and Safety Program Section 2.04 Health and Safety Training.

4.7.3 Qualified Person

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

4.7.4 INMIR – Incident/Near Miss Reporting and Investigation – Resulting in No Injury

If, while working on-Site and following this SOP, an event or hazard that did not result in injury, illness or damage is encountered **it is expected** that the NEAR MISS is reported by filling in the appropriate information using INMIR – Incident/Near Miss Reporting and Investigation form on Survey123 platform

4.7.5 INMIR – Incident/Near Miss Reporting and Investigation – Resulting in Injury and or Loss

If, while working on a site and following this SOP, there is an incident resulting in loss (personal injury, property damage) fill in the appropriate information using INMIR – Incident/Near Miss Reporting and Investigation form on Survey123 platform.

5.0 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.

6.0 MAINTENANCE OF SOP

This SOP will be reviewed annually by the National Practice Leader**.**

7.0 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.

D:\SOPs\Practice SOPs\EDR\EDR003\SOP - EDR003 - FIELD SCREENING OF SOIL SAMPLES.docx

Template: Master SOP Template – November 11, 2021

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.

M:\SOPs\Practice SOPs\EDR\SOP - EDR006 - BOREHOLE DRILLING.docx

Template: Master SOP Template – February 2014

SOP – EDR007 – REV006 – MONITORING WELL DESIGN AND CONSTRUCTION

Title:	Monitoring Well Design and Construction
Practice:	EDR
First Effective Date:	August 03, 2009
Version:	006
Version Date:	November 19, 2020
Author:	Robert MacKenzie
Authorized by:	Terry Duffy

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	August 03, 2009	N/A	MEM
001	November 26, 2010	Update approval signatures	FG
002	November 15, 2013	Streamlined to cross reference AAPGO guidance document/Added section on O. Reg. 153/04 compliance	RLM
003	April 29, 2016	Updated Section 4.0/Added procedure for outer casing installation in Ontario	RLM
004	April 28, 2017	Remove reference to Pinchin West/Added note to Section 5.2 about placing a reference mark at the top of the well pipe/Added note to Section 5.3 that O.Reg.153/04 requires well screens to intersect the water table when assessing groundwater for petroleum hydrocarbon impacts during a Phase Two ESA	RLM
005	January 30, 2020	Yearly Review	TJD
006	November 19, 2020	Formatting updates	RM

2.0 SCOPE AND APPLICATION

Monitoring wells are installed in overburden and bedrock to enable the collection of groundwater samples from water bearing formations at project sites. For some projects, monitoring wells are also used to monitor for combustible gases in the subsurface.

A monitoring well consists of two parts: the well screen and the well casing (also known as the well riser). The well screen allows groundwater to enter the well from the formation adjacent to the well so that it can be sampled. The well casing allows access to the well from the ground surface.

In Ontario, the regulatory requirements for monitoring well installation are provided in Ontario Regulation 903. All drilling contractors who install groundwater monitoring wells in Ontario must be licensed with the Ontario Ministry of the Environment and Climate Change (MOECC). In addition, for any well installed at a depth of greater than 3.0 metres below ground surface, a Water Well Record must be prepared by the drilling contractor and submitted to the MOECC and the well owner (typically our client).

The design and construction of soil vapour monitoring wells is beyond the scope of this SOP and is described in SOP-EDR018.

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 Considerations

5.1.1 Borehole and Well Diameters

The borehole diameter must be sufficient in size to accommodate the well casing, sand pack and seal materials. In Ontario, the borehole diameter and annular space surrounding the monitoring well must meet the requirements of Ontario Regulation 903. Other provinces have similar requirements that must be considered. It is the Project Manager's responsibility to be aware of specific provincial requirements. Wherever possible, 2-inch (5.1. centimetre) interior diameter monitoring wells should be installed as they permit the use of most sampling and monitoring devices, and will generally provide greater water volume for sampling, especially in low permeability soils. Monitoring wells with interior diameters between 1-inch (2.5 centimetres) and 1.5-inches (3.8 centimetres) are also considered acceptable in some jurisdictions but the use of monitoring wells smaller than 1-inch (2.5 centimetres) is not permitted unless approved by the Project Manager.

5.1.2 Screen Length and Placement

Well screens typically range in length from 1.5 to 3.0 metres. Saturated well screen lengths beyond 1.8 metres, including sand pack, should be avoided in British Columbia, as per British Columbia Ministry of Environment Technical Guidance 8.

Wells screens must not straddle more than one hydrostratigraphic unit and should not be placed such that a preferential pathway for contaminant migration is created between two hydrostratigraphic units. In particular, a well screen must not straddle the overburden/bedrock interface, and the well screen, sand pack and seal must be situated entirely within either the overburden or the bedrock. An exception to this if the well is installed for assessing dense non-aqueous phase liquid (DNAPL), the penetration into the bedrock is minimal, and bedrock fractures are isolated from the sand pack. This type of well installation must only be completed under the guidance of staff with the appropriate geological expertise to ensure it is done correctly.

When determining the well screen length and depth of screen placement for a project, the following should be considered by the Project Manager:

- When assessing for the presence of light non-aqueous phase liquid (LNAPL) at the water table, longer well screens are preferred due to seasonal fluctuations in the water table and the well screen should intersect the water table whenever possible;
- When assessing for the presence of DNAPL, the well screen should be positioned at the bottom of the aquifer immediately above the aquitard;
- When assessing geochemical parameters, shorter well screens may be preferable to reduce the potential for mixing of water from distinct vertical geochemical zones;
- The use of long well screens within the saturated zone may result in the mixing of impacted and unimpacted groundwater from different depths within the aquifer, with the resulting dilution effect biasing the groundwater concentrations low; and
- Nested wells can be used to determine contaminant stratification within an aquifer or assess multiple aquifers, as long as the wells and individual aquifers are properly sealed off from each other within the borehole.

5.1.3 Well Screen/Casing Materials

Polyvinyl chloride (PVC) is the standard material used to construct groundwater monitoring wells. However, some organic compounds if present at excessive concentrations can degrade PVC, and stainless-steel or Teflon well materials may be considered for use by the Project Manager at such project sites.

A filter sock must not be placed over a well screen.

5.1.4 Well Screen Slot Size and Sand Pack

The slot size of the well screen will be determined by the size of the filter pack used. Pinchin typically uses No. 10 slot screen and #1 silica sand to form the sand pack around the well screen. When investigating a site with fine-grained soil, it may be appropriate to use a finer sand pack and smaller slot size to act as a “filter” to prevent as much fine-grained soil from entering the well as possible. The Project Manager should consult with the drilling contractor to determine the most appropriate screen slot size and sand pack size.

5.1.5 Bentonite Seal

The annular space above the sand pack in all wells is to be filled with bentonite. The purpose of placing the bentonite is create a seal above the sand pack that prevents a connection between other water bearing zones within the subsurface and/or water infiltration from the surface.

5.1.6 Surface Completions

A protective steel casing and lockable cap are to be installed at each well to protect the well and prevent tampering. Protective casings come in two varieties: aboveground casings (commonly known as monument casings) and flush-mount casings.

Aboveground casings have the advantage of having better visibility and can be located more easily, especially during winter, are less likely to need repair, and have fewer problems related to water intrusion and frost heave of the casing.

Flush-mount casings are usually the only available option for wells installed in areas of high vehicular or pedestrian traffic. Also, some clients prefer flush-mount casings for aesthetic reasons as they are less obtrusive.

When installing a well in a high vehicular traffic area such as a roadway, the flush-mount casing must have sufficient strength to avoid damage when run over by vehicles. Flush-mount casings with brass lids should not be installed in high vehicular traffic areas as they are easily damaged to the point where they can no longer be opened.

5.2 Well Installation Procedures

Note that Pinchin field staff are not trained, nor have the necessary licensing, to install monitoring wells. This task is to be performed by the drilling contractor in accordance with the applicable regulatory requirements (e.g., Ontario Regulation 903 (as amended) in Ontario). Pinchin field staff will assist the drilling contractor by specifying the general design of the monitoring well but will not perform the actual installation. The primary role of Pinchin field staff during well installation is to document the installation (e.g., measuring and/or recording the well length, screen length, depth to top of sand pack, etc.) as outlined below.

The following presents the general procedure for the completion of overburden and bedrock monitoring well installations after the borehole has been advanced to the appropriate depth:

1. Assemble the well by threading sufficient lengths of screen and riser materials together, and placing a threaded cap or slip-on cap at the bottom of the well. Well materials are to be kept in their plastic sleeves until immediately prior to well installation, and are not to be placed on the ground unless the ground surface is covered by clean plastic sheeting. Well materials should not be stored near potentially contaminated materials (e.g., soil cuttings;

   Dedicated, disposable nitrile gloves are to be worn by all personnel handling the well materials and are to be replaced if they become contaminated during well installation. Confirm the length of the well screen, well riser and total length of well. This is especially important if the screen and/or riser are trimmed to fit the borehole depth or desired screen interval. Record the length of the well screen, the length of the well casing, the total length of the well (including the bottom cap), the type of bottom cap used, and the interior diameter of the well screen/well casing in the field notes;
2. Prior to placing the assembled well into the borehole, measure the depth from ground surface to the bottom of the borehole and record this depth in the field notes;

3. When possible, place a minimum of 0.15 metres of filter pack into the bottom of the borehole to provide a firm base for the well. Note that the placement of such a filter pack base may not be appropriate when investigating a site where DNAPLs are suspected as the filter pack base may act as a DNAPL "sump" beneath the well and the DNAPL may go undetected when monitoring the well;
4. Place the assembled well into the open borehole or within the interior of the hollow stem augers. If trimming of the well casing is required, measure the length of the trimmed piece and record this information in the field notes. Before installing the sand pack, place a J-plug or slip cap on the top of the well to prevent sand and seal materials from entering the well when backfilling the annular space between the well and the borehole walls;
5. Install the sand pack around the exterior of the well screen and extend it to between 0.3 and 0.6 metres above the top of the well screen. The sand pack should be installed slowly, and with a tremie pipe if possible, to minimize the potential for bridging of the sand pack. When installing a sand pack in a borehole that has been drilled with hollow stem augers, the sand pack should be installed in lifts of approximately 0.5 metres. After placement of each lift, the augers are withdrawn from the ground by approximately 0.5 metres and the process repeated until the sand pack is placed to the required depth. Measure the depth to the top of the sand pack and record this depth in the field notes;
6. Install a bentonite seal comprised of granular and/or powdered bentonite above the sand pack to within approximately 0.6 metres of the ground surface. The bentonite should be installed slowly, and with a tremie pipe if possible, to minimize the potential for bridging of the seal. For the portion of the seal located above the water table, distilled water is to be poured into the borehole for each lift placed above the water table (approximately 0.3 to 0.6 metres per lift) to hydrate the seal. Approximately 1 to 2 litres of distilled water per lift is considered sufficient to hydrate the seal. Measure the depth to the top of the bentonite seal and record this depth in the field notes;
7. Record whether the seal was hydrated during installation and over which depth interval. Note that in some jurisdictions very long bentonite seals can be broken up with sand intervals. This reduces the potential for ground heaving due to bentonite shrinking and swelling but the sand intervals must not connect hydraulically separated aquifers;
8. (Ontario only) If the well is to be installed with a flush-mount protective casing, an outer casing comprised of a short length (10 to 15 cm) of PVC riser, or PVC coupling, that is slightly larger in diameter than the well casing needs to be installed around the well casing into the top of the bentonite seal, with the gap between the two casings sealed with bentonite. The top of the outer casing needs to be flush with or slightly below the top of the well casing. For example, if a 2-inch diameter well is installed, then a 10 to 15 cm

length of 3-inch or 4-inch diameter riser or coupling placed around the 2-inch diameter well casing will suffice provided that bentonite is placed between the two casings. The flush-mount protective casing is then installed around the two casings. The outer casing does not need to be capped, and we only need to cap the well casing with a J-plug or slip cap;

9. (Ontario only) If the well is to be installed with a stick up protected by a monument casing, the procedure for installing the outer casing is essentially the same, except that the outer casing will extend from 10 to 15 cm below ground to above the ground surface, preferably flush with or slightly below the top of the well casing if the design of the monument casing permits it;
10. Place a protective well casing (monument or flush-mount) around the well casing and cement it in place;
11. Using a permanent marker, mark a point on the top of the well casing that will serve as a reference point for all future depth to water and elevation survey measurements. Measure the depth to groundwater in the well at the time of completion. Note the depth to water and time of measurement in the field notes;
12. Place a lockable J-plug on the well casing and ensure that the J-plug is tightened sufficiently to prevent surface water from infiltrating into the well if the well has a flush-mount completion. Place a lock on the J-plug for a flush-mount completion or on the lockable cap for an aboveground completion if required by the Project Manager. A PVC slip cap can also be used, especially for an aboveground completion;
13. Photograph the completed well installation. Close up photographs of the well are to be taken as well as more distant photographs that show the location of site landmarks relative to the well so that the photograph can be used to locate the well in the future; and
14. Using a measuring tape or measuring wheel, measure the distance between the well and a nearby landmark (e.g., corner of the nearest building) and provide a well 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 well with a hand-held GPS device.

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

Ontario Regulation 153/04 mandates that well screens must not exceed 3.1 metres in length. In addition, whenever the Phase Two ESA includes the assessment of petroleum hydrocarbon impacts in groundwater, the well screen in each well must intersect the water table.

5.4 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

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

British Columbia Ministry of the Environment, *Technical Guidance 8: Groundwater Investigation and Characterization*, July 2010.

9.0 APPENDICES

None.

M:\SOPs\Practice SOPs\EDR\SOP - EDR007 - MONITORING WELL DESIGN AND CONSTRUCTION.docx

Template: Master SOP Template – February 2014

PINCHIN

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:	

TABLE OF CONTENTS

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

I:\2018 SOP Updates\SOP - EDR013 - REV004 - Sample Handling Documentation.docx

Template: Master SOP Template – February 2014

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 – EDR016 – REV003 – FIELD MEASUREMENT OF WATER QUALITY PARAMETERS

Title:	Field Measurement of Water Quality Parameters
Practice:	EDR
First Effective Date:	November 24, 2010
Version:	003
Version Date:	January 3, 2018
Author:	Paresh Patel
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 24, 2010	N/A	PDP
001	October 31, 2013	Cross-referenced low flow sampling SOP/Added section on O. Reg. 153/04 compliance	RLM
002	April 29, 2016	Updated Section 4.0	RLM
003	April 28, 2017	Removed reference to Pinchin West	RLM
003	January 3, 2018	Reviewed and confirmed current	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for measuring water quality parameters during water sampling, and covers the calibration and use of multi-parameter and single-parameter probes for monitoring in situ water quality parameters in streams, down hole in monitoring wells and in flow-through cells. Water quality parameters may include temperature, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), conductivity and turbidity.

Measurements of water quality parameters are typically made for two main purposes: to provide information on water geochemistry to assist in designing in situ remediation programs and to assess whether representative formation groundwater is being sampled during low flow purging and sampling. They can also be used to assess whether well development is complete in certain situations (see SOP-EDR018).

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 and Reagents Required

- Single or multi-parameter probes for monitoring water quality parameters;
- Calibration solutions for calibrating the probes to the standard values;
- Field book or field forms;
- Distilled water;
- Beaker or bucket;
- Stirrer for DO measurement (optional); and
- Flow-through cell (optional).

5.2 Probe Measurement Accuracy

The probes utilized for measuring water quality parameters shall be capable of producing measurement accuracy greater or equal to the following specifications:

Temperature:	± 0.5 degrees Celsius (°C)
Conductivity:	± 1 microSiemens per centimetre (µS/cm)
pH:	±0.1 pH unit
Dissolved Oxygen:	±0.2 milligrams per litre (mg/L) up to20 mg/L
	± 0.6 mg/L greater than 20 mg/L
Turbidity:	±1% up to 100 Nephelometric Turbidity Units (NTU)
	±3% up to 100-400 NTU
	±5% up to 400-3,000 NTU
ORP:	± 20 millivolts (mV)

5.3 Probe Calibration

Calibrate the water quality probes used for field parameter measurement in accordance with the manufacturer's specifications. Wherever possible, arrange for the equipment rental company to calibrate the water quality probes and provide a calibration sheet that contains information such as calibration date and calibration measurements for each parameter. If the water quality probes are used for more than one day, a calibration check must be performed using standard calibration solutions at the start of each day at a minimum. If the calibration check shows deviations from the standard values that exceed the ranges provided below, the probe(s) that exceed the ranges must be calibrated prior to further use:

pH	±0.1 pH units
Specific Conductance	±3%
Temperature	±3%

DO	±10%
ORP	±10 mV
Turbidity	±10%

A calibration check should also be performed if the parameter measurements suggest that calibration drift has occurred. Document all calibration activities in the field notes, including date and time of calibration/calibration check, calibration solutions used, probe readings, and make, model and serial number of the instrument(s). Note that if the water quality probe manufacturer recommends more frequent calibration/calibration checks than specified above, the manufacturer's recommendations are to be followed.

Extra care must be taken to calibrate a multi-parameter probe to prevent cross-contamination. Specifically, following immersion of the probes into each calibration standard, all probes should be thoroughly rinsed in distilled water and the excess water shaken off or blotted dry with a lint-free wipe. Conductivity standards are much more sensitive to cross contamination/dilution than other standards, and prior to immersion in a conductivity standard, all probes should be thoroughly rinsed and completely dried with lint-free wipes. Besides being easily diluted, conductivity also affects other parameters (specifically DO), and the conductivity probe should always be the first probe calibrated. The following order for calibration of a multi-parameter probe is to be followed:

1. Specific Conductance;
2. pH;
3. DO; and
4. Turbidity.

There is no recommended order for calibration of other parameters.

5.4 Single-Parameter Probes

Prior to conducting field measurements, probe sensors must be allowed to equilibrate to the temperature of the water being monitored. Probe sensors have equilibrated adequately when the temperature reading has stabilized. Deployment of single-parameter probes will follow the following procedures:

5.4.1 Temperature

Whenever possible the temperature shall be measured in situ (i.e., within a stream, direct deployment in a monitoring well). When temperature cannot be measured in situ, it can be measured in a beaker or bucket. The following conditions must be met when measuring temperature within a beaker or bucket:

- The beaker or bucket shall be large enough to allow full immersion of the temperature probe. The beaker or bucket is to be rinsed with water from the well or stream being measured prior to obtaining the measurement;

- The probe must be placed in the beaker or bucket immediately before the temperature changes due to ambient conditions;
- The beaker or bucket must be shaded from direct sunlight and strong breezes before and during temperature measurement; and
- The probe must be allowed to equilibrate for at least 1 minute before temperature is recorded.

5.4.2 pH

Preferably, pH is measured in situ at the centroid of flow and at the mid-depth of a stream, or the mid-point of the well screen in a well. The pH probe must be allowed to equilibrate according to the manufacturer's recommendations before the pH value is recorded without removing the probe from the water.

If the pH cannot be measured in situ, it should be measured in a bucket or beaker using the procedures outlined above for measuring temperature.

5.4.3 Dissolved Oxygen

As for pH, it is preferable to measure DO in situ at the centroid of flow and at the mid-depth of a stream, or the mid-point of the well screen in a well. The DO probe must be allowed to equilibrate according to manufacturer's recommendations before the DO value is recorded without removing the probe from the water.

If DO cannot be measured in situ, it should be measured in a bucket or beaker using the procedures outlined above for measuring temperature.

Some types of DO probes require a sufficient flow of fresh water across the membrane to maintain the accuracy and precision of the DO measurement. When taking DO measurements in a bucket or beaker, either employ a stirrer, or physically move the probe in a gentle motion. Moving the probe in a gentle motion should also be completed when measuring DO in situ down hole in a monitoring well.

5.4.4 ORP

ORP shall be measured using the procedures outlined above for measuring pH. Note that changes in temperature directly affect ORP values and ORP should be measured as soon as possible after the probe has stabilized.

5.4.5 Turbidity

In situ turbidity shall be measured using the procedures outlined above for measuring pH.

If turbidity cannot be measured in situ, it can be measured with a probe in a bucket or beaker using the procedures outlined above for measuring temperature. Note that some turbidity measuring instruments do not use a probe, and a sample of the water is collected in a small vial that is inserted into the instrument which then measures the turbidity of the water.

5.4.6 Multi-Parameter Probe Use With A Flow-Through Cell

A multi-parameter probe and a flow-through cell are typically employed when undertaking low flow purging and sampling of groundwater. SOP-EDR023 describes the procedures to be followed when using a multi-parameter probe and a flow-through cell.

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:

- Thorough records of the calibration and calibration checks of the probes/instruments used for water quality parameter measurement 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 equipment calibration, and equipment calibration records must be appended to the Phase Two ESA report; and
- If groundwater samples collected for a Phase Two ESA are not collected using low flow purging and sampling, which mandates the measurement of water quality parameters, water quality parameters must be measured (pH, temperature and specific conductance at a minimum) and the measurements included in the Phase Two ESA report. Ontario Regulation 153/04 does not provide specifics as to when or how these water quality parameter measurements are to be made but one set of measurements made at the conclusion of purging prior to sampling is the minimum requirement. These measurements can be made by filling a clean bucket or beaker with purge water and immersing the probes in the purge water.

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

New Jersey Department of Environmental Protection, *Field Sampling Procedures Manual,* August 2005.

Commonwealth of Kentucky – Department of Environmental Protection, *Standard Operating Procedure – In Situ Water Quality Measurements and Meter Calibration,* January 1, 2009.

U.S Environmental Protection Agency – Science and Ecosystem Support Division, Athens, Georgia, *In Situ Water Quality Monitoring,* December 7, 2009.

U.S. Geological Survey, *National Field Manual for the Collection of Water-Quality Data: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 9, Chapters A1-A9,* Various dates.

9.0 APPENDICES

None.

I:\2018 SOP Updates\SOP - EDR016 - REV003 - Field Measurement of Water Quality Parameters.docx

Template: Master SOP Template – February 2014

SOP – EDR017 – REV006 – MONITORING WELL DEVELOPMENT

Title:	Monitoring Well Development
Practice:	EDR
First Effective Date:	November 23, 2010
Version:	006
Version Date:	January 3, 2018
Author:	Paresh Patel and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	November 23, 2010	N/A	PDP
001	June 15, 2013	Streamlined background section/Focused procedure on tasks that can be completed by Pinchin personnel/Provided step-by-step summary of field procedure	RLM
002	January 22, 2015	Incorporated procedures specific to Pinchin West into SOP	RLM
003	February 9, 2016	Revised overall procedure to include initial determination of well yield/Added reference to revised well development field forms/Provided guidance on assessing field parameter stabilization when developing wells where water or air were used during drilling	RLM
004	April 29, 2016	Updated Section 4.0	RLM
005	April 28, 2017	Removed references to Pinchin West	RLM
006	January 3, 2018	Modified Section 3.0 to allow well development to occur immediately after well installation under certain circumstances.	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for groundwater monitoring well development and provides a description of the equipment required and field methods.

All groundwater monitoring wells are to be developed following installation prior to groundwater sampling or the completion of hydraulic conductivity testing. In addition, previously installed groundwater monitoring wells that have not been purged in over one year should be redeveloped prior to additional sampling or hydraulic conductivity testing if there is evidence of sediment impacting the monitoring well (e.g., the depth to bottom of well measurement indicates sediment accumulation) or at the discretion of the Project Manager.

This SOP pertains to monitoring well development that can be undertaken by Pinchin personnel. Monitoring well development completed by drilling rigs is beyond the scope of this SOP.

3.0 OVERVIEW

The main objective of groundwater monitoring well development is to ensure that groundwater sampled from a well is representative of the groundwater in the formation adjacent to the well and that hydraulic conductivity testing provides data representative of the hydraulic characteristics of the adjacent formation.

The specific goals of well development include the following:

- Rectifying the clogging or smearing of formation materials that may have occurred during drilling of the borehole;
- Retrieving lost drilling fluids;
- Improving well efficiency (i.e., the hydraulic connection between the sand pack and the formation);
- Restoring groundwater properties that may have been altered during the drilling process (e.g., volatilization of volatile parameters due to frictional heating during auger advancement or use of air rotary drilling methods); and
- Grading the filter pack to effectively trap fine particles that may otherwise interfere with water quality analysis.

Monitoring well development should not be completed until at least 24 hours have elapsed following monitoring well installation to permit enough time for the well seal to set up, unless both of the following conditions are met:

- The well seal is entirely above the water table; and
- Surface runoff (e.g., from heavy rainfall or snow melt) is not occurring at the well location at the time of development.

Any deviation from this procedure must be approved by the Project Manager before proceeding.

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

- Inertial pump (e.g., Waterra tubing and foot valve);
- Surge block for use with an inertial pump (Optional);
- Submersible pump (including pump controller and power supply) (Optional);
- Disposable bailer (Optional);
- Graduated pail (to contain purge water and permit the volume of groundwater purged to be tracked);
- Pails or drums for purge water storage prior to disposal;
- Well keys (if wells are locked);
- Tools to open monitoring well (T-bar, socket set, Allen keys, etc.);
- Interface probe;
- Equipment cleaning supplies (see SOP-EDR009);
- Field parameter measurement equipment (see SOP-EDR016) (Optional);
- Disposable nitrile gloves; and
- Field forms.

Pinchin typically employs inertial pumps or bailers for well development because they can be dedicated to each well. However, the use of submersible pumps is a viable alternative for developing deep wells with high well volumes at the discretion of the Project Manager.

5.2 Procedures

The well development procedures employed will be determined by the hydraulic conductivity of the formation in which the groundwater monitoring well is installed. For this SOP, a high yield well is defined as a well that cannot be purged to dryness when pumping continuously at a rate of up to 2 litres per minute (L/min) and a low yield well is defined as a well that can be purged to dryness when pumping continuously at a rate of up to 2 L/min or less. This threshold represents a “normal” pumping rate when hand pumping with an inertial pump.

The initial stage of well development (Stage 1) will apply to all wells and will involve the removal of up to one well volume, followed by an evaluation of the well yield. The procedures followed for Stage 2 of well development will be contingent on whether the well is determined to be a low yield or high yield well.

5.2.1 Well Development for Low and High Yield Wells - Stage 1

The initial procedure for developing a low yield or high yield monitoring well is as follows:

1. Decontaminate all non-dedicated monitoring and pumping equipment that will be used, including the interface probe and submersible pump (if used), in accordance with the procedures described in SOP-EDR009;
2. Review the well construction details provided in the borehole log, previous field notes or well construction summary table from a previous report. Determine the well depth, well stick up, screen length, depth to the top of the sand pack and diameter of the borehole annulus. If the well depth is unavailable, measure it with the interface probe;
3. Measure the initial water level (i.e., static water level) from the reference point on the well (which should be marked at the top of the well pipe) with an interface probe. If measurable free-phase product is present on the water table, record the depth to the top of the free-phase product and the depth to the free-phase product/water boundary (i.e., water level), and discuss this with the Project Manager before proceeding further;
4. Calculate the well volume. **Note that for the purpose of this SOP, there are two definitions of well volume depending on the province in which the project is being conducted.** For Ontario and Manitoba, the well volume is defined as the volume of water within the wetted length of the well pipe (well pipe volume) plus the volume of water within the wetted length of the sand pack (sand pack volume). For British Columbia, Alberta and Saskatchewan, the well volume is defined as the volume of water within the wetted length of the well pipe (well pipe volume) only.

   The volume of water in the well pipe is calculated as follows:

   Well Pipe Volume (litres) = $h_w \times \pi r_w^2 \times 1{,}000$ litres per cubic metre (L/m^3)

   Where $\pi = 3.14$

   h_w = the height of the water column in the monitoring well in metres (wetted length)

   r_w = the radius of the monitoring well in metres (i.e., half the interior diameter of the well)

   The volume of the sand pack in the monitoring well is calculated as follows:

   Sand Pack Volume (litres) = $h_w \times [(0.3\ \pi r_b^2 \times 1{,}000\ L/m^3) - (0.3\ \pi r_w^2 \times 1{,}000\ L/m^3)]$

   Where 0.3 = the assumed porosity of the sand pack

h_w = the height of the water column in the monitoring well in metres (wetted length)

$\pi = 3.14$

r_b = the radius of the borehole annulus in metres

r_w = the radius of the monitoring well in metres

For Ontario and Manitoba projects, the following table provides well volumes in litres/metre for typical well installations:

Borehole Annulus Diameter (Inches/Metres)	Well Interior Diameter (Inches)	Well Pipe Volume (Litres/Metre)*	Well Volume (Litres/Metre)*
4/0.1	1.25	0.8	2.9
	1.5	1.1	3.2
	2	2.0	3.8
6/0.15	1.25	0.8	5.9
	1.5	1.1	6.1
	2	2.0	6.7
8.25/0.21	1.5	1.1	11.2
	2	2.0	11.8
10.25/0.26	1.5	1.1	16.7
	2	2.0	17.3

* Litres to be removed per metre of standing water in the well (wetted length).

If the borehole annulus and well interior diameters match one of those listed above, to determine the volume of one well volume simply multiply the number in the last column of the table by the wetted length in the well. For example, if a 2-inch diameter well installed in a 8.25-inch diameter borehole has 2.2 metres of standing water, one well volume equals 26.0 litres (2.2 metres x 11.8 litres/metre).

<u>Note that the above well volume calculations apply only to wells where the water level in the well is below the top of the sand pack</u>. If the water level is above the top of the sand pack, then the well volume is the volume of water in the sand pack and well pipe within the sand pack interval, plus the volume of water in the well pipe (i.e., well pipe volume) above the top of the sand pack.

For example, assume a 2-inch diameter well has been installed in a 8.25-inch diameter borehole to a depth of 6.0 metres below ground surface (mbgs), with a 3.05 metre long screen. The sand pack extends from 6.0 mbgs to 2.5 mbgs and the water level is at 1.85 mbgs. One well volume equals ([6.0 metres – 2.5 metres] x 11.8 litres/metre) + ([2.5 metres – 1.85 metres] x 2.0 litres/metre) or 42.6 litres.

For British Columbia, Alberta and Saskatchewan projects, the well volume is calculated using the conversion factor listed in the third column of the above table. For example, if there are 2.5 metres of standing water in a 1.5-inch diameter well, one well volume equals 2.75 litres (2.5 metres x 1.1 litres/metre);

5. Lower the pump into the well until the pump intake is approximately 0.3 metres above the bottom of the well. Remove half a well volume while pumping at a rate of approximately 1 to 2 L/min. Measure the depth to water after the half a well volume is removed. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations (e.g., sheen, odour, free-phase product, sediment content, clarity, colour, etc.); and
6. Move the pump intake upward to the middle of the water column (or middle of the screened interval if the static water level in the well is above the top of the screen). Remove half a well volume (for a cumulative total of 1 well volume) or purge until dry while pumping at a rate of approximately 1 to 2 L/min, whichever occurs first. Measure the depth to water after the half a well volume is removed unless dry. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations. Note that if suction is broken (indicating that drawdown to the pump intake depth has occurred), move the pump intake to the bottom of the well and continue purging.

After completing Step 6, review the water level data to assess whether the well is a low yield or high yield well. If the well is purged dry or close to dryness, or significant drawdown has occurred, then the well is a low yield well. If little or no drawdown has occurred then the well is a high yield well. Some judgement will be required by field personnel when classifying the well yield if moderate drawdown has occurred during removal of the first well volume.

5.2.2 Well Development for High Yield Wells - Stage 2

The procedure for the second stage of developing a high yield monitoring well is as follows:

1. Move the pump intake upward to near the top of the screened interval (or near the top of the water column if the water level is currently below the top of the screen). Remove half a well volume (for a cumulative total of 1.5 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump

intake depth and any pertinent visual/olfactory observations (e.g., sheen, odour, free-phase product, sediment content, clarity, colour, etc.);

2. Note that if the wetted length is short within a well (e.g., 1.5 metres or less), there will not be enough separation between pump intake depths to warrant pumping from three depths (i.e., near the bottom, middle and top of the water column). In this case, pumping from two depths (i.e., near the bottom and top of the water column) is sufficient;
3. Lower the pump intake until it is approximately 0.3 metres above the bottom of the well. Remove half a well volume (for a cumulative total of 2 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
4. Move the pump intake upward to the middle of the water column (or middle of the screened interval if the water level in the well is above the top of the screen). Remove half a well volume (for a cumulative total of 2.5 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
5. Move the pump intake upward to near the top of the screened interval (or near the top of the water column if the water level is currently below the top of the screen). Remove half a well volume (for a cumulative total of 3 well volumes) while pumping at the maximum practical rate that is greater than 2 L/min. Record the approximate purge volume, pump intake depth and any pertinent visual/olfactory observations;
6. If the purge water contains high sediment content after the removal of 3 well volumes, well development should continue by removing additional well volumes following the same procedure as above until the sediment content visibly decreases. If the purge water continues to have high sediment content after the removal of 2 additional well volumes (i.e., 5 well volumes in total), contact the Project Manager to discuss whether well development should continue. A cap of 10 well volumes removed is considered sufficient for high yield well development regardless of sediment content; and
7. Record the water level at the conclusion of well development.

Note that at the discretion of the Project Manager, when developing a monitoring well using an inertial pump, a surge block can be attached to the foot valve before completing Step 1 (i.e., the first time groundwater is pumped from near the top of the screened interval or water column) and then leaving it on the foot valve for the remainder of well development. A surge block is used to increase the turbulence created by pumping and enhance the removal of fine-grained material from the sand pack.

Note that the use of a bailer to develop a high yield well with a wetted interval greater than 2 metres is not recommended given that the depth from which groundwater is removed is difficult to control. However, a bailer can be used as a substitute for a surge block by raising and lowering it through the screened interval for approximately 5 to 10 minutes before the start of Step 1.

5.2.3 Well Development for Low Yield Wells - Stage 2

The procedure for the second stage of developing a low yield monitoring well is as follows:

1. Position the pump intake at the bottom of the well and purge the well to dryness if it was not purged to dryness during completion of Stage 1 at the maximum practical rate that is greater than 2 L/min. Allow sufficient time for the well to recover to at least 90% of the initial static water level or allow the well to recover for a period of time designated by the Project Manager; and
2. Repeat Step 1 until the well has been purged to dryness a minimum of 3 times. An exception to this is that if recovery is slow, and especially if sediment content is low, repeat purging (i.e., purging the well to dryness more than once) may not be necessary and the need for additional purging is to be discussed with the Project Manager. If the purge water contains high sediment content after purging to dryness 3 times, well development should continue by purging the well to dryness until the sediment content visibly decreases. If the purge water continues to have high sediment content after purging the well to dryness 2 additional times (i.e., purging the well to dryness 5 times in total), contact the Project Manager to discuss whether well development should continue. A cap of purging a well to dryness 10 times is considered sufficient for low yield well development regardless of sediment content.

As per the procedure for high yield well development, a surge block can be attached to the foot valve to increase the effectiveness of the pumping action. If a surge block is used, pumping should commence at the top of the water column in the well (instead of near the bottom of the well as described above) with the pump intake progressively lowered as the water level in the well decreases.

Note that bailers can be used in lieu of an inertial pump for the development of a low yield well. The turbulence created in a well by the act of dropping a bailer into it and then removing it full of groundwater can be effective in removing fine-grained material from the sand pack. If a bailer is left in a well, it should be “hung” above the water table to facilitate future water level monitoring.

5.2.4 Removal of Water Lost During Well Installation

When water has been used during well installation (e.g., for bedrock coring, to control heaving sands), the total volume of water required to be purged from a well during development will be equal to 3 times the estimated volume of water lost during drilling plus the volume of water that would normally be removed during well development.

For example, for a high yield well where 25 litres of water were lost during drilling and the well volume is 10 litres, the minimum amount of water to be purged during development is 105 litres (i.e., 3 times the volume of water lost during drilling [75 litres] plus a minimum of 3 well volumes [30 litres]).

For a low yield well, the well will need to be purged to dryness enough times to remove a volume equivalent to 3 times the volume of water lost during drilling plus the volume of water that would normally be removed during well development.

As an alternative to removing 3 times the volume of water lost during drilling, field parameter stabilization during well development can be used to assess whether sufficient water has been removed. For example, the conductivity of drill water (which is usually tap water) is typically much lower than groundwater, and conductivity measurements can act as a guide during development as to whether the water being removed is formation groundwater or drill water.

For assessing field parameter stability when developing a high yield well, field parameter measurements of pH, conductivity, temperature and oxidation-reduction potential are to be made after every half well volume is removed and stability is considered achieved if the field parameters are all within ±10% over 3 consecutive readings. Note that a minimum of 3 well volumes must be removed even if field parameter stabilization is achieved prior to the removal of 3 well volumes to comply with the minimum well purging requirements of this SOP (i.e., removal of a minimum of 3 well volumes from a high yield well).

For assessing field parameter stability when developing a low yield well, field parameter measurements of pH, conductivity, temperature and oxidation-reduction potential are to be made once each time a well is purged to dryness, approximately halfway through purging. For example, if based on the current water level it is estimated that 10 litres will be removed before a well is purged to dryness, the field parameters are to be measured after 5 litres have been removed. Stability is considered achieved if the field parameters are all within ±10% over 3 consecutive readings. After stabilization is achieved, continue to purge the well to dryness a final time at which point development is complete.

A second alternative would be to allow sufficient time for the drill water to dissipate into the formation. The appropriate amount of time will depend on the amount of water lost to the formation and the formation characteristics, but will be a minimum of one week. A Senior Project

Manager or Senior Technical Reviewer will be responsible for determining the suitability of this approach and the required length of time. At the discretion of the Senior Project Manager or Senior Technical Reviewer, field parameter measurements may be made during pre-sampling purging to assess whether the drill water has dissipated by the time of sampling.

Note that it can be difficult to estimate the amount of water lost during drilling. If the driller's water tank is accessible, measure the water levels in the water tank before and after drilling the well and then estimate the volume of water used during drilling using the water tank dimensions and subtract this volume from the volume of water recovered at the end of drilling from this volume to estimate the volume of water lost. If this is not possible, ask the driller to estimate the approximate volume of water lost during drilling.

For some well installations, determining even an approximate volume of water lost during drilling is not possible. In this situation, field parameter stabilization should be used as a guide in deciding how much water to remove during well development.

5.2.5 Development of Monitoring Wells Installed Using Air Rotary Drilling Methods

When developing a monitoring well installed using an air rotary drilling procedure, field parameter stabilization must be used to assess whether sufficient water has been removed and the field parameters measured must include dissolved oxygen. This is particularly important when the contaminants of concern at a site include volatile organic compounds (VOCs) as the use of compressed air during the drilling process can result in sparging of VOCs from the groundwater, resulting in groundwater samples that are biased low with respect to VOC concentrations.

The well development procedure is the same as described in Section 5.2.4, except that the field parameters measured are to include pH, conductivity, temperature, oxidation-reduction potential and dissolved oxygen. The criterion for determining field parameter stabilization for dissolved oxygen is ±10% over 3 consecutive readings or 3 consecutive readings with concentrations less than 0.5 milligrams per litre.

5.2.6 Assessing Field Parameter Stabilization

When determining whether field parameter stabilization has occurred over 3 consecutive readings (except for dissolved oxygen when using the less than 0.5 milligrams per litre over 3 consecutive readings criterion), the following procedure is to be followed:

1. For each parameter, use the first of the 3 readings and calculate 10% of this reading; and
2. The range that the next 2 readings must be within is ± 10% of the first reading.

For example, if the temperature of the first of 3 consecutive readings is 10º C, the next 2 readings must fall between 9 and 11 º C for temperature to be considered stable.

5.3 Well Development Record

Well development is to be documented through the completion in full of the following field forms located in the Pinchin Orchard:

- EDR-GW-Well Development-S1-Low/High Yield Well (completed for Stage 1 for both low and high yield wells);
- EDR-GW-Well Development-S2-Low Yield Well (completed for Stage 2 for low yield wells); and/or
- EDR-GW-Well Development-S2-High Yield Well (completed for Stage 2 for high yield wells).

Any deviations from this SOP along with the rationale for these deviations must be recorded on the EDR-GW-Well Development-S1-Low/High Yield Well form.

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

When developing a low yield well, the well must be purged to dryness a minimum of 3 times regardless of the recovery time unless reduced purging is authorized by the Qualified Person responsible for the Phase Two ESA.

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.

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:	

TABLE OF CONTENTS

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

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 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

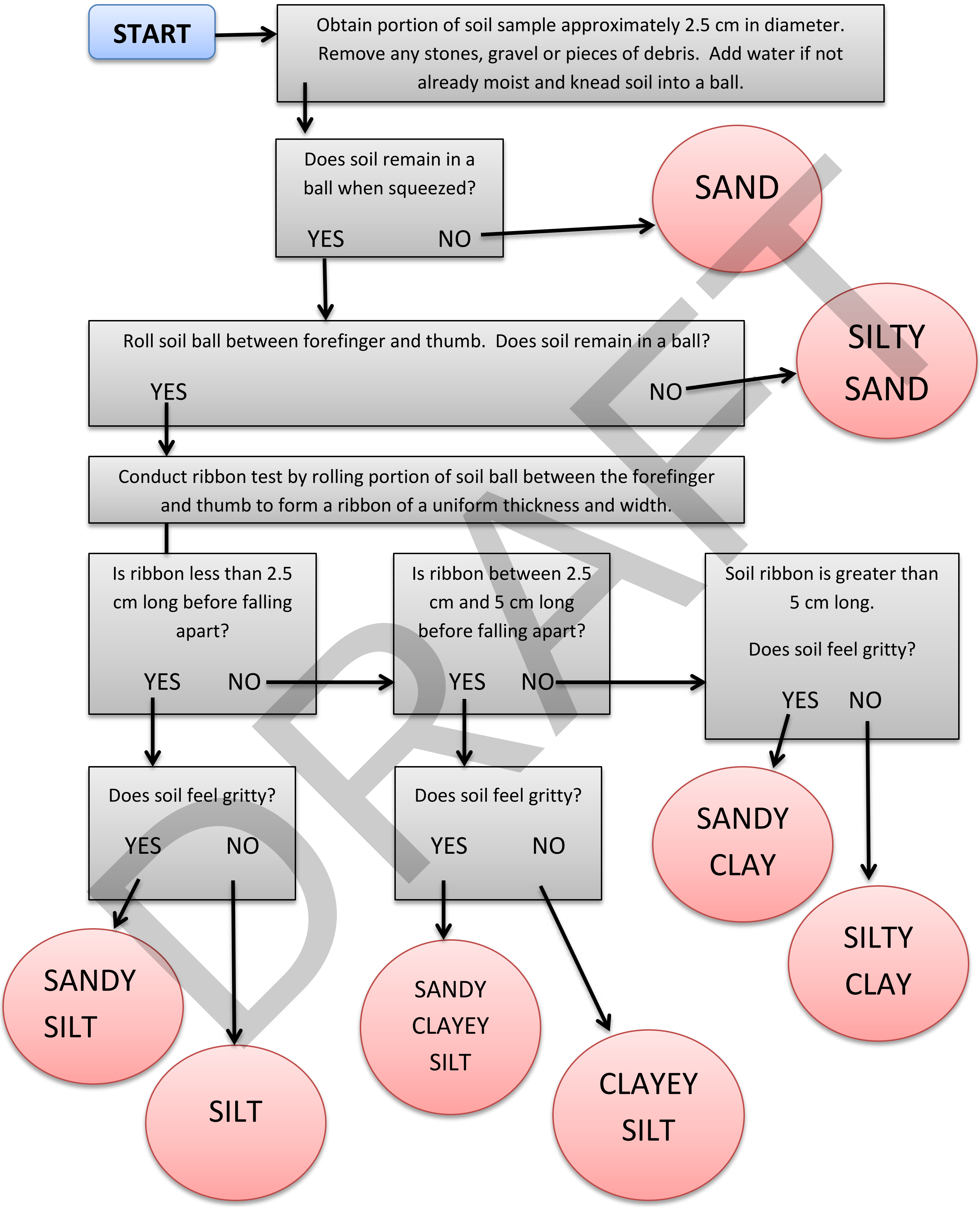
I:\2018 SOP Updates\SOP - EDR019 - REV004 - Soil Sampling Logging.docx

Template: Master SOP Template – February 2014

APPENDIX I

Soil Texture by Feel Chart

Key to Soil Texture by Feel



PINCHIN

SOP – EDR023 – REV006 – LOW FLOW GROUNDWATER SAMPLING

Title:	Low Flow Groundwater Sampling
Practice:	EDR
First Effective Date:	July 08, 2011
Version:	006
Version Date:	January 3, 2018
Author:	Paresh Patel and Robert MacKenzie
Authorized by:	Robert MacKenzie
Signature:	

TABLE OF CONTENTS

1.0 VERSION HISTORY

Version	Date	Summary of Changes	Author
Original	July 08, 2011	N/A	PDP
001	April 15, 2013	Streamlined background section/Provided step-by-step summary of field procedure/Added O. Reg. 153/04 compliance items	RLM
002	September 11, 2013	Added centrifugal submersible pump to list of pumps suitable for low flow sampling	RLM
003	January 26, 2015	Adjusted well development, sampling and field parameter measurement procedures to reflect Pinchin West practices.	RLM
004	April 29, 2016	Updated Section 4.0/Updated Section 5.3 to reflect current field documentation requirements and new document retention policy	RLM
005	April 28, 2017	Removed reference to Pinchin West/In Section 5.2, removed the requirement to complete a post-sampling water level and total purge volume, and added requirement to record pump intake depth at the time of sampling	RLM
006	January 3, 2018	Minor wording changes throughout	RLM

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the standard procedures for collecting groundwater samples from monitoring wells using low flow (low stress) sampling techniques and provides a description of the equipment required and field procedures.

Low flow sampling provides an alternative to the conventional groundwater purge and sampling technique using inertial pumps, submersible pumps and/or bailers, and emphasizes the need to minimize hydraulic stress at the well-aquifer interface by maintaining low water level drawdown, and by using low pumping rates during purging and sampling. Rather than removing a specified number of well volumes or purging a well to dryness a specified number of times prior to sampling, purging is completed at a low pumping rate until first, a stable water level is achieved, and second, field parameters such as pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), specific conductance and turbidity, which are monitored during purging, have stabilized indicating that representative formation groundwater is being purged. It is important that water level and field parameter stabilization are achieved prior to groundwater sampling as this indicates that fresh formation water is being purged and not stagnant groundwater from within the well itself.

Low flow groundwater sampling methods work best for moderate to high yield wells (i.e., wells installed in permeable soils such as sand, silty sand and some silts). For low yield wells (e.g., wells installed in silty clay), low flow groundwater sampling may not be suitable and alternate purging and sampling procedures will be required (see SOP-EDR008 for low yield well sampling procedures).

Conventional sampling can result in sediment entrainment in samples which can result in "positive bias" (i.e., reported concentrations greater than actual groundwater concentrations). This is particularly an issue with petroleum hydrocarbons (PHCs) in the F3 and F4 fraction ranges and polycyclic aromatic hydrocarbons (PAHs) and low flow sampling as per this SOP is strongly recommended when sampling for these parameters unless the hybrid sampling method described in SOP-EDR008 is employed.

This SOP is based primarily on the procedures described in the United States Environmental Protection Agency Region 1 document *"Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells"*, revised January 19, 2010.

3.0 OVERVIEW

The low flow sampling technique can be implemented for any size of monitoring well that can accommodate a positive lift pump or tubing assembly. Note that low flow sampling can be conducted for bedrock monitoring wells without well screens (i.e., with an open interval below the well casing) but for simplicity the screen interval or open interval will be referred to collectively in this SOP as the "screen interval".

Advantages of the low flow sampling technique over conventional groundwater sampling techniques include:

- Minimal disturbance at the sampling point, reducing the potential for sediment to be entrained during the purging process which can result in positive bias (elevated and unrepresentative concentrations) of parameters such as heavy fraction range PHCs and PAHs;
- Reduced operator variability resulting in greater operator control;
- Reduced purge water volumes resulting in reduced investigation derived waste disposal costs; and
- Improved sample consistency resulting in more representative (unbiased) and reproducible sample results.

Disadvantages of the low flow sampling technique over conventional groundwater sampling techniques include:

- Purging and sampling typically requires more time than conventional sampling methods;
- Use of non-dedicated equipment (e.g., submersible pumps) that requires cleaning before initial use and between monitoring well locations; and
- Overall project costs for low flow groundwater sampling programs are typically higher than groundwater sampling programs completed using conventional sampling methods.

It is imperative that the monitoring wells to be sampled are properly developed prior to conducting low flow groundwater sampling. This often includes redevelopment of previously installed wells that have not been sampled for a prolonged period of time (i.e., more than one year). During well development or redevelopment, the hydraulic characteristics of each well should be assessed to provide guidance on the suitability of using the low flow groundwater sampling procedure. Well development procedures are provided in SOP-EDR017.

When groundwater conditions are known, sample the background monitoring wells (i.e., outside of the impacted groundwater area) and wells with low concentrations of contaminants of concern first prior to sampling wells with known impacts. Leave impacted wells to the last to minimize the potential for cross contamination.

In Ontario and Manitoba, or where otherwise specified by provincial guidance documents, a peristaltic pump is not to be used for the collection of groundwater samples for analysis of volatile parameters (i.e., volatile organic compounds (VOCs) and PHCs F1 Fraction). When sampling for volatile parameters using low flow groundwater sampling methods, a bladder pump or centrifugal pump (collectively referred to herein as "submersible pumps") must be used. A "hybrid" groundwater purging and sampling procedure using a peristaltic pump to undertake low flow groundwater sampling for non-volatile parameters as described in this SOP followed by conventional purging and sampling methods for volatile parameters is an acceptable alternative to using a bladder pump or centrifugal pump.

Peristaltic pumps cannot be used where the suction lift (i.e., vertical distance between the pump and ground level) is more than 8.5 metres (28 feet).

It is very important to maintain consistency in applying low flow groundwater sampling procedures to purging and sampling for each monitoring well and for each sampling event. Any deviation from the field procedures described in this SOP can induce variability in the analytical results.

Our primary objective is to obtain unbiased groundwater samples whose analytical results are representative of actual groundwater quality at the property being investigated.

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

5.1.1 Documents and Information Gathering

The following documents and information are required to complete low flow groundwater sampling:

- A copy of the proposal or work plan;
- Monitoring well construction details;
- A copy of this SOP;
- Field data from the last sampling event (if available);
- Operation, maintenance and calibration manuals for the multi-parameter water quality meter;
- A site-specific Health and Safety Plan (as per the project requirements); and
- Client or site representative's contact details.

5.1.2 Extraction Devices and Tubing

This SOP will not discuss in detail the various pumps and tubing options that are available for completing low flow groundwater sampling. The following section provides some general guidelines for the use of this equipment and it is recommended that the equipment supplier be consulted when selecting the appropriate pump and tubing, taking into account site-specific parameters (e.g., well depth, well diameter, site accessibility) and the parameters that will be sampled.

5.1.3 Extraction Devices

For purging and sampling using the low flow sampling procedure, submersible pumps (e.g., centrifugal, bladder) and peristaltic pumps are the most commonly used extraction devices. Regardless of the type of extraction device used, the low flow sampling procedure requires precise control over the flow rate during purging and sample collection. A battery-operated pump controller is required to operate submersible pumps and to control the extraction flow rate. Peristaltic pumps have built-in flow rate adjusters.

Submersible pumps with internal parts constructed of stainless-steel or Teflon are preferred. If the internal parts are constructed of other materials, adequate information must be provided by the equipment supplier to show that the substituted materials do not leach contaminants nor cause interference to the analytical procedures to be used. The use of any such substituted materials must be approved by the Project Manager prior to the field program.

If a bladder pump is selected for the collection of samples for volatile parameters analysis, it should be capable of delivering a water volume sufficient to fill a VOC sample vial in one pulse.

5.1.4 Tubing

Teflon, Teflon-lined polyethylene or polyethylene 1/4-inch interior diameter (ID) or 3/8-inch ID tubing is to be used to connect to the pump and the flow-through cell. In the winter time, the use of 3/8-inch ID tubing is recommended to avoid groundwater freezing in the tubing during severe cold weather conditions.

If the tubing is constructed of other materials (other than mentioned above), adequate information must be provided to show that the substitute materials do not leach contaminants nor cause interference with the analytical procedures. The use of any such substituted materials must be approved by the Project Manager prior to the field program.

Direct sunlight and hot ambient air temperatures may cause groundwater in the tubing to heat up and de-gas resulting in loss of volatile parameters. When sampling under these conditions, the length of the tubing between the top of the monitoring well and the flow-through cell should be kept as short as possible to minimize exposure to sunlight or ambient air and heating of the groundwater.

5.1.5 Groundwater Monitoring, Purging and Sampling

The following equipment is required to complete the low flow purging and sampling procedure described in this SOP:

- Well keys;
- Interface probe;
- Assorted tools (e.g., knife, screwdriver, etc.);
- Equipment cleaning reagents required as per SOP-EDR009 (e.g., distilled water, phosphate-free detergent, etc.);
- Multi-parameter water quality meter (including calibration solutions);
- Graduated cylinder, graduated measuring cup or graduated bucket;
- Stopwatch;

- Flow-through cell;
- Peristaltic pump, centrifugal pump or bladder pump;
- Tubing;
- Pails or drums for storing purge water;
- Paper towels or wipes;
- Calculator;
- Field forms (see Section 5.3) and/or field notebook (hereafter the “field notes”);
- Waterproof and permanent markers;
- Disposable gloves and appropriate personal protective equipment based on site-specific conditions;
- Cooler and ice packs;
- Sample bottles and labels. Several extra sample bottles of each type should be available in case of breakage or other problems; and
- Laboratory Chain of Custody forms.

The following equipment may be used during well sampling, in addition to the above:

- Disposable field filtration units/filters (if appropriate).

5.2 Low Flow Groundwater Sampling Procedures

The following is the summary of the procedures to be followed for low flow groundwater sampling:

1. Develop the monitoring wells to be sampled (if required) prior to sampling by removing between three and five well volumes or by purging them to dryness between one and three times. Further details regarding well development are provided in SOP-EDR017. Well development is to be completed for all newly installed wells prior to low flow sampling and may be required for previously installed monitoring wells that have not been sampled in more than one year. Ideally, well development should occur at least one day prior to low flow sampling. At the discretion of the Project Manager, low flow sampling can occur on the same day as the well is developed but the well must be allowed to fully recover to its original static level prior to the start of purging;
2. Decontaminate all non-dedicated monitoring and sampling equipment that will be used, including the interface probe, submersible pump (if used), water quality meter probes and flow-through cell in accordance with the procedures described in SOP-EDR009;

3. Calibrate the water quality meter used for field parameter measurement in accordance with the manufacturer's specifications. Wherever possible, arrange for the equipment rental company to calibrate the water quality meter and provide a calibration sheet that contains information such as calibration date and calibration measurements for each parameter. If the water quality meter is to be used for more than a one day, a calibration check shall be performed using standard calibration solutions at the start of each day at a minimum. If the calibration check shows deviations from the standard values that exceed the ranges provided in bullet 10 below, the instrument shall be calibrated prior to further use. A calibration check should also be performed during the course of purging and sampling if the parameter measurements suggest that calibration drift has occurred. Document all calibration activities in the field notes, including date and time of calibration/calibration check, calibration solutions used, probe readings and make, model and serial number of the water quality meter. Note that if the water quality meter manufacturer recommends more frequent calibration/calibration checks than specified above, the manufacturer's recommendations are to be followed. See SOP-EDR016 for additional procedures regarding water quality meter calibration.

   Extra care must be taken when calibrating the multi-parameter probe to prevent cross-contamination. Specifically, following immersion of the probes into each calibration standard, all probes should be thoroughly rinsed in distilled or de-ionized water and the excess water shaken off or blotted dry with a lint-free wipe. Conductivity standards are much more sensitive to cross contamination/dilution than other standards. Besides being easily diluted, conductivity standards also affect other parameters (specifically DO), and the conductivity probe should always be the first probe calibrated. The following order for calibration of a multi-parameter probe is to be followed:

   - Specific Conductance;
   - pH;
   - DO;
   - Turbidity; and
   - All other parameters (there is no recommended order for these parameters).

4. Review the well construction details provided in the well development forms, borehole logs or well construction summary table from a previous report. Determine the well depth, well stick up, length of the screen interval, and depth to the top of the screen interval. If the well depth is unavailable, measure it with the interface probe;

Measure the initial water level (i.e., static water level) from the reference point on the well (which should be marked at the top of the well casing) with an interface probe. If measurable free-phase product is present in the well, discuss this with the Project Manager before proceeding further. Using the known well depth, confirm that at least 0.6 metres of water is present within the well. If less than 0.6 metres of water is present, low flow sampling may not be appropriate and the Project Manager is to be contacted before proceeding further;

5. Following decontamination, slowly install the pump or tubing (for peristaltic pumps) to the appropriate depth within the well. Do not connect the pump discharge tubing to the flow-through cell at this time. If the water level in the well is above the top of the screen interval, the pump or tubing intake depth will be the mid-point of the screen interval. If the water level is below the top of the screen interval, the pump or tubing intake will be set at the mid-point of the wetted interval (i.e., the distance between the static water level and the bottom of the well) or 0.6 metres from the bottom of the well, whichever is a greater distance from the bottom of the well. Pumping from within 0.6 metres of the bottom of the well has a higher potential to entrain sediment from the bottom of the well and is not to be completed unless authorized by the Project Manager.

   The pump intake depth may vary from that described above at the discretion of the Project Manager depending on the specific purpose of the groundwater sampling program. For example, if chlorinated solvents that are denser than water are being assessed, it may be desirable to position the pump intake as close to the bottom of the well as possible, or if PHC-related parameters which are lighter than water are being assessed, it may be preferable to position the pump intake as close to the water table as possible. Pump intake depth should be confirmed with the Project Manager prior to the field program;

6. Turn on the pump and discharge groundwater into a purge bucket. Purge initially at a flow rate of approximately 250 millilitres/minute (mL/min). Increase or decrease the flow rate until the water level in the well reaches a steady state condition (i.e., a stabilized water level). The goal is to purge at as high a pumping rate as the well will sustain and still maintain a stabilized water level; however, purging rates should not exceed 500 mL/min during purging and sampling. Also, it is important that during the early phase of purging, emphasis should be put on minimizing pumping stress (i.e., rapid fluctuations in pumping rates).

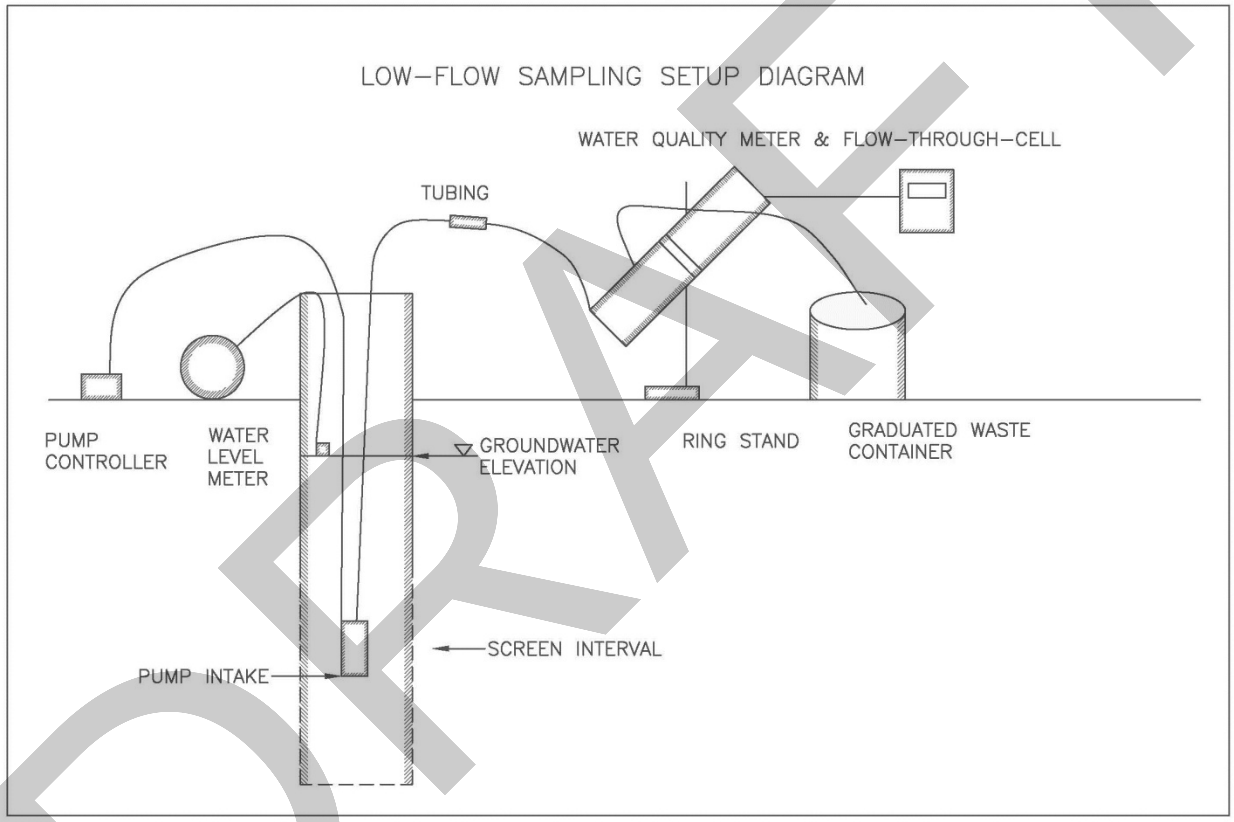
Whenever possible, purge at a pumping rate low enough to keep the total drawdown in the well to less than 10 centimetres although this may not be achievable for low to moderate yield wells. Once a steady state condition is achieved, the purge rate must be maintained constant and should not be changed. Determine the flow rate using a graduated bucket, graduated measuring cup or graduated cylinder and a stop watch. If the well is purged dry even after reducing the flow rate to the minimum practical purging rate of approximately 50 mL/min to 100 mL/min, then low flow sampling procedures will not work for the well and the sampling procedure described in SOP-EDR008 for sampling low yield wells is to be followed. During purging and sampling, it is important to keep the pump intake below the water level in the well at all times to avoid aeration of the groundwater;

7. If the visual appearance of the groundwater is highly turbid once a stabilized water level is achieved, continue to discharge purged water directly into the purge bucket until the groundwater clears, as highly turbid groundwater may foul the flow-through cell. Once the turbidity clears up, connect the flow-through cell to the pump discharge tubing. If the groundwater remains highly turbid after approximately 15 minutes of purging, contact the Project Manager to discuss whether sampling should occur. Further well development may be required to remove excess sediment from the monitoring well before sampling can proceed;
8. Confirm the volume of the flow-through cell excluding the volume of the water quality meter probes. If this information is not readily available, fill the cell with water with the water quality probes inserted and empty its contents into a graduated cylinder or measuring cup to determine the volume. After connecting the discharge tubing to the flow-through cell, continue purging until the flow-through cell is full and turn on the multi-parameter meter. Record the initial field parameter readings in the field notes. At a minimum, the field parameters that are to be monitored are pH, specific conductance, temperature, DO and ORP. The monitoring of turbidity is also a minimum requirement in Ontario and Manitoba. Field parameter readings are to be obtained at a frequency of no less than once every 5 minutes. Obtaining field parameter readings at a spacing of greater than 5 minutes apart may be required if the volume of the flow-through cell is large or pumping occurs at a low rate (e.g., 50 or 100 mL/min). For example, if the flow-through cell has a volume of 300 mL and the pumping rate is 50 mL/min, it will take 6 minutes for the volume of water equivalent to the flow-through cell volume to pass through the cell and field parameter readings should be taken 6 minutes apart. If the pumping rate for the same flow-through cell is 100 mL/min, although it will take only 3

minutes for the volume of water equivalent to the flow-through cell volume to pass through the cell, field parameter readings are to be taken at 5 minute intervals.

Figure 1 shows a typical low flow groundwater sampling set up using a submersible pump. The set up when using a peristaltic pump is similar except that the only part of the extraction system in the well is tubing that is connected to the peristaltic pump at the ground surface (i.e., there is no pump mechanism within the well), and a second section of tubing connects the discharge of the peristaltic pump to the flow-through cell.

Figure 1: Low Flow Sampling Set Up Diagram



Reference: USEPA Region I EQASOP-GW 001, July 30, 1996, Revised January 19, 2010.

Air bubbles in the flow-through cell can result in inaccurate field parameter measurements, in particular for DO. If air bubbles appear in the flow-through cell, check that the discharge tubing is properly connected to the flow-through cell and check that the pump intake is located below the water table by confirming the pump intake depth and checking the water level in the well. If air bubbles persist in the flow-through cell, position the flow-through cell at a 45-degree angle with the ports facing upwards. This configuration should keep any gas bubbles entering the cell away from the multimeter probes and allow the air bubbles to exit the cell easily;

9. Regardless of the frequency of field parameter readings, purging is to be completed until field parameter stabilization is achieved, which occurs when the field parameter measurements for <u>all</u> of the parameters are within the following ranges for <u>three consecutive</u> sets of readings:

pH	±0.1 pH units
Specific Conductance	±3%
Temperature	±3%
DO	±10% for values greater than 0.5 milligrams per litres (mg/L), or three consecutive values less than 0.5 mg/L
ORP	±10 millivolts
Turbidity	±10% for values greater than 5 Nephelometric Turbidity Units (NTUs), or three consecutive values less than 5 NTU

10. Check the water level in the well during purging a minimum of once every 10 minutes to confirm that steady state conditions are being maintained. Although not mandatory, more frequent water level measurements can be made (e.g., at the time of each set of water quality parameters). Reduce the pumping rate if the water level measurements indicate that drawdown is occurring. Confirm the new pumping rate as per Step 7 and record it in the field notes;
11. Record the time of all water level and field parameter measurements in the field notes;
12. Should field parameter stabilization not occur within one hour of the start of purging, contact the Project Manager to discuss whether to continue purging to attempt to achieve field parameter stabilization or whether to proceed with groundwater sample collection. The Project Manager will consider the total volume of water purged to this point and may

deem it suitable to collect the groundwater sample if, for example, three or more well volumes in total have been purged despite the lack of field parameter stability. Note that achieving stabilization of some parameters is more important with respect to certain contaminant types. For example, the stabilization of DO readings is important for volatile parameter sampling because fluctuations in DO concentrations may indicate that the groundwater is being aerated during the purging process which could result in volatile loss from the groundwater samples;

13. Following field parameter stabilization, disconnect the tubing from the flow-through cell and collect the groundwater samples by filling the appropriate laboratory-supplied sample containers directly from the discharge tubing. Note that it is important not to sample groundwater that has passed through the flow-through cell. If pumping at a moderate to high pumping (i.e., > 200 mL/min), the pumping rate should be reduced to prevent overfilling or the splashing of preservatives out of the sample containers. The order of sample collection should be most volatile parameters to least volatile parameters as follows:

- VOCs and PHCs F1 Fraction;
- PHCs F2-F4 Fraction;
- PAHs and Base/Neutral/Acid Extractables;
- Metals and Inorganics; and
- Polychlorinated Biphenyls and Organochlorine Pesticides.

Special Notes for Volatile Parameter Sampling

When collecting samples for volatile parameter analysis (i.e., VOCs and PHCs F1 Fraction), the tubing must be filled completely and must not contain air bubbles prior to sample collection. If this is observed, increase the pumping rate slightly prior to sample collection until the tubing is filled and/or there are no longer any air bubbles, and then collect the sample. When collecting the groundwater samples for volatile parameter analysis, the sample vials should be tilted to avoid agitation and bubbling to minimize the potential for volatilization.

Special Notes for Metals Sampling

Groundwater samples collected for metals analysis will require filtering prior to preservation if dissolved metals concentrations are sought. Depending on the type and diameter of the discharge tubing used, in-line filters can be used for field filtering. Disposable filtration kits (e.g., Nalgene 0.45 micron filters) can also be used for field filtering. When collecting samples in containers that are pre-charged with preservatives, care must be taken not to overfill the containers as some of the preservative may be lost which will result in the sample not being properly preserved. Also, sample containers for metals analysis typically have a fill line marked on the container and the container must not be filled to above this line as this will cause dilution of the preservative and the sample may not be properly preserved.

If field filtering cannot be completed, then the groundwater samples are to be collected in sample containers that do not contain preservatives, and the analytical laboratory is to be instructed to filter and preserve the samples immediately upon receipt. The procedure and necessary equipment required to filter and preserve metals samples using the low flow methods should be discussed with the Project Manager prior to mobilization to the field; and

14. Record the pump intake depth at the time of sample collection. Remove the pump and/or tubing from the well and decontaminate the sampling equipment.

5.3 Fieldwork Records

The purging and sampling of a monitoring well using the low flow groundwater sampling procedure described in this SOP are to be documented through the completion in full of the following field forms located in the Pinchin Orchard:

- EDR-GW-Low Flow Sampling; and
- EDR-GW-Water Quality Parameters.

Any deviations from this SOP along with the rationale for these deviations must be recorded on the forms.

Upon completion of the sampling event, the field notes must be submitted to the Project Manager for review. The field notes must also be scanned and a copy of the scan placed in the project folder on the server.

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

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

- Calibration checks <u>must</u> be made for the water quality meter used for field parameter measurements at the frequency specified in Step 3 of Section 5.2. Records of the calibration checks must be kept and appended to the Phase Two ESA report;

- At least one field duplicate groundwater sample must be collected for every ten samples submitted for analysis. The frequency is one for one to 10 samples, two 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; and
- 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.

In addition, low flow groundwater sampling using a bladder pump or centrifugal pump should be completed whenever well yields are high enough to permit it for all Phase Two ESAs undertaken to support the filing of a Record of Site Condition. This will minimize potential issues the Ministry of the Environment and Climate Change may have regarding the representativeness of the groundwater analytical data.

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

U.S. Environmental Protection Agency Region I, *Low Stress (‘low flow’) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells,* EQASOP-GW 001, July 30, 1996, Revised January 19, 2010.

9.0 APPENDICES

None.

I:\2018 SOP Updates\SOP - EDR023 - REV006 - Low Flow Groundwater Sampling.docx

Template: Master SOP Template – February 2014

PINCHIN

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:

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

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.

I:\2018 SOP Updates\SOP - EDR025 - REV004 - QA QC Sampling.docx

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:

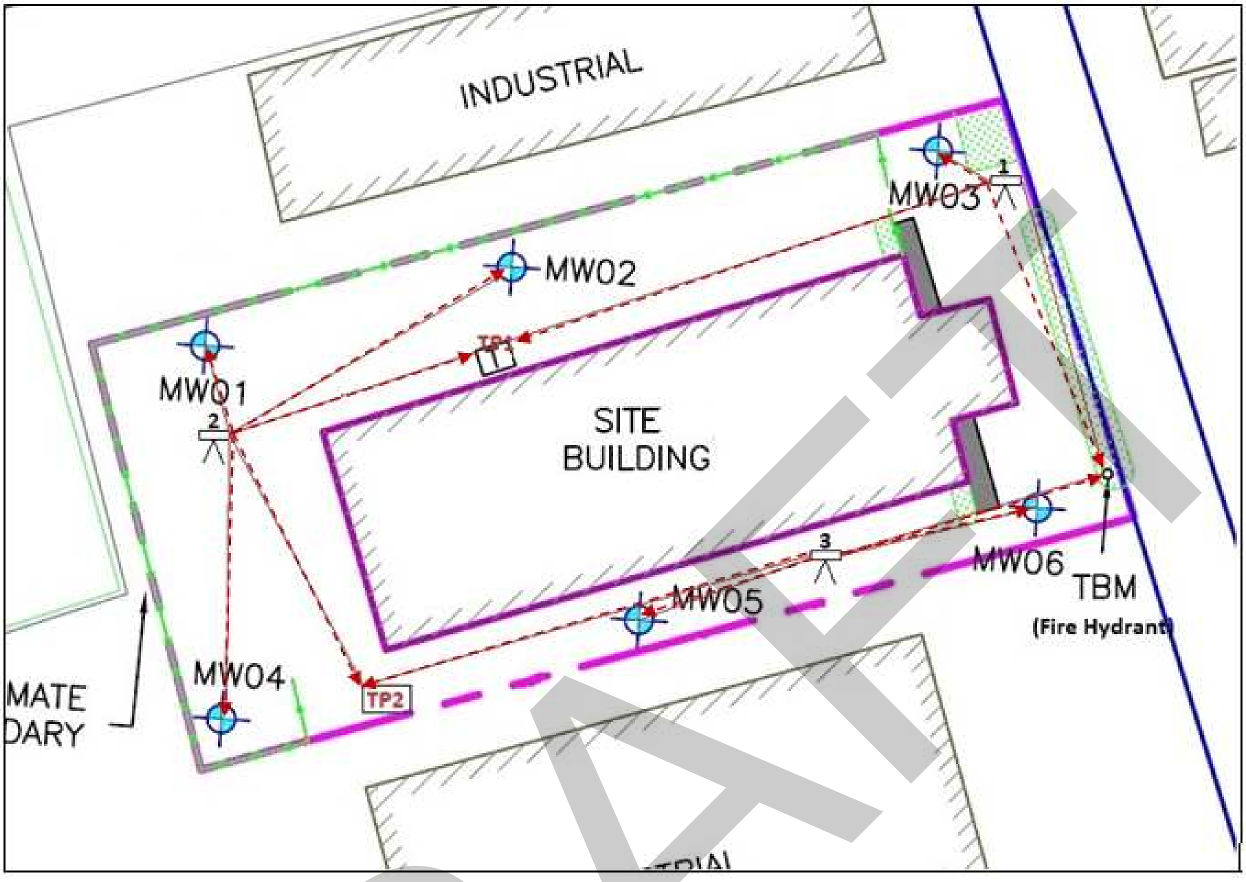
- Prior to use, turn on the laser level and receiver to ensure the batteries are fully charged; and
- Check equipment calibration (Equipment rentals should come with a calibration sheet for the survey equipment).

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**;

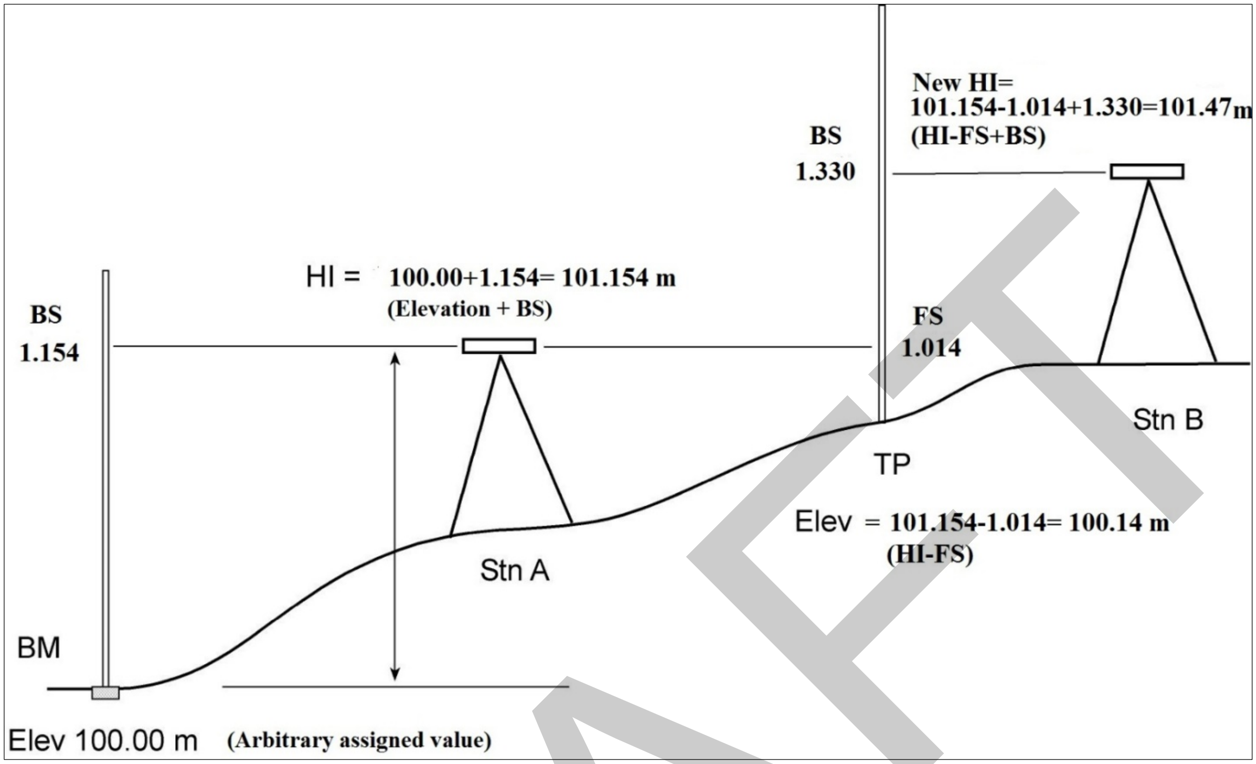


Figure 1: Survey set up from TBM with one TP.

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

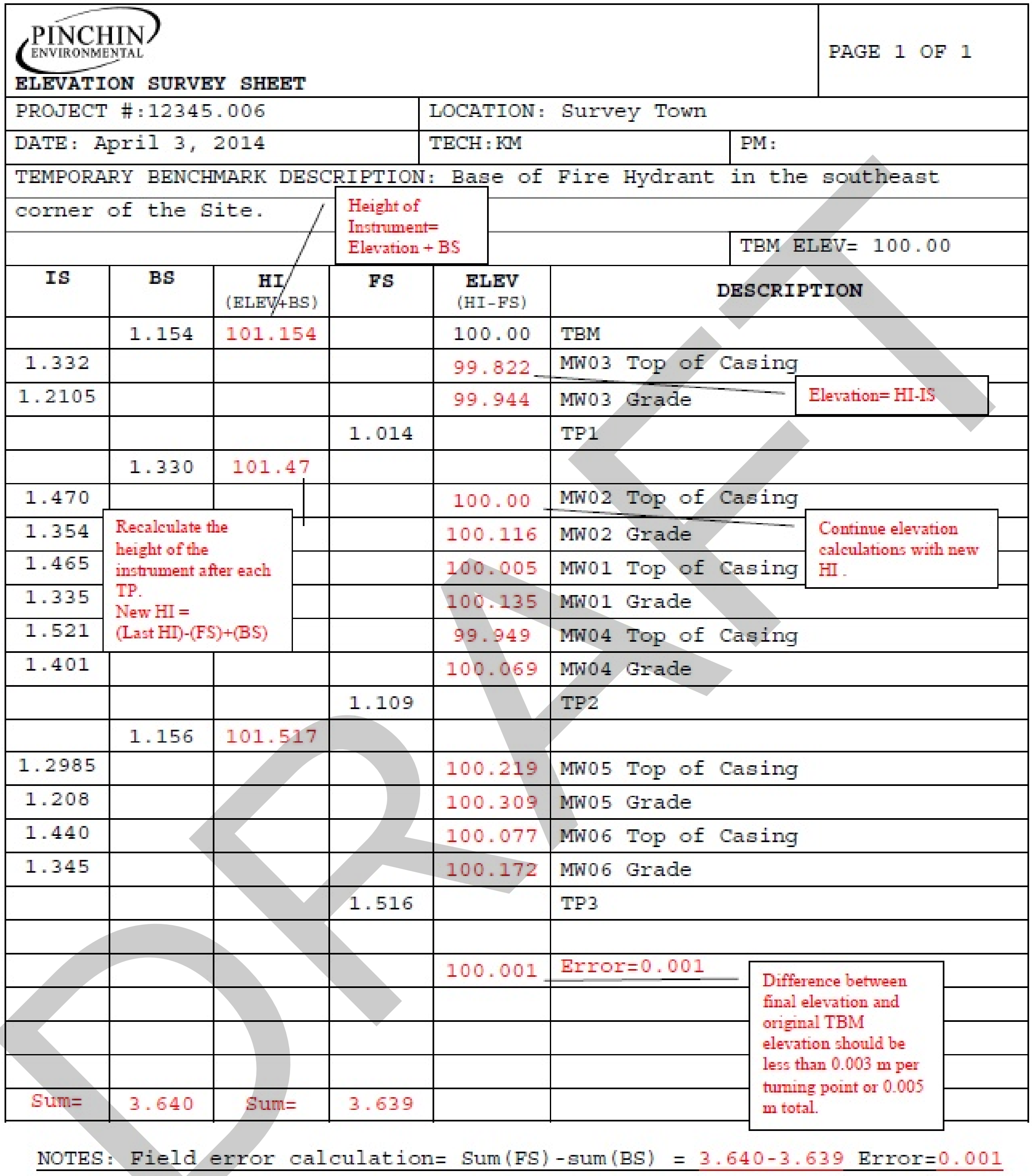
The acceptable error limit is 3 millimetres (mm) (0.003 m) per TP, with a maximum allowable error of 5 mm per survey. If the total error per survey exceeds 0.003 m per TP or 0.005 m per survey, the survey must be repeated. Common sources of error include:

- 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.
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		

Height of Instrument= Elevation + BS

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

PINCHIN

Log of Borehole: MW1

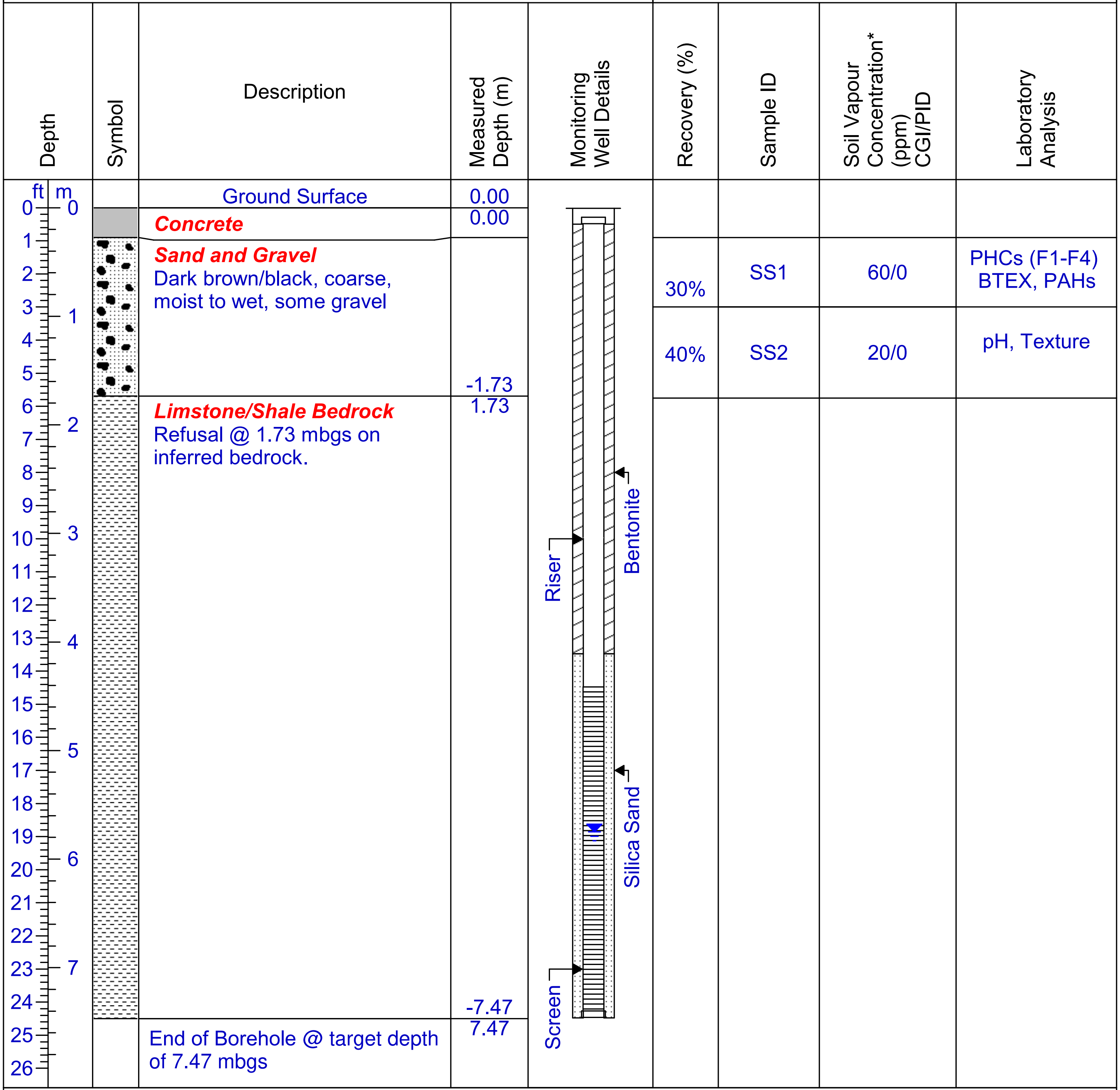
Project #: 334803.001 **Logged By:** JM

Project: Phase Two Environmental Site Assessment

Client: KTS Properties

Location: 130 Slater Street, Ottawa, Ontario

Drill Date: March 18, 2024



SUBSURFACE PROFILE					SAMPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
		Ground Surface	0.00					
		Concrete	0.00					
		Sand and Gravel Dark brown/black, coarse, moist to wet, some gravel	-1.73		30%	SS1	60/0	PHCs (F1-F4) BTEX, PAHs
					40%	SS2	20/0	pH, Texture
		Limstone/Shale Bedrock Refusal @ 1.73 mbgs on inferred bedrock.	1.73 -7.47					
		End of Borehole @ target depth of 7.47 mbgs	7.47					

Contractor: Strata Drilling Group

Drilling Method: Pionjar Electric Drill

Well Casing Size: 3.42 cm

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

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: MW2

Project #: 334803.001 **Logged By:** JM

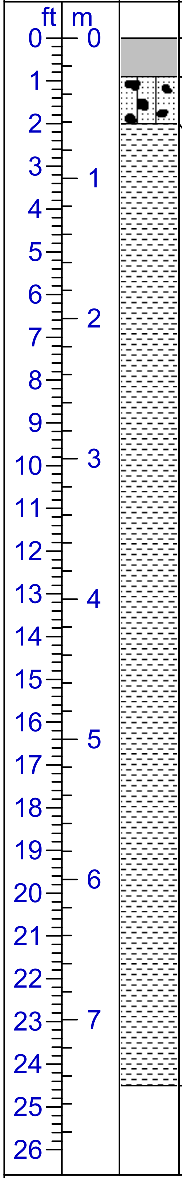
Project: Phase Two Environmental Site Assessment

Client: KTS Properties

Location: 130 Slater Street, Ottawa, Ontario

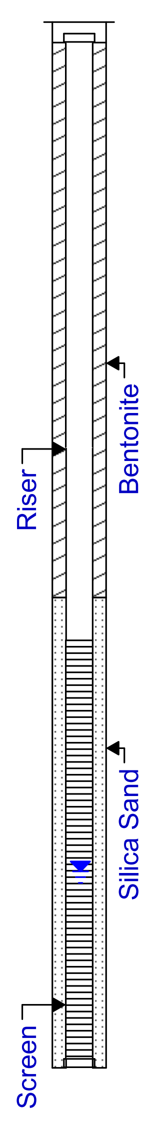
Drill Date: March 19, 2024

SUBSURFACE PROFILE



Description	Measured Depth (m)	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
Ground Surface	0.00				
Concrete	0.00				
Sandy Silt and Gravel Dark brown, no odour.		5%	SS1	0/1	PHCs (F1-F4) VOCS, metals
Limestone/Shale Bedrock Refusal @ 0.61 mbgs on inferred bedrock. PHC-like odour @ 2.59 mbgs.	-7.47				
End of Borehole @ target depth of 7.47 mbgs.	7.47				

SAMPLE



Contractor: Strata Drilling Group

Drilling Method: Pionjar Electric Drill

Well Casing Size: 3.42 cm

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

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: MW3

Project #: 334803.001 **Logged By:** JM

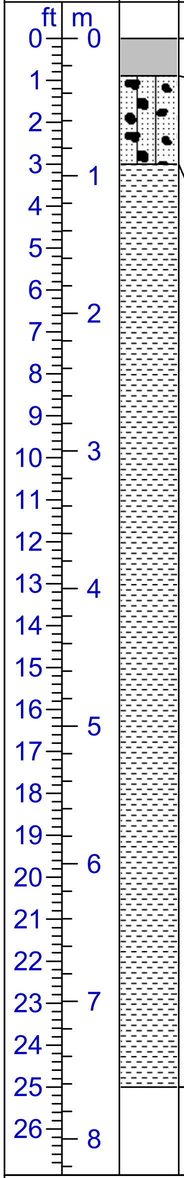
Project: Phase Two Environmental Site Assessment

Client: KTS Properties

Location: 130 Slater Street, Ottawa, Ontario

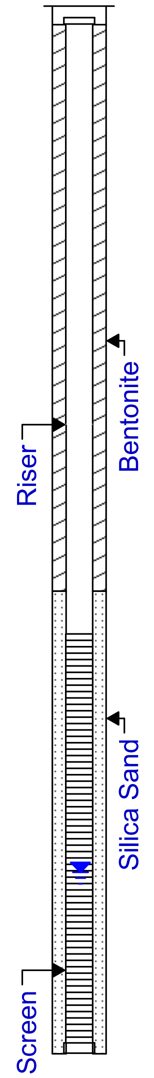
Drill Date: March 20, 2024

SUBSURFACE PROFILE / SAMPLE



Description	Measured Depth (m)	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
Ground Surface	0.00				
Concrete	0.00				
Sandy Silt and Gravel Dark silty sand/clay, some gravel, no odour, some shale bits.		80%	SS1	105/0	PHCs (F1-F4) VOCS, metals
Limestone/Shale Bedrock Refusal @ 0.91 mbgs on inferred bedrock. PHC-like odours @ 1.22-1.83 mbgs.	-0.91 0.91				
End of Borehole @ target depth of 7.62 mbgs.	-7.62 7.62				

Monitoring Well Details



Contractor: Strata Drilling Group

Drilling Method: Pionjar Electric Drill

Well Casing Size: 3.42 cm

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

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: MW4

Project #: 334803.001 **Logged By:** JM

Project: Phase Two Environmental Site Assessment

Client: KTS Properties

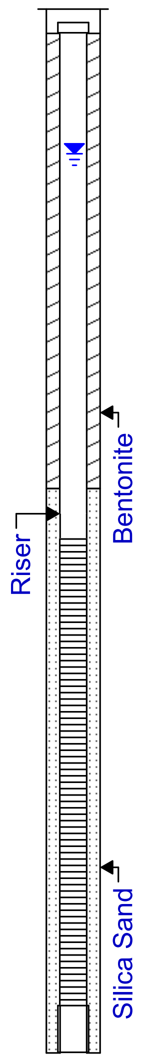
Location: 130 Slater Street, Ottawa, Ontario

Drill Date: March 21, 2024

SUBSURFACE PROFILE

Description	Measured Depth (m)
Ground Surface	0.00
Concrete	0.00
Silty Sand Grey, wet, loose, no odours.	-1.52
Sandy Clay Grey, some gravel, wet.	1.52 -2.29
Shale/Limestone Bedrock Drilling refusal @ 2.29 mbgs on inferred bedrock. Shale bedrock with silt seams.	2.29 -6.31
End of Borehole @ target depth of 6.31 mbgs.	6.31

Monitoring Well Details



SAMPLE

Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
10%	SS1	145/0	
70%	SS2	110/0	
100%	SS3	150/0	PHCs (F1-F4) VOCS, metals
70%	SS4	135/0	pH, texture
	SS5		PHCs (F1-F4) BTEX, PAHs

Contractor: Strata Drilling Group

Drilling Method: Pionjar Electric Drill

Well Casing Size: 3.42 cm

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

Grade Elevation: NM

Top of Casing Elevation: NM

Sheet: 1 of 1

APPENDIX D

Laboratory Certificates of Analysis

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.
1456 Centennial Drive, Unit 2
KINGSTON, ON   K7P 0K4
(613) 541-1013

ATTENTION TO: Alicia McDonald

PROJECT: 334803.001

AGAT WORK ORDER: 24P132434

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganic Team Lead

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Mar 28, 2024

PAGES (INCLUDING COVER): 26

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Certificate of Analysis

AGAT WORK ORDER: 24P132434
PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:

ATTENTION TO: Alicia McDonald
SAMPLED BY:

O. Reg. 153(511) - All Metals (Soil)

DATE RECEIVED: 2024-03-22 **DATE REPORTED: 2024-03-28**

			SAMPLE DESCRIPTION:	MW2-S1	MW3-S1	MW4-S3	DUP-1
			SAMPLE TYPE:	Soil	Soil	Soil	Soil
			DATE SAMPLED:	2024-03-19	2024-03-20	2024-03-21	2024-03-20
Parameter	**Unit**	**G / S**	**RDL**	**5756118**	**5756121**	**5756122**	**5756124**
Antimony	µg/g		0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g		1	4	5	2	4
Barium	µg/g		2.0	247	243	106	200
Beryllium	µg/g		0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/g		5	8	7	5	6
Boron (Hot Water Soluble)	µg/g		0.10	0.49	0.38	0.14	0.34
Cadmium	µg/g		0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g		5	34	15	15	17
Cobalt	µg/g		0.8	10.2	7.3	5.8	6.8
Copper	µg/g		1.0	20.0	16.3	11.4	15.1
Lead	µg/g		1	15	10	6	7
Molybdenum	µg/g		0.5	4.7	3.6	1.1	2.9
Nickel	µg/g		1	28	25	14	20
Selenium	µg/g		0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g		0.5	<0.5	<0.5	<0.5	<0.5
Thallium	µg/g		0.5	<0.5	<0.5	<0.5	<0.5
Uranium	µg/g		0.50	1.18	1.33	0.86	1.08
Vanadium	µg/g		2.0	36.7	23.2	26.1	25.0
Zinc	µg/g		5	44	20	21	21
Chromium, Hexavalent	µg/g		0.2	<0.2	<0.2	<0.2	<0.2
Mercury	µg/g		0.10	<0.10	<0.10	<0.10	<0.10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
Analysis performed at AGAT Toronto (unless marked by *)

NIVINE BASILY

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 24P132434

PROJECT: 334803.001

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - ORPs (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW1-S2	MW4-S4
			SAMPLE TYPE:	Soil	Soil
			DATE SAMPLED:	2024-03-18	2024-03-21
Parameter	**Unit**	**G / S**	**RDL**	**5756117**	**5756123**
pH, 2:1 CaCl2 Extraction	pH Units		NA	6.88	7.14

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5756117-5756123 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract obtained from 2:1 leaching procedure (2 parts extraction fluid:1 part wet soil). SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

NIVINE BASILY
CHARTERED CHEMIST

Certificate of Analysis

AGAT WORK ORDER: 24P132434

PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - Metals & Inorganics

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	TCLP
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-21
Parameter	**Unit**	**G / S**	**RDL**	**5756125**
Arsenic Leachate	mg/L	2.5	0.010	<0.010
Barium Leachate	mg/L	100	0.020	0.639
Boron Leachate	mg/L	500	0.050	0.057
Cadmium Leachate	mg/L	0.5	0.010	<0.010
Chromium Leachate	mg/L	5	0.050	<0.050
Lead Leachate	mg/L	5	0.010	0.011
Mercury Leachate	mg/L	0.1	0.01	<0.01
Selenium Leachate	mg/L	1	0.020	<0.020
Silver Leachate	mg/L	5	0.010	<0.010
Uranium Leachate	mg/L	10	0.050	<0.050
Fluoride Leachate	mg/L	150	0.10	0.26
Cyanide Leachate	mg/L	20	0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
NIVINE BASILY
CHEMIST

Certified By:

CLIENT NAME: PINCHIN LTD. **ATTENTION TO: Alicia McDonald**

SAMPLING SITE: **SAMPLED BY:**

Particle Size by Sieve (Wet)

DATE RECEIVED: 2024-03-22 **DATE REPORTED: 2024-03-28**

			SAMPLE DESCRIPTION:	**MW1-S2**	**MW4-S4**
			SAMPLE TYPE:	**Soil**	**Soil**
			DATE SAMPLED:	**2024-03-18**	**2024-03-21**
Parameter	**Unit**	**G / S**	**RDL**	**5756117**	**5756123**
Sieve Analysis - 75 µm (retained)	%		NA	60.56	62.40
Sieve Analysis - 75 µm (passing)	%		NA	39.44	37.60
Soil Texture (Toronto)				Coarse	Coarse

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5756117-5756123 Value reported is the amount of sample passing through or retained on sieve after wash with water and represents proportion by weight particles smaller or larger than indicated sieve size.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

NIVINE BASILY

Certificate of Analysis

AGAT WORK ORDER: 24P132434

PROJECT: 334803.001

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW1-S1
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-18
Parameter	**Unit**	**G / S**	**RDL**	**5756116**
Naphthalene	µg/g		0.05	<0.05
Acenaphthylene	µg/g		0.05	<0.05
Acenaphthene	µg/g		0.05	<0.05
Fluorene	µg/g		0.05	<0.05
Phenanthrene	µg/g		0.05	<0.05
Anthracene	µg/g		0.05	<0.05
Fluoranthene	µg/g		0.05	<0.05
Pyrene	µg/g		0.05	<0.05
Benz(a)anthracene	µg/g		0.05	<0.05
Chrysene	µg/g		0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.05	<0.05
Benzo(k)fluoranthene	µg/g		0.05	<0.05
Benzo(a)pyrene	µg/g		0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g		0.05	<0.05
Dibenz(a,h)anthracene	µg/g		0.05	<0.05
Benzo(g,h,i)perylene	µg/g		0.05	<0.05
2-and 1-methyl Naphthalene	µg/g		0.05	<0.05
Moisture Content	%		0.1	9.5
Surrogate	**Unit**	**Acceptable Limits**		
Naphthalene-d8	%	50-140		70
Acridine-d9	%	50-140		70
Terphenyl-d14	%	50-140		60

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5756116 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

DATE RECEIVED: 2024-03-22 **DATE REPORTED: 2024-03-28**

			SAMPLE DESCRIPTION:	MW1-S1
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-18
Parameter	**Unit**	**G / S**	**RDL**	**5756116**
Benzene	µg/g		0.02	<0.02
Toluene	µg/g		0.05	<0.05
Ethylbenzene	µg/g		0.05	<0.05
m & p-Xylene	µg/g		0.05	<0.05
o-Xylene	µg/g		0.05	<0.05
Xylenes (Total)	µg/g		0.05	<0.05
F1 (C6 to C10)	µg/g		5	5
F1 (C6 to C10) minus BTEX	µg/g		5	5
F2 (C10 to C16)	µg/g		10	<10
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10
F3 (C16 to C34)	µg/g		50	<50
F3 (C16 to C34) minus PAHs	µg/g		50	<50
F4 (C34 to C50)	µg/g		50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	9.5
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-140		102
Terphenyl	%	60-140		98

Certified By:

Results relate only to the items tested. Results apply to samples as received.

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

DATE RECEIVED: 2024-03-22 **DATE REPORTED: 2024-03-28**

Comments:	RDL - Reported Detection Limit; G / S - Guideline / Standard
5756116	Results are based on sample dry weight. The C6-C10 fraction is calculated using toluene response factor. Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene. C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited. The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34. Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present. The chromatogram has returned to baseline by the retention time of nC50. Total C6 - C50 results are corrected for BTEX and PAH contributions. C>10 – C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene. C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene). This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. nC10, nC16 and nC34 response factors are within 10% of their average. C50 response factor is within 70% of nC10 + nC16 + nC34 average. Linearity is within 15%. Extraction and holding times were met for this sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW2-S1	MW3-S1	MW4-S3	DUP-1
			SAMPLE TYPE:	Soil	Soil	Soil	Soil
			DATE SAMPLED:	2024-03-19	2024-03-20	2024-03-21	2024-03-20
Parameter	**Unit**	**G / S**	**RDL**	**5756118**	**5756121**	**5756122**	**5756124**
F1 (C6 to C10)	µg/g		5	<5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g		5	<5	<5	<5	<5
F2 (C10 to C16)	µg/g		10	<10	<10	<10	<10
F3 (C16 to C34)	µg/g		50	100	<50	<50	<50
F4 (C34 to C50)	µg/g		50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	NA	NA
Moisture Content	%		0.1	11.2	7.3	17.0	22.1
Surrogate	**Unit**	**Acceptable Limits**					
Toluene-d8	%	50-140		100	100	101	102
Terphenyl	%	60-140		97	86	96	89

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5756118-5756124 Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 24P132434

PROJECT: 334803.001

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - VOCs (with PHC) (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW2-S1	MW3-S1	MW4-S3	DUP-1
			SAMPLE TYPE:	Soil	Soil	Soil	Soil
			DATE SAMPLED:	2024-03-19	2024-03-20	2024-03-21	2024-03-20
Parameter	**Unit**	**G / S**	**RDL**	**5756118**	**5756121**	**5756122**	**5756124**
Dichlorodifluoromethane	µg/g		0.05	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g		0.02	<0.02	<0.02	<0.02	<0.02
Bromomethane	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Acetone	ug/g		0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Trans- 1,2-Dichloroethylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Methyl tert-butyl Ether	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g		0.02	<0.02	<0.02	<0.02	<0.02
Methyl Ethyl Ketone	ug/g		0.50	<0.50	<0.50	<0.50	<0.50
Cis- 1,2-Dichloroethylene	ug/g		0.02	<0.02	<0.02	<0.02	<0.02
Chloroform	ug/g		0.04	<0.04	<0.04	<0.04	<0.04
1,2-Dichloroethane	ug/g		0.03	<0.03	<0.03	<0.03	<0.03
1,1,1-Trichloroethane	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Benzene	ug/g		0.02	<0.02	<0.02	<0.02	<0.02
1,2-Dichloropropane	ug/g		0.03	<0.03	<0.03	<0.03	<0.03
Trichloroethylene	ug/g		0.03	<0.03	<0.03	<0.03	<0.03
Bromodichloromethane	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Methyl Isobutyl Ketone	ug/g		0.50	<0.50	<0.50	<0.50	<0.50
1,1,2-Trichloroethane	ug/g		0.04	<0.04	<0.04	<0.04	<0.04
Toluene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Ethylene Dibromide	ug/g		0.04	<0.04	<0.04	<0.04	<0.04
Tetrachloroethylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g		0.04	<0.04	<0.04	<0.04	<0.04
Chlorobenzene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
m & p-Xylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05

Certified By:

O. Reg. 153(511) - VOCs (with PHC) (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW2-S1	MW3-S1	MW4-S3	DUP-1
			SAMPLE TYPE:	Soil	Soil	Soil	Soil
			DATE SAMPLED:	2024-03-19	2024-03-20	2024-03-21	2024-03-20
Parameter	**Unit**	**G / S**	**RDL**	**5756118**	**5756121**	**5756122**	**5756124**
Bromoform	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Styrene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
o-Xylene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
Xylenes (Total)	ug/g		0.05	<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene (Cis + Trans)	µg/g		0.05	<0.05	<0.05	<0.05	<0.05
n-Hexane	µg/g		0.05	<0.05	<0.05	<0.05	<0.05
Moisture Content	%		0.1	11.2	7.3	17.0	22.1
Surrogate	**Unit**	**Acceptable Limits**					
Toluene-d8	% Recovery	50-140		100	100	101	102
4-Bromofluorobenzene	% Recovery	50-140		96	96	94	101

Comments: RDL - Reported Detection Limit;   G / S - Guideline / Standard

5756118-5756124 The sample was analyzed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene + o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

O. Reg. 558 - Benzo(a) pyrene

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	TCLP
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-21
Parameter	**Unit**	**G / S**	**RDL**	**5756125**
Benzo(a)pyrene Leachate	mg/L	0.001	0.001	<0.001
Surrogate	**Unit**	**Acceptable Limits**		
Acridine-d9	%	50-140		107
Naphthalene-d8	%	50-140		82
Terphenyl-d14	%	50-140		88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5756125 The sample was leached according to Regulation 558 protocol. Analysis was performed on the leachate.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 24P132434

PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:

ATTENTION TO: Alicia McDonald

SAMPLED BY:

O. Reg. 558 - PCBs

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	TCLP
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-21
Parameter	**Unit**	**G / S**	**RDL**	**5756125**
PCB's Leachate	mg/L	0.3	0.005	<0.005
Surrogate	**Unit**	**Acceptable Limits**		
Decachlorobiphenyl	%	50-140		96

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5756125 The soil sample was leached using the Regulation 558 procedure. Analysis was performed on the leachate.
PCB total is a calculated parameter. The calculated value is the sum of Aroclor 1242, Aroclor 1248, Aroclor 1254 and Aroclor 1260.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 24P132434
PROJECT: 334803.001

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:

ATTENTION TO: Alicia McDonald
SAMPLED BY:

O. Reg. 558 - VOCs

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	TCLP
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-21
Parameter	**Unit**	**G / S**	**RDL**	**5756125**
Vinyl Chloride Leachate	mg/L	0.2	0.030	<0.030
1,1 Dichloroethene Leachate	mg/L	1.4	0.020	<0.020
Dichloromethane Leachate	mg/L	5.0	0.030	<0.030
Methyl Ethyl Ketone Leachate	mg/L	200	0.090	<0.090
Chloroform Leachate	mg/L	10.0	0.020	<0.020
1,2-Dichloroethane Leachate	mg/L	0.5	0.020	<0.020
Carbon Tetrachloride Leachate	mg/L	0.5	0.020	<0.020
Benzene Leachate	mg/L	0.5	0.020	<0.020
Trichloroethene Leachate	mg/L	5.0	0.020	<0.020
Tetrachloroethene Leachate	mg/L	3.0	0.050	<0.050
Chlorobenzene Leachate	mg/L	8.0	0.010	<0.010
1,2-Dichlorobenzene Leachate	mg/L	20.0	0.010	<0.010
1,4-Dichlorobenzene Leachate	mg/L	0.5	0.010	<0.010
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	50-140		110
4-Bromofluorobenzene	% Recovery	50-140		94

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5756125 Sample was prepared using Regulation 558 protocol and a zero headspace extractor.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:

AGAT WORK ORDER: 24P132434
ATTENTION TO: Alicia McDonald
SAMPLED BY:

Soil Analysis

RPT Date: Mar 28, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - ORPs (Soil)

PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lower	Upper	Recovery	Lower	Upper	Recovery	Lower	Upper
pH, 2:1 CaCl2 Extraction	5748806		6.21	6.38	2.8%	NA	102%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Duplicate NA: results are under 5X the RDL and will not be calculated.

Particle Size by Sieve (Wet)

PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lower	Upper	Recovery	Lower	Upper	Recovery	Lower	Upper
Sieve Analysis - 75 µm (retained)	5756117	5756117	60.56	61.06	0.8%	NA	98%	75%	125%						
Sieve Analysis - 75 µm (passing)	5756117	5756117	39.44	38.94	1.3%	NA									

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

O. Reg. 153(511) - All Metals (Soil)

PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lower	Upper	Recovery	Lower	Upper	Recovery	Lower	Upper
Antimony	5753582		<0.8	<0.8	NA	< 0.8	122%	70%	130%	100%	80%	120%	95%	70%	130%
Arsenic	5753582		4	4	NA	< 1	115%	70%	130%	103%	80%	120%	105%	70%	130%
Barium	5753582		82.6	80.4	2.7%	< 2.0	100%	70%	130%	100%	80%	120%	93%	70%	130%
Beryllium	5753582		0.8	0.7	NA	< 0.5	86%	70%	130%	103%	80%	120%	106%	70%	130%
Boron	5753582		6	6	NA	< 5	74%	70%	130%	97%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	5759323		0.34	0.34	NA	< 0.10	97%	60%	140%	103%	70%	130%	101%	60%	140%
Cadmium	5753582		<0.5	<0.5	NA	< 0.5	94%	70%	130%	100%	80%	120%	103%	70%	130%
Chromium	5753582		28	28	0.0%	< 5	105%	70%	130%	113%	80%	120%	114%	70%	130%
Cobalt	5753582		10.5	10.4	1.0%	< 0.8	108%	70%	130%	109%	80%	120%	107%	70%	130%
Copper	5753582		17.9	17.7	1.1%	< 1.0	98%	70%	130%	110%	80%	120%	106%	70%	130%
Lead	5753582		15	15	0.0%	< 1	113%	70%	130%	112%	80%	120%	112%	70%	130%
Molybdenum	5753582		<0.5	<0.5	NA	< 0.5	107%	70%	130%	106%	80%	120%	111%	70%	130%
Nickel	5753582		20	20	0.0%	< 1	107%	70%	130%	107%	80%	120%	103%	70%	130%
Selenium	5753582		0.8	<0.8	NA	< 0.8	111%	70%	130%	103%	80%	120%	109%	70%	130%
Silver	5753582		<0.5	<0.5	NA	< 0.5	107%	70%	130%	101%	80%	120%	99%	70%	130%
Thallium	5753582		<0.5	<0.5	NA	< 0.5	114%	70%	130%	100%	80%	120%	101%	70%	130%
Uranium	5753582		0.85	0.87	NA	< 0.50	114%	70%	130%	101%	80%	120%	104%	70%	130%
Vanadium	5753582		42.8	42.0	1.9%	< 2.0	117%	70%	130%	115%	80%	120%	107%	70%	130%
Zinc	5753582		70	69	1.4%	< 5	107%	70%	130%	106%	80%	120%	112%	70%	130%
Chromium, Hexavalent	5756313		<0.2	<0.2	NA	< 0.2	94%	70%	130%	94%	80%	120%	74%	70%	130%
Mercury	5753582		<0.10	<0.10	NA	< 0.10	116%	70%	130%	104%	80%	120%	108%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

O. Reg. 558 - Metals & Inorganics

PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lower	Upper	Recovery	Lower	Upper	Recovery	Lower	Upper
Arsenic Leachate	5760066		<0.010	<0.010	NA	< 0.010	101%	70%	130%	113%	80%	120%	118%	70%	130%
Barium Leachate	5760066		6.68	6.61	1.1%	< 0.020	102%	70%	130%	112%	80%	120%	104%	70%	130%
Boron Leachate	5760066		4.15	4.15	0.0%	< 0.050	99%	70%	130%	113%	80%	120%	88%	70%	130%

Quality Assurance

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

Soil Analysis (Continued)

RPT Date: Mar 28, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Cadmium Leachate	5760066		0.010	0.010	NA	< 0.010	101%	70%	130%	107%	80%	120%	112%	70%	130%
Chromium Leachate	5760066		<0.050	<0.050	NA	< 0.050	102%	70%	130%	105%	80%	120%	111%	70%	130%
Lead Leachate	5760066		3.24	3.32	2.7%	< 0.010	103%	70%	130%	101%	80%	120%	114%	70%	130%
Mercury Leachate	5760066		<0.01	<0.01	NA	< 0.01	100%	70%	130%	99%	80%	120%	111%	70%	130%
Selenium Leachate	5760066		0.028	0.024	NA	< 0.020	94%	70%	130%	108%	80%	120%	110%	70%	130%
Silver Leachate	5760066		<0.010	<0.010	NA	< 0.010	104%	70%	130%	103%	80%	120%	101%	70%	130%
Uranium Leachate	5760066		<0.050	<0.050	NA	< 0.050	99%	70%	130%	105%	80%	120%	108%	70%	130%
Fluoride Leachate	5762906		0.23	0.21	NA	< 0.10	NA	90%	110%	NA	90%	110%	106%	70%	130%
Cyanide Leachate	5760066		<0.05	<0.05	NA	< 0.05	105%	70%	130%	102%	80%	120%	103%	70%	130%
(Nitrate + Nitrite) as N Leachate	5760066		<0.70	<0.70	NA	< 0.70	100%	80%	120%	101%	80%	120%	85%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

NIVINE BASILY

Certified By:

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:

AGAT WORK ORDER: 24P132434
ATTENTION TO: Alicia McDonald
SAMPLED BY:

Trace Organics Analysis

RPT Date: Mar 28, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	5754888		<0.05	<0.05	NA	< 0.05	111%	50%	140%	73%	50%	140%	80%	50%	140%
Acenaphthylene	5754888		<0.05	<0.05	NA	< 0.05	103%	50%	140%	73%	50%	140%	73%	50%	140%
Acenaphthene	5754888		<0.05	<0.05	NA	< 0.05	106%	50%	140%	75%	50%	140%	80%	50%	140%
Fluorene	5754888		<0.05	<0.05	NA	< 0.05	109%	50%	140%	73%	50%	140%	73%	50%	140%
Phenanthrene	5754888		<0.05	<0.05	NA	< 0.05	108%	50%	140%	80%	50%	140%	78%	50%	140%
Anthracene	5754888		<0.05	<0.05	NA	< 0.05	100%	50%	140%	78%	50%	140%	75%	50%	140%
Fluoranthene	5754888		<0.05	<0.05	NA	< 0.05	107%	50%	140%	83%	50%	140%	80%	50%	140%
Pyrene	5754888		<0.05	<0.05	NA	< 0.05	100%	50%	140%	90%	50%	140%	95%	50%	140%
Benz(a)anthracene	5754888		<0.05	<0.05	NA	< 0.05	91%	50%	140%	75%	50%	140%	90%	50%	140%
Chrysene	5754888		<0.05	<0.05	NA	< 0.05	107%	50%	140%	73%	50%	140%	78%	50%	140%
Benzo(b)fluoranthene	5754888		<0.05	<0.05	NA	< 0.05	94%	50%	140%	83%	50%	140%	90%	50%	140%
Benzo(k)fluoranthene	5754888		<0.05	<0.05	NA	< 0.05	100%	50%	140%	100%	50%	140%	100%	50%	140%
Benzo(a)pyrene	5754888		<0.05	<0.05	NA	< 0.05	93%	50%	140%	83%	50%	140%	90%	50%	140%
Indeno(1,2,3-cd)pyrene	5754888		<0.05	<0.05	NA	< 0.05	93%	50%	140%	83%	50%	140%	73%	50%	140%
Dibenz(a,h)anthracene	5754888		<0.05	<0.05	NA	< 0.05	91%	50%	140%	73%	50%	140%	78%	50%	140%
Benzo(g,h,i)perylene	5754888		<0.05	<0.05	NA	< 0.05	97%	50%	140%	73%	50%	140%	100%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)															
Benzene	5753887		<0.02	<0.02	NA	< 0.02	92%	60%	140%	75%	60%	140%	105%	60%	140%
Toluene	5753887		<0.05	<0.05	NA	< 0.05	71%	60%	140%	92%	60%	140%	86%	60%	140%
Ethylbenzene	5753887		<0.05	<0.05	NA	< 0.05	81%	60%	140%	103%	60%	140%	98%	60%	140%
m & p-Xylene	5753887		<0.05	<0.05	NA	< 0.05	83%	60%	140%	101%	60%	140%	99%	60%	140%
o-Xylene	5753887		<0.05	<0.05	NA	< 0.05	83%	60%	140%	102%	60%	140%	99%	60%	140%
F1 (C6 to C10)	5753887		<5	<5	NA	< 5	99%	60%	140%	95%	60%	140%	89%	60%	140%
F2 (C10 to C16)	5753618		< 10	< 10	NA	< 10	111%	60%	140%	90%	60%	140%	86%	60%	140%
F3 (C16 to C34)	5753618		115	83	NA	< 50	102%	60%	140%	94%	60%	140%	119%	60%	140%
F4 (C34 to C50)	5753618		94	91	NA	< 50	64%	60%	140%	94%	60%	140%	71%	60%	140%
O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Soil)															
F1 (C6 to C10)	5753298		<5	<5	NA	< 5	95%	60%	140%	93%	60%	140%	88%	60%	140%
F2 (C10 to C16)	5753618		< 10	< 10	NA	< 10	111%	60%	140%	90%	60%	140%	86%	60%	140%
F3 (C16 to C34)	5753618		115	83	NA	< 50	102%	60%	140%	94%	60%	140%	119%	60%	140%
F4 (C34 to C50)	5753618		94	91	NA	< 50	64%	60%	140%	94%	60%	140%	71%	60%	140%
O. Reg. 153(511) - VOCs (with PHC) (Soil)															
Dichlorodifluoromethane	5753298		<0.05	<0.05	NA	< 0.05	95%	50%	140%	72%	50%	140%	77%	50%	140%
Vinyl Chloride	5753298		<0.02	<0.02	NA	< 0.02	114%	50%	140%	117%	50%	140%	98%	50%	140%
Bromomethane	5753298		<0.05	<0.05	NA	< 0.05	89%	50%	140%	108%	50%	140%	83%	50%	140%
Trichlorofluoromethane	5753298		<0.05	<0.05	NA	< 0.05	83%	50%	140%	96%	50%	140%	67%	50%	140%
Acetone	5753298		<0.50	<0.50	NA	< 0.50	97%	50%	140%	86%	50%	140%	86%	50%	140%
1,1-Dichloroethylene	5753298		<0.05	<0.05	NA	< 0.05	109%	50%	140%	115%	60%	130%	89%	50%	140%

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:

AGAT WORK ORDER: 24P132434
ATTENTION TO: Alicia McDonald
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Mar 28, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Methylene Chloride	5753298		<0.05	<0.05	NA	< 0.05	103%	50%	140%	98%	60%	130%	89%	50%	140%
Trans- 1,2-Dichloroethylene	5753298		<0.05	<0.05	NA	< 0.05	102%	50%	140%	107%	60%	130%	95%	50%	140%
Methyl tert-butyl Ether	5753298		<0.05	<0.05	NA	< 0.05	101%	50%	140%	117%	60%	130%	111%	50%	140%
1,1-Dichloroethane	5753298		<0.02	<0.02	NA	< 0.02	114%	50%	140%	114%	60%	130%	108%	50%	140%
Methyl Ethyl Ketone	5753298		<0.50	<0.50	NA	< 0.50	97%	50%	140%	94%	50%	140%	108%	50%	140%
Cis- 1,2-Dichloroethylene	5753298		<0.02	<0.02	NA	< 0.02	107%	50%	140%	108%	60%	130%	109%	50%	140%
Chloroform	5753298		<0.04	<0.04	NA	< 0.04	109%	50%	140%	103%	60%	130%	108%	50%	140%
1,2-Dichloroethane	5753298		<0.03	<0.03	NA	< 0.03	111%	50%	140%	95%	60%	130%	119%	50%	140%
1,1,1-Trichloroethane	5753298		<0.05	<0.05	NA	< 0.05	106%	50%	140%	85%	60%	130%	96%	50%	140%
Carbon Tetrachloride	5753298		<0.05	<0.05	NA	< 0.05	108%	50%	140%	96%	60%	130%	98%	50%	140%
Benzene	5753298		<0.02	<0.02	NA	< 0.02	105%	50%	140%	107%	60%	130%	104%	50%	140%
1,2-Dichloropropane	5753298		<0.03	<0.03	NA	< 0.03	103%	50%	140%	102%	60%	130%	103%	50%	140%
Trichloroethylene	5753298		<0.03	<0.03	NA	< 0.03	105%	50%	140%	105%	60%	130%	112%	50%	140%
Bromodichloromethane	5753298		<0.05	<0.05	NA	< 0.05	92%	50%	140%	106%	60%	130%	105%	50%	140%
Methyl Isobutyl Ketone	5753298		<0.50	<0.50	NA	< 0.50	97%	50%	140%	95%	50%	140%	105%	50%	140%
1,1,2-Trichloroethane	5753298		<0.04	<0.04	NA	< 0.04	104%	50%	140%	117%	60%	130%	101%	50%	140%
Toluene	5753298		<0.05	<0.05	NA	< 0.05	109%	50%	140%	113%	60%	130%	102%	50%	140%
Dibromochloromethane	5753298		<0.05	<0.05	NA	< 0.05	113%	50%	140%	113%	60%	130%	114%	50%	140%
Ethylene Dibromide	5753298		<0.04	<0.04	NA	< 0.04	104%	50%	140%	118%	60%	130%	119%	50%	140%
Tetrachloroethylene	5753298		<0.05	<0.05	NA	< 0.05	85%	50%	140%	96%	60%	130%	102%	50%	140%
1,1,1,2-Tetrachloroethane	5753298		<0.04	<0.04	NA	< 0.04	107%	50%	140%	101%	60%	130%	113%	50%	140%
Chlorobenzene	5753298		<0.05	<0.05	NA	< 0.05	105%	50%	140%	105%	60%	130%	106%	50%	140%
Ethylbenzene	5753298		<0.05	<0.05	NA	< 0.05	94%	50%	140%	114%	60%	130%	110%	50%	140%
m & p-Xylene	5753298		<0.05	<0.05	NA	< 0.05	106%	50%	140%	115%	60%	130%	115%	50%	140%
Bromoform	5753298		<0.05	<0.05	NA	< 0.05	106%	50%	140%	112%	60%	130%	110%	50%	140%
Styrene	5753298		<0.05	<0.05	NA	< 0.05	82%	50%	140%	109%	60%	130%	106%	50%	140%
1,1,2,2-Tetrachloroethane	5753298		<0.05	<0.05	NA	< 0.05	116%	50%	140%	101%	60%	130%	99%	50%	140%
o-Xylene	5753298		<0.05	<0.05	NA	< 0.05	106%	50%	140%	108%	60%	130%	106%	50%	140%
1,3-Dichlorobenzene	5753298		<0.05	<0.05	NA	< 0.05	94%	50%	140%	85%	60%	130%	114%	50%	140%
1,4-Dichlorobenzene	5753298		<0.05	<0.05	NA	< 0.05	98%	50%	140%	85%	60%	130%	108%	50%	140%
1,2-Dichlorobenzene	5753298		<0.05	<0.05	NA	< 0.05	97%	50%	140%	84%	60%	130%	111%	50%	140%
n-Hexane	5753298		<0.05	<0.05	NA	< 0.05	112%	50%	140%	71%	60%	130%	100%	50%	140%
O. Reg. 558 - PCBs															
PCB's Leachate	5756125	5756125	< 0.005	< 0.005	NA	< 0.005	107%	50%	140%	103%	50%	140%	106%	50%	140%
O. Reg. 558 - Benzo(a) pyrene															
Benzo(a)pyrene Leachate	5749069		< 0.001	< 0.001	NA	< 0.001	93%	50%	140%	80%	50%	140%	76%	50%	140%
O. Reg. 558 - VOCs															
Vinyl Chloride Leachate	5754629		<0.030	<0.030	NA	< 0.030	107%	50%	140%	61%	50%	140%	90%	50%	140%

Quality Assurance

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

Trace Organics Analysis (Continued)

RPT Date: Mar 28, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper
1,1 Dichloroethene Leachate	5754629		<0.020	<0.020	NA	< 0.020	81%	50%	140%	92%	60%	130%	95%	50%	140%
Dichloromethane Leachate	5754629		<0.030	<0.030	NA	< 0.030	83%	50%	140%	88%	60%	130%	117%	50%	140%
Methyl Ethyl Ketone Leachate	5754629		<0.090	<0.090	NA	< 0.090	99%	50%	140%	83%	50%	140%	109%	50%	140%
Chloroform Leachate	5754629		<0.020	<0.020	NA	< 0.020	86%	50%	140%	89%	60%	130%	95%	50%	140%
1,2-Dichloroethane Leachate	5754629		<0.020	<0.020	NA	< 0.020	108%	50%	140%	107%	60%	130%	102%	50%	140%
Carbon Tetrachloride Leachate	5754629		<0.020	<0.020	NA	< 0.020	96%	50%	140%	119%	60%	130%	111%	50%	140%
Benzene Leachate	5754629		<0.020	<0.020	NA	< 0.020	88%	50%	140%	91%	60%	130%	108%	50%	140%
Trichloroethene Leachate	5754629		<0.020	<0.020	NA	< 0.020	84%	50%	140%	89%	60%	130%	112%	50%	140%
Tetrachloroethene Leachate	5754629		<0.050	<0.050	NA	< 0.050	89%	50%	140%	110%	60%	130%	102%	50%	140%
Chlorobenzene Leachate	5754629		<0.010	<0.010	NA	< 0.010	97%	50%	140%	99%	60%	130%	100%	50%	140%
1,2-Dichlorobenzene Leachate	5754629		<0.010	<0.010	NA	< 0.010	104%	50%	140%	98%	60%	130%	111%	50%	140%
1,4-Dichlorobenzene Leachate	5754629		<0.010	<0.010	NA	< 0.010	97%	50%	140%	105%	60%	130%	102%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: ____________

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
pH, 2:1 CaCl2 Extraction	INOR-93-6075	modified from EPA 9045D, MCKEAGUE 3.11 E3137	PC TITRATE
Arsenic Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Barium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Boron Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Cadmium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Chromium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Lead Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Mercury Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Selenium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Silver Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Uranium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS

Method Summary

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:

AGAT WORK ORDER: 24P132434
ATTENTION TO: Alicia McDonald
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Fluoride Leachate	INOR-93-6000	EPA SW 846-1311; SM 4500F-C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA 1311 modified from MOE 3015 SM 4500 CN-I,G387	SEGMENTED FLOW ANALYSIS
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA SW 846-1311 & modified from SM 4500 - NO3- I	LACHAT FIA
Sieve Analysis - 75 µm (retained)	INOR-93-6065	Modified from ASTM D1140-17	SIEVE
Sieve Analysis - 75 µm (passing)	INOR-93-6065	Modified from ASTM D1140-17	SIEVE

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 to C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
F3 (C16 to C34) minus PAHs	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
Toluene-d8	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Dichlorodifluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Ethylene Dibromide	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene (Cis + Trans)	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5002	modified from EPA 5035A and EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	modified from EPA 5035A & EPA 8260D	(P&T)GC/MS
Benzo(a)pyrene Leachate	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
PCB's Leachate	ORG-91-5112	Regulation 558, EPA SW846 3510C/8082	GC/ECD
Decachlorobiphenyl	ORG-91-5112	EPA SW846 3510C/8082	GC/ECD
Vinyl Chloride Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,1 Dichloroethene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Dichloromethane Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24P132434**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Chloroform Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Benzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Trichloroethene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Tetrachloroethene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Chlorobenzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene Leachate	VOL-91-5001	EPA 1311, modified from EPA 5030C & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

AGAT Laboratories

Have feedback?
Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 24P132434

Cooler Quantity: 1

Arrival Temperatures: 4.6 | 5.1 | 4.7

Depot Temperatures: 1.6 | 1.7 | 1.1

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: F/1

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Pinchin

Contact: Alicia McDonald

Address: Kgn.

Phone: 613-840-6147 Fax:

Reports to be sent to:

1. Email: jmccann@pinchin.com
2. Email: amcdonald@pinchin.com

Regulatory Requirements:

(Please check all applicable boxes)

☒ Regulation 153/04
Table — Indicate One
☐Ind/Com
☐Res/Park
☐Agriculture
Soil Texture *(Check One)*
☐Coarse
☐Fine

☐ Regulation 406
Table — Indicate One
☐Ind/Com
☐Res/Park
☐Agriculture
☐ Regulation 558
☐ CCME

☐ Sewer Use
☐Sanitary ☐Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): *4 DAY TAT

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CSR

Project Information:

Project: 334803.001

Site Location:

Sampled By:

AGAT Quote #: S.O. PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition (RSC)**?
☒ Yes ☐ No

Report Guideline on *Certificate of Analysis*
☐ Yes ☐ No

Legal Sample ☐

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company:

Contact:

Address:

Email:

Sample Matrix Legend

GW	Ground Water	**SD**	Sediment
O	Oil	**SW**	Surface Water
P	Paint	**R**	Rock/Shale
S	Soil		

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y / N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☑CrVI, ☐Hg, ☑HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Aroclors ☐	O. Reg 406: Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4	O. Reg 406: EC, SAR	Regulation 406 SPLP Rainwater Leach mSPLP: ☐Metals ☐VOCs ☐SVOCs ☐OC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐M&I ☐VOCs ☐ABNs ☐B(a)P ☐PCBs	Corrosivity: ☐Moisture ☐Sulphide	pH	Texture/Grain size					Potentially Hazardous or High Concentration (Y/N)
1. MW1-S1	3/18/24	A AM PM	2	S					X		X													
2. MW1-S2	3/18/24	A AM PM	1	S														x	x					
3. MW2-S1	3/19/24	P AM PM	3	S				X	X	X														
4. MW3-S1	3/20/24	P. AM PM	3	S				X	X	X														
5. MW4-S3	3/21/24	P AM PM	3	S				X	X	X														
6. MW4-S4	3/21/24	P. AM PM	1	S														X	X					
7. DUP-1	3/21/24	P AM PM	3	S				X	X	X	~~X~~ JM.													
8. TCLP	3/21/24	P AM PM	3	S												X								
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign): J. McCANN	Date 3/22/24	Time	Samples Received By (Print Name and Sign): Karny Jones	Date Mar 22/24	Time 1325
Samples Relinquished By (Print Name and Sign):	Date Mar 22/24	Time 1600	Samples Received By (Print Name and Sign): Anmol Batth	Date 3/23/24	Time 11:30am
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 1 of 1

No: T-153756

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.
1456 Centennial Drive, Unit 2
KINGSTON, ON K7P 0K4
(613) 541-1013
ATTENTION TO: Alicia McDonald
PROJECT: 334803.001
AGAT WORK ORDER: 24Z132732
TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist
DATE REPORTED: Mar 28, 2024
PAGES (INCLUDING COVER): 10
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

O. Reg. 153(511) - PAHs (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW4-S5
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-22 11:30
Parameter	**Unit**	**G / S**	**RDL**	**5760502**
Naphthalene	µg/g		0.05	<0.05
Acenaphthylene	µg/g		0.05	<0.05
Acenaphthene	µg/g		0.05	<0.05
Fluorene	µg/g		0.05	<0.05
Phenanthrene	µg/g		0.05	0.10
Anthracene	µg/g		0.05	<0.05
Fluoranthene	µg/g		0.05	<0.05
Pyrene	µg/g		0.05	<0.05
Benz(a)anthracene	µg/g		0.05	<0.05
Chrysene	µg/g		0.05	<0.05
Benzo(b)fluoranthene	µg/g		0.05	<0.05
Benzo(k)fluoranthene	µg/g		0.05	<0.05
Benzo(a)pyrene	µg/g		0.05	<0.05
Indeno(1,2,3-cd)pyrene	µg/g		0.05	<0.05
Dibenz(a,h)anthracene	µg/g		0.05	<0.05
Benzo(g,h,i)perylene	µg/g		0.05	<0.05
2-and 1-methyl Naphthalene	µg/g		0.05	0.18
Moisture Content	%		0.1	18.4
Surrogate	**Unit**	**Acceptable Limits**		
Naphthalene-d8	%	50-140		80
Acridine-d9	%	50-140		90
Terphenyl-d14	%	50-140		95

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5760502 Results are based on the dry weight of the soil.
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopukolof

Certificate of Analysis

AGAT WORK ORDER: 24Z132732
PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:130 Slater St. Ottawa

ATTENTION TO: Alicia McDonald
SAMPLED BY:Mandy Witteman

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

			SAMPLE DESCRIPTION:	MW4-S5
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2024-03-22 11:30
Parameter	**Unit**	**G / S**	**RDL**	**5760502**
Benzene	µg/g		0.02	<0.02
Toluene	µg/g		0.05	0.42
Ethylbenzene	µg/g		0.05	0.33
m & p-Xylene	µg/g		0.05	4.37
o-Xylene	µg/g		0.05	1.39
Xylenes (Total)	µg/g		0.05	5.76
F1 (C6 to C10)	µg/g		5	339
F1 (C6 to C10) minus BTEX	µg/g		5	332
F2 (C10 to C16)	µg/g		10	357
F2 (C10 to C16) minus Naphthalene	µg/g		10	357
F3 (C16 to C34)	µg/g		50	320
F3 (C16 to C34) minus PAHs	µg/g		50	320
F4 (C34 to C50)	µg/g		50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA
Moisture Content	%		0.1	18.4
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	% Recovery	60-140		105
Terphenyl	%	60-140		68

Certified By:

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

SAMPLING SITE:130 Slater St. Ottawa

SAMPLED BY:Mandy Witteman

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

DATE RECEIVED: 2024-03-22

DATE REPORTED: 2024-03-28

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5760502
Results are based on sample dry weight.
The C6-C10 fraction is calculated using toluene response factor.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX and PAH contributions.
C>10 – C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopukolof

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:130 Slater St. Ottawa

AGAT WORK ORDER: 24Z132732
ATTENTION TO: Alicia McDonald
SAMPLED BY:Mandy Witteman

Trace Organics Analysis

RPT Date: Mar 28, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)															
Benzene	5755021		<0.02	<0.02	NA	< 0.02	92%	60%	140%	75%	60%	140%	83%	60%	140%
Toluene	5755021		<0.05	<0.05	NA	< 0.05	71%	60%	140%	92%	60%	140%	78%	60%	140%
Ethylbenzene	5755021		<0.05	<0.05	NA	< 0.05	81%	60%	140%	103%	60%	140%	75%	60%	140%
m & p-Xylene	5755021		<0.05	<0.05	NA	< 0.05	83%	60%	140%	101%	60%	140%	78%	60%	140%
o-Xylene	5755021		<0.05	<0.05	NA	< 0.05	83%	60%	140%	102%	60%	140%	82%	60%	140%
F1 (C6 to C10)	5755021		<5	<5	NA	< 5	99%	60%	140%	95%	60%	140%	93%	60%	140%
F2 (C10 to C16)	5754143		< 10	< 10	NA	< 10	110%	60%	140%	95%	60%	140%	98%	60%	140%
F3 (C16 to C34)	5754143		< 50	< 50	NA	< 50	109%	60%	140%	114%	60%	140%	117%	60%	140%
F4 (C34 to C50)	5754143		< 50	< 50	NA	< 50	67%	60%	140%	101%	60%	140%	74%	60%	140%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	5754888		<0.05	<0.05	NA	< 0.05	111%	50%	140%	73%	50%	140%	80%	50%	140%
Acenaphthylene	5754888		<0.05	<0.05	NA	< 0.05	103%	50%	140%	73%	50%	140%	73%	50%	140%
Acenaphthene	5754888		<0.05	<0.05	NA	< 0.05	106%	50%	140%	75%	50%	140%	80%	50%	140%
Fluorene	5754888		<0.05	<0.05	NA	< 0.05	109%	50%	140%	73%	50%	140%	73%	50%	140%
Phenanthrene	5754888		<0.05	<0.05	NA	< 0.05	108%	50%	140%	80%	50%	140%	78%	50%	140%
Anthracene	5754888		<0.05	<0.05	NA	< 0.05	100%	50%	140%	78%	50%	140%	75%	50%	140%
Fluoranthene	5754888		<0.05	<0.05	NA	< 0.05	107%	50%	140%	83%	50%	140%	80%	50%	140%
Pyrene	5754888		<0.05	<0.05	NA	< 0.05	100%	50%	140%	90%	50%	140%	95%	50%	140%
Benz(a)anthracene	5754888		<0.05	<0.05	NA	< 0.05	91%	50%	140%	75%	50%	140%	90%	50%	140%
Chrysene	5754888		<0.05	<0.05	NA	< 0.05	107%	50%	140%	73%	50%	140%	78%	50%	140%
Benzo(b)fluoranthene	5754888		<0.05	<0.05	NA	< 0.05	94%	50%	140%	83%	50%	140%	90%	50%	140%
Benzo(k)fluoranthene	5754888		<0.05	<0.05	NA	< 0.05	100%	50%	140%	100%	50%	140%	100%	50%	140%
Benzo(a)pyrene	5754888		<0.05	<0.05	NA	< 0.05	93%	50%	140%	83%	50%	140%	90%	50%	140%
Indeno(1,2,3-cd)pyrene	5754888		<0.05	<0.05	NA	< 0.05	93%	50%	140%	83%	50%	140%	73%	50%	140%
Dibenz(a,h)anthracene	5754888		<0.05	<0.05	NA	< 0.05	91%	50%	140%	73%	50%	140%	78%	50%	140%
Benzo(g,h,i)perylene	5754888		<0.05	<0.05	NA	< 0.05	97%	50%	140%	73%	50%	140%	100%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: NPopukoloff

CLIENT NAME: PINCHIN LTD. **ATTENTION TO: Alicia McDonald**

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5760502	**MW4-S5**	**Soil**	**22-MAR-2024**	**22-MAR-2024**

O. Reg. 153(511) - PAHs (Soil)

Parameter	Date Prepared	Date Analyzed	Initials
Naphthalene	28-MAR-2024	28-MAR-2024	NP
Acenaphthylene	28-MAR-2024	28-MAR-2024	NP
Acenaphthene	28-MAR-2024	28-MAR-2024	NP
Fluorene	28-MAR-2024	28-MAR-2024	NP
Phenanthrene	28-MAR-2024	28-MAR-2024	NP
Anthracene	28-MAR-2024	28-MAR-2024	NP
Fluoranthene	28-MAR-2024	28-MAR-2024	NP
Pyrene	28-MAR-2024	28-MAR-2024	NP
Benz(a)anthracene	28-MAR-2024	28-MAR-2024	NP
Chrysene	28-MAR-2024	28-MAR-2024	NP
Benzo(b)fluoranthene	28-MAR-2024	28-MAR-2024	NP
Benzo(k)fluoranthene	28-MAR-2024	28-MAR-2024	NP
Benzo(a)pyrene	28-MAR-2024	28-MAR-2024	NP
Indeno(1,2,3-cd)pyrene	28-MAR-2024	28-MAR-2024	NP
Dibenz(a,h)anthracene	28-MAR-2024	28-MAR-2024	NP
Benzo(g,h,i)perylene	28-MAR-2024	28-MAR-2024	NP
2-and 1-methyl Naphthalene	28-MAR-2024	28-MAR-2024	SYS
Naphthalene-d8	28-MAR-2024	28-MAR-2024	NP
Acridine-d9	28-MAR-2024	28-MAR-2024	NP
Terphenyl-d14	28-MAR-2024	28-MAR-2024	NP
Moisture Content	27-MAR-2024	27-MAR-2024	GU

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

Parameter	Date Prepared	Date Analyzed	Initials
Benzene	27-MAR-2024	27-MAR-2024	VB
Toluene	27-MAR-2024	27-MAR-2024	VB
Ethylbenzene	27-MAR-2024	27-MAR-2024	VB
m & p-Xylene	27-MAR-2024	27-MAR-2024	VB
o-Xylene	27-MAR-2024	27-MAR-2024	VB
Xylenes (Total)	27-MAR-2024	27-MAR-2024	SYS
F1 (C6 to C10)	27-MAR-2024	27-MAR-2024	VB
F1 (C6 to C10) minus BTEX	27-MAR-2024	27-MAR-2024	SYS
Toluene-d8	27-MAR-2024	27-MAR-2024	VB
F2 (C10 to C16)	27-MAR-2024	27-MAR-2024	SS
F2 (C10 to C16) minus Naphthalene	28-MAR-2024	28-MAR-2024	SYS
F3 (C16 to C34)	27-MAR-2024	27-MAR-2024	SS
F3 (C16 to C34) minus PAHs	28-MAR-2024	28-MAR-2024	SYS
F4 (C34 to C50)	27-MAR-2024	27-MAR-2024	SS
Gravimetric Heavy Hydrocarbons			

Time Markers

AGAT WORK ORDER: 24Z132732

PROJECT: 334803.001

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5760502	**MW4-S5**	**Soil**	**22-MAR-2024**	**22-MAR-2024**

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

Parameter	Date Prepared	Date Analyzed	Initials
Moisture Content	27-MAR-2024	27-MAR-2024	GU
Terphenyl	27-MAR-2024	27-MAR-2024	SS

Method Summary

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:130 Slater St. Ottawa

AGAT WORK ORDER: 24Z132732
ATTENTION TO: Alicia McDonald
SAMPLED BY:Mandy Witteman

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluorene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benz(a)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Chrysene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5106	modified from EPA 3570 and EPA 8270E	GC/MS
Moisture Content	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 to C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

Method Summary

CLIENT NAME: PINCHIN LTD.

AGAT WORK ORDER: 24Z132732

PROJECT: 334803.001

ATTENTION TO: Alicia McDonald

SAMPLING SITE:130 Slater St. Ottawa

SAMPLED BY:Mandy Witteman

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
F3 (C16 to C34) minus PAHs	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

AGAT Laboratories

Have feedback?
Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 24Z132732

Cooler Quantity: One - no ice packs

Arrival Temperatures: 19.6 | 19.3 | 19.1
2.1 | 2.4 | 2.3

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: bagged ice

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Pinchin Ltd
Contact: Alicia McDonald
Address: Kingston.
Phone:
Fax:
Reports to be sent to:
1. Email: amcdonald@pinchin.com
2. Email: mwitteman@pinchin.com

Regulatory Requirements:

(Please check all applicable boxes)

☒ Regulation 153/04
Table ____ *Indicate One*
☐Ind/Com
☐Res/Park
☐Agriculture
Soil Texture *(Check One)*
☐Coarse
☐Fine

☐ Regulation 406
Table ____ *Indicate One*
☐ Regulation 558
☐ CCME

☐ Sewer Use
☐Sanitary ☐Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT **(Rush Surcharges Apply)**

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 33480 3.001
Site Location: 130 Slater St. Ottawa
Sampled By: Mandy Witteman
AGAT Quote #:
PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition?**
☒ Yes ☐ No

Report Guideline on *Certificate of Analysis*
☐ Yes ☐ No

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company: Pinchin.
Contact:
Address:
Email: amcdonald@pinchin.com

Sample Matrix Legend

GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153 Metals & Inorganics	Metals - ☐CrVI, ☐Hg, ☐HWSB	BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558 Landfill Disposal Characterization TCLP: TCLP: ☐M&I ☐VOCs ☐ABNs ☐B(a)P ☐PCBs	O. Reg 406 Regulation 406 SPLP Rainwater Leach SPLP: ☐Metals ☐VOCs ☐SVOCs	Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide							Potentially Hazardous or High Concentration (Y/N)
1. MW4-S5	Mar 22	11:30 [✓ AM] PM	2	S					✓		✓													✓
2.		AM PM																						
3.		AM PM																						
4.		AM PM																						
5.		AM PM																						
6.		AM PM																						
7.		AM PM																						
8.		AM PM																						
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Mandy Witteman	Mar. 22/24	11:30Am	(Berthelet)	2024-03-22	15h00
Upto Dureo	2024-03-25	15h00		mar 26	8:30 h

Page 1 of 1

Nº: T - 148082

Pink Copy - Client / Yellow Copy - AGAT / White Copy- AGAT

Document ID: DIV-78-1511.022

Any and all products and/or services provided by AGAT Labs are pursuant to the terms and conditions as set forth at **www.agatlabs.com/termsandconditions** unless otherwise agreed in a current written contractual document.

Date Issued: Mar 30, 2023

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.
1 HINES ROAD SUITE 200
KANATA, ON K2K 3C7
(613) 592-3387

ATTENTION TO: Alicia McDonald

PROJECT: 334803.001

AGAT WORK ORDER: 24Z134306

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

WATER ANALYSIS REVIEWED BY: Chuandi Zhang, Inorganic Supervisor

DATE REPORTED: Apr 04, 2024

PAGES (INCLUDING COVER): 32

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Certificate of Analysis

AGAT WORK ORDER: 24Z134306
PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:130 Slater St. Ottawa, ON

ATTENTION TO: Alicia McDonald
SAMPLED BY:

O. Reg. 153(511) - PAHs (Water)

DATE RECEIVED: 2024-03-27 **DATE REPORTED: 2024-04-04**

		SAMPLE DESCRIPTION:		MW1	MW4	DUP-1
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2024-03-27	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769697**	**5769703**	**5769708**
Naphthalene	µg/L		0.20	<0.20	<0.20	<0.20
Acenaphthylene	µg/L		0.20	<0.20	<0.20	<0.20
Acenaphthene	µg/L		0.20	<0.20	<0.20	<0.20
Fluorene	µg/L		0.20	<0.20	<0.20	<0.20
Phenanthrene	µg/L		0.10	<0.10	<0.10	<0.10
Anthracene	µg/L		0.10	<0.10	<0.10	<0.10
Fluoranthene	µg/L		0.20	<0.20	<0.20	<0.20
Pyrene	µg/L		0.20	<0.20	<0.20	<0.20
Benzo(a)anthracene	µg/L		0.20	<0.20	<0.20	<0.20
Chrysene	µg/L		0.10	<0.10	<0.10	<0.10
Benzo(b)fluoranthene	µg/L		0.10	<0.10	<0.10	<0.10
Benzo(k)fluoranthene	µg/L		0.10	<0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L		0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L		0.20	<0.20	<0.20	<0.20
Dibenz(a,h)anthracene	µg/L		0.20	<0.20	<0.20	<0.20
Benzo(g,h,i)perylene	µg/L		0.20	<0.20	<0.20	<0.20
2-and 1-methyl Napthalene	µg/L		0.20	<0.20	<0.20	<0.20
Sediment				1	1	1
Surrogate	**Unit**	**Acceptable Limits**				
Naphthalene-d8	%	50-140		115	101	104
Acridine-d9	%	50-140		86	70	113
Terphenyl-d14	%	50-140		91	107	112

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769697-5769708 Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.
Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amount
Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column.
2- and 1-Methyl Naphthalene is a calculated parameter. The calculated value is the sum of 2-Methyl Naphthalene and 1-Methyl Naphthalene. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopnukolof

Certificate of Analysis

AGAT WORK ORDER: 24Z134306
PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:130 Slater St. Ottawa, ON

ATTENTION TO: Alicia McDonald
SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	MW4
			SAMPLE TYPE:	Water
			DATE SAMPLED:	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769703**
F1 (C6 to C10)	µg/L		25	<25
F1 (C6 to C10) minus BTEX	µg/L		25	<25
F2 (C10 to C16)	µg/L		100	<100
F2 (C10 to C16) minus Naphthalene	µg/L		100	<100
F3 (C16 to C34)	µg/L		100	<100
F3 (C16 to C34) minus PAHs	µg/L		100	<100
F4 (C34 to C50)	µg/L		100	<100
Gravimetric Heavy Hydrocarbons	µg/L		500	NA
Sediment				1
Surrogate	**Unit**	**Acceptable Limits**		
Toluene-d8	%	50-140		100
Terphenyl	% Recovery	60-140		83

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769703 The C6-C10 fraction is calculated using toluene response factor.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX and PAH contributions.
C>10 – C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.
Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amounts

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:130 Slater St. Ottawa, ON

ATTENTION TO: Alicia McDonald

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	MW1	DUP-1
			SAMPLE TYPE:	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769697**	**5769708**
Benzene	µg/L		0.20	<0.20	<0.20
Toluene	µg/L		0.20	<0.20	<0.20
Ethylbenzene	µg/L		0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20
o-Xylene	µg/L		0.10	<0.10	<0.10
Xylenes (Total)	µg/L		0.20	<0.20	<0.20
F1 (C6 to C10)	µg/L		25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L		25	<25	<25
F2 (C10 to C16)	µg/L		100	<100	<100
F2 (C10 to C16) minus Naphthalene	µg/L		100	<100	<100
F3 (C16 to C34)	µg/L		100	<100	<100
F3 (C16 to C34) minus PAHs	µg/L		100	<100	<100
F4 (C34 to C50)	µg/L		100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L		500	NA	NA
Sediment				1	1
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	% Recovery	60-140		88.2	94.2
Terphenyl	% Recovery	60-140		87	76

Certified By:

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769697-5769708 Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.
Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amount
The C6-C10 fraction is calculated using toluene response factor.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX and PAH contributions.
C>10 – C16 (F2- Naphthalene) is a calculated parameter. The calculated value is F2 - Naphthalene.
C>16 - C34 (F3-PAH) is a calculated parameter. The calculated value is F3-PAH (PAH: sum of Phenanthrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Fluoranthene, Dibenzo(a,h)anthracene, Indeno(1,2,3-c,d)pyrene and Pyrene).
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopukolof

CLIENT NAME: PINCHIN LTD.

ATTENTION TO: Alicia McDonald

SAMPLING SITE:130 Slater St. Ottawa, ON

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	MW2	MW3
			SAMPLE TYPE:	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769698**	**5769700**
F1 (C6 to C10)	µg/L		25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L		25	<25	<25
F2 (C10 to C16)	µg/L		100	<100	<100
F3 (C16 to C34)	µg/L		100	<100	<100
F4 (C34 to C50)	µg/L		100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L		500	NA	NA
Sediment				1	1
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	%	50-140		100	104
Terphenyl	% Recovery	60-140		100	91

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769698-5769700 The C6-C10 fraction is calculated using Toluene response factor.
Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6-C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client.
NA = Not Applicable

Sediment parameter is comment only based on visual inspection of the sample prior to extraction and is not an accredited test.
Legend: 1 = no sediment present; 2 = sediment present; 3 = sediment present in trace amounts

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Certificate of Analysis

AGAT WORK ORDER: 24Z134306
PROJECT: 334803.001

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:130 Slater St. Ottawa, ON

ATTENTION TO: Alicia McDonald
SAMPLED BY:

O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	TRIP BLANK	DUP-2
			SAMPLE TYPE:	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769709**	**5769729**
Dichlorodifluoromethane	µg/L		0.40	<0.40	<0.40
Vinyl Chloride	µg/L		0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40	<0.40
Acetone	µg/L		1.0	<1.0	<1.0
1,1-Dichloroethylene	µg/L		0.30	<0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30	<0.30
trans- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20
Chloroform	µg/L		0.20	<0.20	1.56
1,2-Dichloroethane	µg/L		0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20	<0.20
Benzene	µg/L		0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20
Toluene	µg/L		0.20	<0.20	0.35
Dibromochloromethane	µg/L		0.10	<0.10	<0.10
Ethylene Dibromide	µg/L		0.10	<0.10	<0.10
Tetrachloroethylene	µg/L		0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	0.43

Certified By: NPopukolof

Certificate of Analysis

AGAT WORK ORDER: 24Z134306
PROJECT: 334803.001

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD.
SAMPLING SITE:130 Slater St. Ottawa, ON

ATTENTION TO: Alicia McDonald
SAMPLED BY:

O. Reg. 153(511) - VOCs (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	TRIP BLANK	DUP-2
			SAMPLE TYPE:	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769709**	**5769729**
Bromoform	µg/L		0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	0.19
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10	<0.10
1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30
Xylenes (Total)	µg/L		0.20	<0.20	0.62
n-Hexane	µg/L		0.20	<0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**			
Toluene-d8	% Recovery	50-140		102	104
4-Bromofluorobenzene	% Recovery	50-140		92	97

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769709-5769729 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopukolof

O. Reg. 153(511) - VOCs (with PHC) (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	MW2	MW3	MW4
			SAMPLE TYPE:	Water	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769698**	**5769700**	**5769703**
Dichlorodifluoromethane	µg/L		0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L		0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L		0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L		0.40	<0.40	<0.40	<0.40
Acetone	µg/L		1.0	191	<1.0	<1.0
1,1-Dichloroethylene	µg/L		0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L		0.30	<0.30	<0.30	<0.30
trans- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L		0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L		0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20
Chloroform	µg/L		0.20	1.65	<0.20	1.50
1,2-Dichloroethane	µg/L		0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L		0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L		0.20	<0.20	<0.20	<0.20
Benzene	µg/L		0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L		0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L		0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L		0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L		1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	µg/L		0.20	<0.20	<0.20	<0.20
Toluene	µg/L		0.20	<0.20	<0.20	0.34
Dibromochloromethane	µg/L		0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L		0.10	<0.10	<0.10	<0.10
Tetrachloroethylene	µg/L		0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L		0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L		0.20	<0.20	<0.20	0.42

Certified By:

CLIENT NAME: PINCHIN LTD.

SAMPLING SITE:130 Slater St. Ottawa, ON

ATTENTION TO: Alicia McDonald

SAMPLED BY:

O. Reg. 153(511) - VOCs (with PHC) (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	MW2	MW3	MW4
			SAMPLE TYPE:	Water	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769698**	**5769700**	**5769703**
Bromoform	µg/L		0.10	<0.10	<0.10	<0.10
Styrene	µg/L		0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L		0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	0.17
1,3-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L		0.10	<0.10	<0.10	<0.10
1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L		0.20	<0.20	<0.20	0.59
n-Hexane	µg/L		0.20	<0.20	<0.20	<0.20
Surrogate	**Unit**	**Acceptable Limits**				
Toluene-d8	% Recovery	50-140		100	104	100
4-Bromofluorobenzene	% Recovery	50-140		98	97	95

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769698-5769703 Xylenes total is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
1,3-Dichloropropene total is a calculated parameter. The calculated value is the sum of Cis-1,3-Dichloropropene and Trans-1,3-Dichloropropene.
The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

O. Reg. 153(511) - All Metals (Water)

DATE RECEIVED: 2024-03-27

DATE REPORTED: 2024-04-04

			SAMPLE DESCRIPTION:	MW2	MW3	MW4	DUP-2
			SAMPLE TYPE:	Water	Water	Water	Water
			DATE SAMPLED:	2024-03-27	2024-03-27	2024-03-27	2024-03-27
Parameter	**Unit**	**G / S**	**RDL**	**5769698**	**5769700**	**5769703**	**5769729**
Dissolved Antimony	µg/L		1.0	2.7	<1.0	1.2	<1.0
Dissolved Arsenic	µg/L		1.0	1.8	1.4	2.0	3.9
Dissolved Barium	µg/L		2.0	317	100	297	291
Dissolved Beryllium	µg/L		0.50	<0.50	<0.50	<0.50	<0.50
Dissolved Boron	µg/L		10.0	317	530	104	91.1
Dissolved Cadmium	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Dissolved Chromium	µg/L		2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Cobalt	µg/L		0.50	2.84	<0.50	0.80	<0.50
Dissolved Copper	µg/L		1.0	2.8	<1.0	4.0	3.4
Dissolved Lead	µg/L		0.50	<0.50	<0.50	3.33	3.72
Dissolved Molybdenum	µg/L		0.50	29.3	5.26	21.5	23.5
Dissolved Nickel	µg/L		1.0	17.0	2.3	3.6	3.3
Dissolved Selenium	µg/L		1.0	6.7	4.8	<1.0	<1.0
Dissolved Silver	µg/L		0.20	<0.20	<0.20	<0.20	<0.20
Dissolved Thallium	µg/L		0.30	<0.30	<0.30	<0.30	<0.30
Dissolved Uranium	µg/L		0.50	18.9	5.27	8.46	7.81
Dissolved Vanadium	µg/L		0.40	0.53	0.57	3.61	3.83
Dissolved Zinc	µg/L		5.0	12.6	<5.0	6.0	<5.0
Mercury	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Chromium VI	µg/L		2.000	<2.000	<2.000	<2.000	<2.000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5769698-5769729 Metals analysis completed on a filtered sample.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:130 Slater St. Ottawa, ON

AGAT WORK ORDER: 24Z134306
ATTENTION TO: Alicia McDonald
SAMPLED BY:

Trace Organics Analysis

RPT Date: Apr 04, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)															
Benzene	5769643		0.45	0.49	NA	< 0.20	89%	60%	140%	75%	60%	140%	88%	60%	140%
Toluene	5769643		0.30	0.31	NA	< 0.20	79%	60%	140%	91%	60%	140%	92%	60%	140%
Ethylbenzene	5769643		<0.10	<0.10	NA	< 0.10	91%	60%	140%	109%	60%	140%	106%	60%	140%
m & p-Xylene	5769643		<0.20	<0.20	NA	< 0.20	104%	60%	140%	102%	60%	140%	90%	60%	140%
o-Xylene	5769643		<0.10	<0.10	NA	< 0.10	92%	60%	140%	95%	60%	140%	93%	60%	140%
F1 (C6 to C10)	5769643		<25	<25	NA	< 25	98%	60%	140%	92%	60%	140%	97%	60%	140%
F2 (C10 to C16)	5763081		< 100	< 100	NA	< 100	124%	60%	140%	67%	60%	140%	94%	60%	140%
F3 (C16 to C34)	5763081		< 100	< 100	NA	< 100	121%	60%	140%	60%	60%	140%	78%	60%	140%
F4 (C34 to C50)	5763081		< 100	< 100	NA	< 100	66%	60%	140%	94%	60%	140%	81%	60%	140%
O. Reg. 153(511) - PAHs (Water)															
Naphthalene	5764046		<0.20	<0.20	NA	< 0.20	108%	50%	140%	103%	50%	140%	97%	50%	140%
Acenaphthylene	5764046		<0.20	<0.20	NA	< 0.20	118%	50%	140%	91%	50%	140%	88%	50%	140%
Acenaphthene	5764046		<0.20	<0.20	NA	< 0.20	117%	50%	140%	93%	50%	140%	88%	50%	140%
Fluorene	5764046		<0.20	<0.20	NA	< 0.20	117%	50%	140%	96%	50%	140%	91%	50%	140%
Phenanthrene	5764046		<0.10	<0.10	NA	< 0.10	116%	50%	140%	102%	50%	140%	96%	50%	140%
Anthracene	5764046		<0.10	<0.10	NA	< 0.10	105%	50%	140%	95%	50%	140%	91%	50%	140%
Fluoranthene	5764046		<0.20	<0.20	NA	< 0.20	114%	50%	140%	101%	50%	140%	97%	50%	140%
Pyrene	5764046		<0.20	<0.20	NA	< 0.20	116%	50%	140%	99%	50%	140%	94%	50%	140%
Benzo(a)anthracene	5764046		<0.20	<0.20	NA	< 0.20	91%	50%	140%	80%	50%	140%	81%	50%	140%
Chrysene	5764046		<0.10	<0.10	NA	< 0.10	112%	50%	140%	87%	50%	140%	73%	50%	140%
Benzo(b)fluoranthene	5764046		<0.10	<0.10	NA	< 0.10	133%	50%	140%	116%	50%	140%	91%	50%	140%
Benzo(k)fluoranthene	5764046		<0.10	<0.10	NA	< 0.10	114%	50%	140%	115%	50%	140%	97%	50%	140%
Benzo(a)pyrene	5764046		<0.01	<0.01	NA	< 0.01	112%	50%	140%	90%	50%	140%	72%	50%	140%
Indeno(1,2,3-cd)pyrene	5764046		<0.20	<0.20	NA	< 0.20	105%	50%	140%	81%	50%	140%	74%	50%	140%
Dibenz(a,h)anthracene	5764046		<0.20	<0.20	NA	< 0.20	76%	50%	140%	68%	50%	140%	63%	50%	140%
Benzo(g,h,i)perylene	5764046		<0.20	<0.20	NA	< 0.20	70%	50%	140%	98%	50%	140%	75%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Water)															
F1 (C6 to C10)	5764074		<25	<25	NA	< 25	77%	60%	140%	91%	60%	140%	84%	60%	140%
O. Reg. 153(511) - VOCs (with PHC) (Water)															
Dichlorodifluoromethane	5764074		<0.40	<0.40	NA	< 0.40	96%	50%	140%	100%	50%	140%	99%	50%	140%
Vinyl Chloride	5764074		<0.17	<0.17	NA	< 0.17	118%	50%	140%	122%	50%	140%	81%	50%	140%
Bromomethane	5764074		<0.20	<0.20	NA	< 0.20	103%	50%	140%	105%	50%	140%	88%	50%	140%
Trichlorofluoromethane	5764074		<0.40	<0.40	NA	< 0.40	103%	50%	140%	104%	50%	140%	69%	50%	140%
Acetone	5764074		<1.0	<1.0	NA	< 1.0	117%	50%	140%	92%	50%	140%	88%	50%	140%
1,1-Dichloroethylene	5764074		<0.30	<0.30	NA	< 0.30	96%	50%	140%	100%	60%	130%	71%	50%	140%
Methylene Chloride	5764074		<0.30	<0.30	NA	< 0.30	99%	50%	140%	103%	60%	130%	112%	50%	140%
trans- 1,2-Dichloroethylene	5764074		<0.20	<0.20	NA	< 0.20	88%	50%	140%	90%	60%	130%	79%	50%	140%
Methyl tert-butyl ether	5764074		<0.20	<0.20	NA	< 0.20	87%	50%	140%	85%	60%	130%	99%	50%	140%

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:130 Slater St. Ottawa, ON

AGAT WORK ORDER: 24Z134306
ATTENTION TO: Alicia McDonald
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Apr 04, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
1,1-Dichloroethane	5764074		<0.30	<0.30	NA	< 0.30	93%	50%	140%	97%	60%	130%	85%	50%	140%
Methyl Ethyl Ketone	5764074		<1.0	<1.0	NA	< 1.0	100%	50%	140%	94%	50%	140%	113%	50%	140%
cis- 1,2-Dichloroethylene	5764074		<0.20	<0.20	NA	< 0.20	94%	50%	140%	97%	60%	130%	79%	50%	140%
Chloroform	5764074		<0.20	<0.20	NA	< 0.20	89%	50%	140%	95%	60%	130%	76%	50%	140%
1,2-Dichloroethane	5764074		<0.20	<0.20	NA	< 0.20	87%	50%	140%	97%	60%	130%	104%	50%	140%
1,1,1-Trichloroethane	5764074		<0.30	<0.30	NA	< 0.30	79%	50%	140%	83%	60%	130%	73%	50%	140%
Carbon Tetrachloride	5764074		<0.20	<0.20	NA	< 0.20	71%	50%	140%	77%	60%	130%	65%	50%	140%
Benzene	5764074		<0.20	<0.20	NA	< 0.20	91%	50%	140%	98%	60%	130%	82%	50%	140%
1,2-Dichloropropane	5764074		<0.20	<0.20	NA	< 0.20	92%	50%	140%	96%	60%	130%	86%	50%	140%
Trichloroethylene	5764074		<0.20	<0.20	NA	< 0.20	93%	50%	140%	99%	60%	130%	78%	50%	140%
Bromodichloromethane	5764074		<0.20	<0.20	NA	< 0.20	76%	50%	140%	81%	60%	130%	78%	50%	140%
Methyl Isobutyl Ketone	5764074		<1.0	<1.0	NA	< 1.0	108%	50%	140%	75%	50%	140%	115%	50%	140%
1,1,2-Trichloroethane	5764074		<0.20	<0.20	NA	< 0.20	109%	50%	140%	116%	60%	130%	91%	50%	140%
Toluene	5764074		<0.20	<0.20	NA	< 0.20	91%	50%	140%	100%	60%	130%	76%	50%	140%
Dibromochloromethane	5764074		<0.10	<0.10	NA	< 0.10	81%	50%	140%	86%	60%	130%	79%	50%	140%
Ethylene Dibromide	5764074		<0.10	<0.10	NA	< 0.10	80%	50%	140%	84%	60%	130%	92%	50%	140%
Tetrachloroethylene	5764074		<0.20	<0.20	NA	< 0.20	92%	50%	140%	97%	60%	130%	71%	50%	140%
1,1,1,2-Tetrachloroethane	5764074		<0.10	<0.10	NA	< 0.10	75%	50%	140%	76%	60%	130%	79%	50%	140%
Chlorobenzene	5764074		<0.10	<0.10	NA	< 0.10	92%	50%	140%	101%	60%	130%	78%	50%	140%
Ethylbenzene	5764074		<0.10	<0.10	NA	< 0.10	84%	50%	140%	91%	60%	130%	70%	50%	140%
m & p-Xylene	5764074		0.27	<0.20	NA	< 0.20	87%	50%	140%	95%	60%	130%	106%	50%	140%
Bromoform	5764074		<0.10	<0.10	NA	< 0.10	60%	50%	140%	62%	60%	130%	68%	50%	140%
Styrene	5764074		<0.10	<0.10	NA	< 0.10	82%	50%	140%	91%	60%	130%	76%	50%	140%
1,1,2,2-Tetrachloroethane	5764074		<0.10	<0.10	NA	< 0.10	71%	50%	140%	72%	60%	130%	111%	50%	140%
o-Xylene	5764074		<0.10	<0.10	NA	< 0.10	89%	50%	140%	98%	60%	130%	77%	50%	140%
1,3-Dichlorobenzene	5764074		<0.10	<0.10	NA	< 0.10	92%	50%	140%	100%	60%	130%	80%	50%	140%
1,4-Dichlorobenzene	5764074		<0.10	<0.10	NA	< 0.10	91%	50%	140%	99%	60%	130%	80%	50%	140%
1,2-Dichlorobenzene	5764074		<0.10	<0.10	NA	< 0.10	92%	50%	140%	100%	60%	130%	81%	50%	140%
n-Hexane	5764074		<0.20	<0.20	NA	< 0.20	98%	50%	140%	105%	60%	130%	90%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: NPopukolof

Quality Assurance

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:130 Slater St. Ottawa, ON

AGAT WORK ORDER: 24Z134306
ATTENTION TO: Alicia McDonald
SAMPLED BY:

Water Analysis

RPT Date: Apr 04, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - All Metals (Water)															
Dissolved Antimony	5774881		<1.0	<1.0	NA	< 1.0	103%	70%	130%	108%	80%	120%	104%	70%	130%
Dissolved Arsenic	5774881		<1.0	1.8	NA	< 1.0	99%	70%	130%	108%	80%	120%	107%	70%	130%
Dissolved Barium	5774881		736	769	4.4%	< 2.0	100%	70%	130%	101%	80%	120%	111%	70%	130%
Dissolved Beryllium	5774881		<0.50	<0.50	NA	< 0.50	108%	70%	130%	113%	80%	120%	108%	70%	130%
Dissolved Boron	5774881		440	428	2.8%	< 10.0	98%	70%	130%	113%	80%	120%	128%	70%	130%
Dissolved Cadmium	5774881		<0.20	<0.20	NA	< 0.20	102%	70%	130%	101%	80%	120%	96%	70%	130%
Dissolved Chromium	5774881		<2.0	<2.0	NA	< 2.0	99%	70%	130%	97%	80%	120%	118%	70%	130%
Dissolved Cobalt	5774881		0.63	<0.50	NA	< 0.50	110%	70%	130%	104%	80%	120%	113%	70%	130%
Dissolved Copper	5774881		3.4	2.9	NA	< 1.0	98%	70%	130%	98%	80%	120%	101%	70%	130%
Dissolved Lead	5774881		0.87	0.84	NA	< 0.50	98%	70%	130%	103%	80%	120%	96%	70%	130%
Dissolved Molybdenum	5774881		2.70	1.71	NA	< 0.50	100%	70%	130%	104%	80%	120%	116%	70%	130%
Dissolved Nickel	5774881		<10	<10	NA	< 1.0	110%	70%	130%	104%	80%	120%	103%	70%	130%
Dissolved Selenium	5774881		<10	<10	NA	< 1.0	101%	70%	130%	101%	80%	120%	94%	70%	130%
Dissolved Silver	5774881		0.22	0.26	NA	< 0.20	103%	70%	130%	96%	80%	120%	93%	70%	130%
Dissolved Thallium	5774881		<0.30	<0.30	NA	< 0.30	96%	70%	130%	99%	80%	120%	98%	70%	130%
Dissolved Uranium	5774881		4.14	3.98	3.9%	< 0.50	100%	70%	130%	105%	80%	120%	101%	70%	130%
Dissolved Vanadium	5774881		1.13	1.08	NA	< 0.40	117%	70%	130%	106%	80%	120%	129%	70%	130%
Dissolved Zinc	5774881		12.7	12.6	NA	< 5.0	100%	70%	130%	101%	80%	120%	85%	70%	130%
Mercury	5769698	5769698	<0.02	<0.02	NA	< 0.02	102%	70%	130%	100%	80%	120%	93%	70%	130%
Chromium VI	5769788		<2.000	<2.000	NA	< 2	102%	70%	130%	101%	80%	120%	102%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

CLIENT NAME: PINCHIN LTD. **ATTENTION TO: Alicia McDonald**

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769697	**MW1**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - PAHs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Naphthalene	03-APR-2024	03-APR-2024	JJ
Acenaphthylene	03-APR-2024	03-APR-2024	JJ
Acenaphthene	03-APR-2024	03-APR-2024	JJ
Fluorene	03-APR-2024	03-APR-2024	JJ
Phenanthrene	03-APR-2024	03-APR-2024	JJ
Anthracene	03-APR-2024	03-APR-2024	JJ
Fluoranthene	03-APR-2024	03-APR-2024	JJ
Pyrene	03-APR-2024	03-APR-2024	JJ
Benzo(a)anthracene	03-APR-2024	03-APR-2024	JJ
Chrysene	03-APR-2024	03-APR-2024	JJ
Benzo(b)fluoranthene	03-APR-2024	03-APR-2024	JJ
Benzo(k)fluoranthene	03-APR-2024	03-APR-2024	JJ
Benzo(a)pyrene	03-APR-2024	03-APR-2024	JJ
Indeno(1,2,3-cd)pyrene	03-APR-2024	03-APR-2024	JJ
Dibenz(a,h)anthracene	03-APR-2024	03-APR-2024	JJ
Benzo(g,h,i)perylene	03-APR-2024	03-APR-2024	JJ
2-and 1-methyl Napthalene	03-APR-2024	03-APR-2024	SYS
Naphthalene-d8	03-APR-2024	03-APR-2024	JJ
Acridine-d9	03-APR-2024	03-APR-2024	JJ
Terphenyl-d14	03-APR-2024	03-APR-2024	JJ
Sediment	02-APR-2024	02-APR-2024	MK

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Benzene	01-APR-2024	01-APR-2024	VB
Toluene	01-APR-2024	01-APR-2024	VB
Ethylbenzene	01-APR-2024	01-APR-2024	VB
m & p-Xylene	01-APR-2024	01-APR-2024	VB
o-Xylene	01-APR-2024	01-APR-2024	VB
Xylenes (Total)	01-APR-2024	01-APR-2024	SYS
F1 (C6 to C10)	01-APR-2024	01-APR-2024	VB
F1 (C6 to C10) minus BTEX	01-APR-2024	01-APR-2024	SYS
Toluene-d8	01-APR-2024	01-APR-2024	VB
F2 (C10 to C16)	02-APR-2024	02-APR-2024	SS
F2 (C10 to C16) minus Naphthalene	03-APR-2024	03-APR-2024	SYS
F3 (C16 to C34)	02-APR-2024	02-APR-2024	SS
F3 (C16 to C34) minus PAHs	03-APR-2024	03-APR-2024	SYS
F4 (C34 to C50)	02-APR-2024	02-APR-2024	SS
Gravimetric Heavy Hydrocarbons			

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769697	**MW1**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Terphenyl	02-APR-2024	02-APR-2024	SS
Sediment	02-APR-2024	02-APR-2024	SG

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769698	**MW2**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - All Metals (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dissolved Antimony	02-APR-2024	02-APR-2024	CC
Dissolved Arsenic	02-APR-2024	02-APR-2024	CC
Dissolved Barium	02-APR-2024	02-APR-2024	CC
Dissolved Beryllium	02-APR-2024	02-APR-2024	CC
Dissolved Boron	02-APR-2024	02-APR-2024	CC
Dissolved Cadmium	02-APR-2024	02-APR-2024	CC
Dissolved Chromium	02-APR-2024	02-APR-2024	CC
Dissolved Cobalt	02-APR-2024	02-APR-2024	CC
Dissolved Copper	02-APR-2024	02-APR-2024	CC
Dissolved Lead	02-APR-2024	02-APR-2024	CC
Dissolved Molybdenum	02-APR-2024	02-APR-2024	CC
Dissolved Nickel	02-APR-2024	02-APR-2024	CC
Dissolved Selenium	02-APR-2024	02-APR-2024	CC
Dissolved Silver	02-APR-2024	02-APR-2024	CC
Dissolved Thallium	02-APR-2024	02-APR-2024	CC
Dissolved Uranium	02-APR-2024	02-APR-2024	CC
Dissolved Vanadium	02-APR-2024	02-APR-2024	CC
Dissolved Zinc	02-APR-2024	02-APR-2024	CC
Mercury	02-APR-2024	02-APR-2024	DL
Chromium VI	01-APR-2024	01-APR-2024	WZ

O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
F1 (C6 to C10)	01-APR-2024	01-APR-2024	MK
F1 (C6 to C10) minus BTEX	01-APR-2024	01-APR-2024	SYS
Toluene-d8	01-APR-2024	01-APR-2024	MK
F2 (C10 to C16)	02-APR-2024	02-APR-2024	SS
F3 (C16 to C34)	02-APR-2024	02-APR-2024	SS
F4 (C34 to C50)	02-APR-2024	02-APR-2024	SS
Gravimetric Heavy Hydrocarbons			
Terphenyl	02-APR-2024	02-APR-2024	SS
Sediment	02-APR-2024	02-APR-2024	SG

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769698	**MW2**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (with PHC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dichlorodifluoromethane	01-APR-2024	01-APR-2024	MK
Vinyl Chloride	01-APR-2024	01-APR-2024	MK
Bromomethane	01-APR-2024	01-APR-2024	MK
Trichlorofluoromethane	01-APR-2024	01-APR-2024	MK
Acetone	01-APR-2024	01-APR-2024	MK
1,1-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Methylene Chloride	01-APR-2024	01-APR-2024	MK
trans- 1,2-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Methyl tert-butyl ether	01-APR-2024	01-APR-2024	MK
1,1-Dichloroethane	01-APR-2024	01-APR-2024	MK
Methyl Ethyl Ketone	01-APR-2024	01-APR-2024	MK
cis- 1,2-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Chloroform	01-APR-2024	01-APR-2024	MK
1,2-Dichloroethane	01-APR-2024	01-APR-2024	MK
1,1,1-Trichloroethane	01-APR-2024	01-APR-2024	MK
Carbon Tetrachloride	01-APR-2024	01-APR-2024	MK
Benzene	01-APR-2024	01-APR-2024	MK
1,2-Dichloropropane	01-APR-2024	01-APR-2024	MK
Trichloroethylene	01-APR-2024	01-APR-2024	MK
Bromodichloromethane	01-APR-2024	01-APR-2024	MK
Methyl Isobutyl Ketone	01-APR-2024	01-APR-2024	MK
1,1,2-Trichloroethane	01-APR-2024	01-APR-2024	MK
Toluene	01-APR-2024	01-APR-2024	MK
Dibromochloromethane	01-APR-2024	01-APR-2024	MK
Ethylene Dibromide	01-APR-2024	01-APR-2024	MK
Tetrachloroethylene	01-APR-2024	01-APR-2024	MK
1,1,1,2-Tetrachloroethane	01-APR-2024	01-APR-2024	MK
Chlorobenzene	01-APR-2024	01-APR-2024	MK
Ethylbenzene	01-APR-2024	01-APR-2024	MK
m & p-Xylene	01-APR-2024	01-APR-2024	MK
Bromoform	01-APR-2024	01-APR-2024	MK
Styrene	01-APR-2024	01-APR-2024	MK
1,1,2,2-Tetrachloroethane	01-APR-2024	01-APR-2024	MK
o-Xylene	01-APR-2024	01-APR-2024	MK
1,3-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,4-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,2-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,3-Dichloropropene	01-APR-2024	01-APR-2024	SYS
Xylenes (Total)	01-APR-2024	01-APR-2024	SYS

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769698	**MW2**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (with PHC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
n-Hexane	01-APR-2024	01-APR-2024	MK
Toluene-d8	01-APR-2024	01-APR-2024	MK
4-Bromofluorobenzene	01-APR-2024	01-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769700	**MW3**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - All Metals (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dissolved Antimony	02-APR-2024	02-APR-2024	CC
Dissolved Arsenic	02-APR-2024	02-APR-2024	CC
Dissolved Barium	02-APR-2024	02-APR-2024	CC
Dissolved Beryllium	02-APR-2024	02-APR-2024	CC
Dissolved Boron	02-APR-2024	02-APR-2024	CC
Dissolved Cadmium	02-APR-2024	02-APR-2024	CC
Dissolved Chromium	02-APR-2024	02-APR-2024	CC
Dissolved Cobalt	02-APR-2024	02-APR-2024	CC
Dissolved Copper	02-APR-2024	02-APR-2024	CC
Dissolved Lead	02-APR-2024	02-APR-2024	CC
Dissolved Molybdenum	02-APR-2024	02-APR-2024	CC
Dissolved Nickel	02-APR-2024	02-APR-2024	CC
Dissolved Selenium	02-APR-2024	02-APR-2024	CC
Dissolved Silver	02-APR-2024	02-APR-2024	CC
Dissolved Thallium	02-APR-2024	02-APR-2024	CC
Dissolved Uranium	02-APR-2024	02-APR-2024	CC
Dissolved Vanadium	02-APR-2024	02-APR-2024	CC
Dissolved Zinc	02-APR-2024	02-APR-2024	CC
Mercury	02-APR-2024	02-APR-2024	DL
Chromium VI	01-APR-2024	01-APR-2024	WZ

O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
F1 (C6 to C10)	01-APR-2024	01-APR-2024	MK
F1 (C6 to C10) minus BTEX	01-APR-2024	01-APR-2024	SYS
Toluene-d8	01-APR-2024	01-APR-2024	MK
F2 (C10 to C16)	02-APR-2024	02-APR-2024	SS
F3 (C16 to C34)	02-APR-2024	02-APR-2024	SS
F4 (C34 to C50)	02-APR-2024	02-APR-2024	SS
Gravimetric Heavy Hydrocarbons			
Terphenyl	02-APR-2024	02-APR-2024	SS

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769700	**MW3**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - PHCs F1 - F4 (with VOC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Sediment	02-APR-2024	02-APR-2024	SG

O. Reg. 153(511) - VOCs (with PHC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dichlorodifluoromethane	01-APR-2024	01-APR-2024	MK
Vinyl Chloride	01-APR-2024	01-APR-2024	MK
Bromomethane	01-APR-2024	01-APR-2024	MK
Trichlorofluoromethane	01-APR-2024	01-APR-2024	MK
Acetone	01-APR-2024	01-APR-2024	MK
1,1-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Methylene Chloride	01-APR-2024	01-APR-2024	MK
trans- 1,2-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Methyl tert-butyl ether	01-APR-2024	01-APR-2024	MK
1,1-Dichloroethane	01-APR-2024	01-APR-2024	MK
Methyl Ethyl Ketone	01-APR-2024	01-APR-2024	MK
cis- 1,2-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Chloroform	01-APR-2024	01-APR-2024	MK
1,2-Dichloroethane	01-APR-2024	01-APR-2024	MK
1,1,1-Trichloroethane	01-APR-2024	01-APR-2024	MK
Carbon Tetrachloride	01-APR-2024	01-APR-2024	MK
Benzene	01-APR-2024	01-APR-2024	MK
1,2-Dichloropropane	01-APR-2024	01-APR-2024	MK
Trichloroethylene	01-APR-2024	01-APR-2024	MK
Bromodichloromethane	01-APR-2024	01-APR-2024	MK
Methyl Isobutyl Ketone	01-APR-2024	01-APR-2024	MK
1,1,2-Trichloroethane	01-APR-2024	01-APR-2024	MK
Toluene	01-APR-2024	01-APR-2024	MK
Dibromochloromethane	01-APR-2024	01-APR-2024	MK
Ethylene Dibromide	01-APR-2024	01-APR-2024	MK
Tetrachloroethylene	01-APR-2024	01-APR-2024	MK
1,1,1,2-Tetrachloroethane	01-APR-2024	01-APR-2024	MK
Chlorobenzene	01-APR-2024	01-APR-2024	MK
Ethylbenzene	01-APR-2024	01-APR-2024	MK
m & p-Xylene	01-APR-2024	01-APR-2024	MK
Bromoform	01-APR-2024	01-APR-2024	MK
Styrene	01-APR-2024	01-APR-2024	MK
1,1,2,2-Tetrachloroethane	01-APR-2024	01-APR-2024	MK
o-Xylene	01-APR-2024	01-APR-2024	MK
1,3-Dichlorobenzene	01-APR-2024	01-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769700	**MW3**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (with PHC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
1,4-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,2-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,3-Dichloropropene	01-APR-2024	01-APR-2024	SYS
Xylenes (Total)	01-APR-2024	01-APR-2024	SYS
n-Hexane	01-APR-2024	01-APR-2024	MK
Toluene-d8	01-APR-2024	01-APR-2024	MK
4-Bromofluorobenzene	01-APR-2024	01-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769703	**MW4**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - All Metals (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dissolved Antimony	02-APR-2024	02-APR-2024	CC
Dissolved Arsenic	02-APR-2024	02-APR-2024	CC
Dissolved Barium	02-APR-2024	02-APR-2024	CC
Dissolved Beryllium	02-APR-2024	02-APR-2024	CC
Dissolved Boron	02-APR-2024	02-APR-2024	CC
Dissolved Cadmium	02-APR-2024	02-APR-2024	CC
Dissolved Chromium	02-APR-2024	02-APR-2024	CC
Dissolved Cobalt	02-APR-2024	02-APR-2024	CC
Dissolved Copper	02-APR-2024	02-APR-2024	CC
Dissolved Lead	02-APR-2024	02-APR-2024	CC
Dissolved Molybdenum	02-APR-2024	02-APR-2024	CC
Dissolved Nickel	02-APR-2024	02-APR-2024	CC
Dissolved Selenium	02-APR-2024	02-APR-2024	CC
Dissolved Silver	02-APR-2024	02-APR-2024	CC
Dissolved Thallium	02-APR-2024	02-APR-2024	CC
Dissolved Uranium	02-APR-2024	02-APR-2024	CC
Dissolved Vanadium	02-APR-2024	02-APR-2024	CC
Dissolved Zinc	02-APR-2024	02-APR-2024	CC
Mercury	02-APR-2024	02-APR-2024	DL
Chromium VI	01-APR-2024	01-APR-2024	WZ

O. Reg. 153(511) - PAHs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Naphthalene	03-APR-2024	03-APR-2024	JJ
Acenaphthylene	03-APR-2024	03-APR-2024	JJ
Acenaphthene	03-APR-2024	03-APR-2024	JJ
Fluorene	03-APR-2024	03-APR-2024	JJ

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769703	**MW4**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - PAHs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Phenanthrene	03-APR-2024	03-APR-2024	JJ
Anthracene	03-APR-2024	03-APR-2024	JJ
Fluoranthene	03-APR-2024	03-APR-2024	JJ
Pyrene	03-APR-2024	03-APR-2024	JJ
Benzo(a)anthracene	03-APR-2024	03-APR-2024	JJ
Chrysene	03-APR-2024	03-APR-2024	JJ
Benzo(b)fluoranthene	03-APR-2024	03-APR-2024	JJ
Benzo(k)fluoranthene	03-APR-2024	03-APR-2024	JJ
Benzo(a)pyrene	03-APR-2024	03-APR-2024	JJ
Indeno(1,2,3-cd)pyrene	03-APR-2024	03-APR-2024	JJ
Dibenz(a,h)anthracene	03-APR-2024	03-APR-2024	JJ
Benzo(g,h,i)perylene	03-APR-2024	03-APR-2024	JJ
2-and 1-methyl Napthalene	03-APR-2024	03-APR-2024	SYS
Naphthalene-d8	03-APR-2024	03-APR-2024	JJ
Acridine-d9	03-APR-2024	03-APR-2024	JJ
Terphenyl-d14	03-APR-2024	03-APR-2024	JJ
Sediment	02-APR-2024	02-APR-2024	MK

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs and VOC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
F1 (C6 to C10)	01-APR-2024	01-APR-2024	MK
F1 (C6 to C10) minus BTEX	01-APR-2024	01-APR-2024	SYS
Toluene-d8	01-APR-2024	01-APR-2024	MK
F2 (C10 to C16)	02-APR-2024	02-APR-2024	SS
F2 (C10 to C16) minus Naphthalene	03-APR-2024	03-APR-2024	SYS
F3 (C16 to C34)	02-APR-2024	02-APR-2024	SS
F3 (C16 to C34) minus PAHs	03-APR-2024	03-APR-2024	SYS
F4 (C34 to C50)	02-APR-2024	02-APR-2024	SS
Gravimetric Heavy Hydrocarbons			
Terphenyl	02-APR-2024	02-APR-2024	SS
Sediment	02-APR-2024	02-APR-2024	SG

O. Reg. 153(511) - VOCs (with PHC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dichlorodifluoromethane	01-APR-2024	01-APR-2024	MK
Vinyl Chloride	01-APR-2024	01-APR-2024	MK
Bromomethane	01-APR-2024	01-APR-2024	MK
Trichlorofluoromethane	01-APR-2024	01-APR-2024	MK
Acetone	01-APR-2024	01-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769703	**MW4**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (with PHC) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
1,1-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Methylene Chloride	01-APR-2024	01-APR-2024	MK
trans- 1,2-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Methyl tert-butyl ether	01-APR-2024	01-APR-2024	MK
1,1-Dichloroethane	01-APR-2024	01-APR-2024	MK
Methyl Ethyl Ketone	01-APR-2024	01-APR-2024	MK
cis- 1,2-Dichloroethylene	01-APR-2024	01-APR-2024	MK
Chloroform	01-APR-2024	01-APR-2024	MK
1,2-Dichloroethane	01-APR-2024	01-APR-2024	MK
1,1,1-Trichloroethane	01-APR-2024	01-APR-2024	MK
Carbon Tetrachloride	01-APR-2024	01-APR-2024	MK
Benzene	01-APR-2024	01-APR-2024	MK
1,2-Dichloropropane	01-APR-2024	01-APR-2024	MK
Trichloroethylene	01-APR-2024	01-APR-2024	MK
Bromodichloromethane	01-APR-2024	01-APR-2024	MK
Methyl Isobutyl Ketone	01-APR-2024	01-APR-2024	MK
1,1,2-Trichloroethane	01-APR-2024	01-APR-2024	MK
Toluene	01-APR-2024	01-APR-2024	MK
Dibromochloromethane	01-APR-2024	01-APR-2024	MK
Ethylene Dibromide	01-APR-2024	01-APR-2024	MK
Tetrachloroethylene	01-APR-2024	01-APR-2024	MK
1,1,1,2-Tetrachloroethane	01-APR-2024	01-APR-2024	MK
Chlorobenzene	01-APR-2024	01-APR-2024	MK
Ethylbenzene	01-APR-2024	01-APR-2024	MK
m & p-Xylene	01-APR-2024	01-APR-2024	MK
Bromoform	01-APR-2024	01-APR-2024	MK
Styrene	01-APR-2024	01-APR-2024	MK
1,1,2,2-Tetrachloroethane	01-APR-2024	01-APR-2024	MK
o-Xylene	01-APR-2024	01-APR-2024	MK
1,3-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,4-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,2-Dichlorobenzene	01-APR-2024	01-APR-2024	MK
1,3-Dichloropropene	01-APR-2024	01-APR-2024	SYS
Xylenes (Total)	01-APR-2024	01-APR-2024	SYS
n-Hexane	01-APR-2024	01-APR-2024	MK
Toluene-d8	01-APR-2024	01-APR-2024	MK
4-Bromofluorobenzene	01-APR-2024	01-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769708	**DUP-1**	**Water**	**27-MAR-2024**	**27-MAR-2024**

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769708	**DUP-1**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - PAHs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Naphthalene	03-APR-2024	03-APR-2024	JJ
Acenaphthylene	03-APR-2024	03-APR-2024	JJ
Acenaphthene	03-APR-2024	03-APR-2024	JJ
Fluorene	03-APR-2024	03-APR-2024	JJ
Phenanthrene	03-APR-2024	03-APR-2024	JJ
Anthracene	03-APR-2024	03-APR-2024	JJ
Fluoranthene	03-APR-2024	03-APR-2024	JJ
Pyrene	03-APR-2024	03-APR-2024	JJ
Benzo(a)anthracene	03-APR-2024	03-APR-2024	JJ
Chrysene	03-APR-2024	03-APR-2024	JJ
Benzo(b)fluoranthene	03-APR-2024	03-APR-2024	JJ
Benzo(k)fluoranthene	03-APR-2024	03-APR-2024	JJ
Benzo(a)pyrene	03-APR-2024	03-APR-2024	JJ
Indeno(1,2,3-cd)pyrene	03-APR-2024	03-APR-2024	JJ
Dibenz(a,h)anthracene	03-APR-2024	03-APR-2024	JJ
Benzo(g,h,i)perylene	03-APR-2024	03-APR-2024	JJ
2-and 1-methyl Napthalene	03-APR-2024	03-APR-2024	SYS
Naphthalene-d8	03-APR-2024	03-APR-2024	JJ
Acridine-d9	03-APR-2024	03-APR-2024	JJ
Terphenyl-d14	03-APR-2024	03-APR-2024	JJ
Sediment	02-APR-2024	02-APR-2024	MK

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Benzene	01-APR-2024	01-APR-2024	VB
Toluene	01-APR-2024	01-APR-2024	VB
Ethylbenzene	01-APR-2024	01-APR-2024	VB
m & p-Xylene	01-APR-2024	01-APR-2024	VB
o-Xylene	01-APR-2024	01-APR-2024	VB
Xylenes (Total)	01-APR-2024	01-APR-2024	SYS
F1 (C6 to C10)	01-APR-2024	01-APR-2024	VB
F1 (C6 to C10) minus BTEX	01-APR-2024	01-APR-2024	SYS
Toluene-d8	01-APR-2024	01-APR-2024	VB
F2 (C10 to C16)	02-APR-2024	02-APR-2024	SS
F2 (C10 to C16) minus Naphthalene	03-APR-2024	03-APR-2024	SYS
F3 (C16 to C34)	02-APR-2024	02-APR-2024	SS
F3 (C16 to C34) minus PAHs	03-APR-2024	03-APR-2024	SYS
F4 (C34 to C50)	02-APR-2024	02-APR-2024	SS
Gravimetric Heavy Hydrocarbons			

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769708	**DUP-1**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Terphenyl	02-APR-2024	02-APR-2024	SS
Sediment	02-APR-2024	02-APR-2024	SG

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769709	**TRIP BLANK**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dichlorodifluoromethane	02-APR-2024	02-APR-2024	MK
Vinyl Chloride	02-APR-2024	02-APR-2024	MK
Bromomethane	02-APR-2024	02-APR-2024	MK
Trichlorofluoromethane	02-APR-2024	02-APR-2024	MK
Acetone	02-APR-2024	02-APR-2024	MK
1,1-Dichloroethylene	02-APR-2024	02-APR-2024	MK
Methylene Chloride	02-APR-2024	02-APR-2024	MK
trans- 1,2-Dichloroethylene	02-APR-2024	02-APR-2024	MK
Methyl tert-butyl ether	02-APR-2024	02-APR-2024	MK
1,1-Dichloroethane	02-APR-2024	02-APR-2024	MK
Methyl Ethyl Ketone	02-APR-2024	02-APR-2024	MK
cis- 1,2-Dichloroethylene	02-APR-2024	02-APR-2024	MK
Chloroform	02-APR-2024	02-APR-2024	MK
1,2-Dichloroethane	02-APR-2024	02-APR-2024	MK
1,1,1-Trichloroethane	02-APR-2024	02-APR-2024	MK
Carbon Tetrachloride	02-APR-2024	02-APR-2024	MK
Benzene	02-APR-2024	02-APR-2024	MK
1,2-Dichloropropane	02-APR-2024	02-APR-2024	MK
Trichloroethylene	02-APR-2024	02-APR-2024	MK
Bromodichloromethane	02-APR-2024	02-APR-2024	MK
Methyl Isobutyl Ketone	02-APR-2024	02-APR-2024	MK
1,1,2-Trichloroethane	02-APR-2024	02-APR-2024	MK
Toluene	02-APR-2024	02-APR-2024	MK
Dibromochloromethane	02-APR-2024	02-APR-2024	MK
Ethylene Dibromide	02-APR-2024	02-APR-2024	MK
Tetrachloroethylene	02-APR-2024	02-APR-2024	MK
1,1,1,2-Tetrachloroethane	02-APR-2024	02-APR-2024	MK
Chlorobenzene	02-APR-2024	02-APR-2024	MK
Ethylbenzene	02-APR-2024	02-APR-2024	MK
m & p-Xylene	02-APR-2024	02-APR-2024	MK
Bromoform	02-APR-2024	02-APR-2024	MK
Styrene	02-APR-2024	02-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769709	**TRIP BLANK**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
1,1,2,2-Tetrachloroethane	02-APR-2024	02-APR-2024	MK
o-Xylene	02-APR-2024	02-APR-2024	MK
1,3-Dichlorobenzene	02-APR-2024	02-APR-2024	MK
1,4-Dichlorobenzene	02-APR-2024	02-APR-2024	MK
1,2-Dichlorobenzene	02-APR-2024	02-APR-2024	MK
1,3-Dichloropropene	02-APR-2024	02-APR-2024	SYS
Xylenes (Total)	02-APR-2024	02-APR-2024	SYS
n-Hexane	02-APR-2024	02-APR-2024	MK
Toluene-d8	02-APR-2024	02-APR-2024	MK
4-Bromofluorobenzene	02-APR-2024	02-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769729	**DUP-2**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - All Metals (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dissolved Antimony	02-APR-2024	02-APR-2024	CC
Dissolved Arsenic	02-APR-2024	02-APR-2024	CC
Dissolved Barium	02-APR-2024	02-APR-2024	CC
Dissolved Beryllium	02-APR-2024	02-APR-2024	CC
Dissolved Boron	02-APR-2024	02-APR-2024	CC
Dissolved Cadmium	02-APR-2024	02-APR-2024	CC
Dissolved Chromium	02-APR-2024	02-APR-2024	CC
Dissolved Cobalt	02-APR-2024	02-APR-2024	CC
Dissolved Copper	02-APR-2024	02-APR-2024	CC
Dissolved Lead	02-APR-2024	02-APR-2024	CC
Dissolved Molybdenum	02-APR-2024	02-APR-2024	CC
Dissolved Nickel	02-APR-2024	02-APR-2024	CC
Dissolved Selenium	02-APR-2024	02-APR-2024	CC
Dissolved Silver	02-APR-2024	02-APR-2024	CC
Dissolved Thallium	02-APR-2024	02-APR-2024	CC
Dissolved Uranium	02-APR-2024	02-APR-2024	CC
Dissolved Vanadium	02-APR-2024	02-APR-2024	CC
Dissolved Zinc	02-APR-2024	02-APR-2024	CC
Mercury	02-APR-2024	02-APR-2024	DL
Chromium VI	01-APR-2024	01-APR-2024	WZ

O. Reg. 153(511) - VOCs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Dichlorodifluoromethane	02-APR-2024	02-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769729	**DUP-2**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Vinyl Chloride	02-APR-2024	02-APR-2024	MK
Bromomethane	02-APR-2024	02-APR-2024	MK
Trichlorofluoromethane	02-APR-2024	02-APR-2024	MK
Acetone	02-APR-2024	02-APR-2024	MK
1,1-Dichloroethylene	02-APR-2024	02-APR-2024	MK
Methylene Chloride	02-APR-2024	02-APR-2024	MK
trans- 1,2-Dichloroethylene	02-APR-2024	02-APR-2024	MK
Methyl tert-butyl ether	02-APR-2024	02-APR-2024	MK
1,1-Dichloroethane	02-APR-2024	02-APR-2024	MK
Methyl Ethyl Ketone	02-APR-2024	02-APR-2024	MK
cis- 1,2-Dichloroethylene	02-APR-2024	02-APR-2024	MK
Chloroform	02-APR-2024	02-APR-2024	MK
1,2-Dichloroethane	02-APR-2024	02-APR-2024	MK
1,1,1-Trichloroethane	02-APR-2024	02-APR-2024	MK
Carbon Tetrachloride	02-APR-2024	02-APR-2024	MK
Benzene	02-APR-2024	02-APR-2024	MK
1,2-Dichloropropane	02-APR-2024	02-APR-2024	MK
Trichloroethylene	02-APR-2024	02-APR-2024	MK
Bromodichloromethane	02-APR-2024	02-APR-2024	MK
Methyl Isobutyl Ketone	02-APR-2024	02-APR-2024	MK
1,1,2-Trichloroethane	02-APR-2024	02-APR-2024	MK
Toluene	02-APR-2024	02-APR-2024	MK
Dibromochloromethane	02-APR-2024	02-APR-2024	MK
Ethylene Dibromide	02-APR-2024	02-APR-2024	MK
Tetrachloroethylene	02-APR-2024	02-APR-2024	MK
1,1,1,2-Tetrachloroethane	02-APR-2024	02-APR-2024	MK
Chlorobenzene	02-APR-2024	02-APR-2024	MK
Ethylbenzene	02-APR-2024	02-APR-2024	MK
m & p-Xylene	02-APR-2024	02-APR-2024	MK
Bromoform	02-APR-2024	02-APR-2024	MK
Styrene	02-APR-2024	02-APR-2024	MK
1,1,2,2-Tetrachloroethane	02-APR-2024	02-APR-2024	MK
o-Xylene	02-APR-2024	02-APR-2024	MK
1,3-Dichlorobenzene	02-APR-2024	02-APR-2024	MK
1,4-Dichlorobenzene	02-APR-2024	02-APR-2024	MK
1,2-Dichlorobenzene	02-APR-2024	02-APR-2024	MK
1,3-Dichloropropene	02-APR-2024	02-APR-2024	SYS
Xylenes (Total)	02-APR-2024	02-APR-2024	SYS
n-Hexane	02-APR-2024	02-APR-2024	MK

Sample ID	Sample Description	Sample Type	Date Sampled	Date Received
5769729	**DUP-2**	**Water**	**27-MAR-2024**	**27-MAR-2024**

O. Reg. 153(511) - VOCs (Water)

Parameter	Date Prepared	Date Analyzed	Initials
Toluene-d8	02-APR-2024	02-APR-2024	MK
4-Bromofluorobenzene	02-APR-2024	02-APR-2024	MK

Method Summary

CLIENT NAME: PINCHIN LTD.
PROJECT: 334803.001
SAMPLING SITE:130 Slater St. Ottawa, ON

AGAT WORK ORDER: 24Z134306
ATTENTION TO: Alicia McDonald
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acenaphthylene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acenaphthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Fluorene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Phenanthrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Anthracene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Fluoranthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Pyrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(a)anthracene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Chrysene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Dibenz(a,h)anthracene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
2-and 1-methyl Napthalene	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Naphthalene-d8	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Acridine-d9	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Terphenyl-d14	ORG-91-5105	modified from EPA 3510C and EPA 8270E	GC/MS
Sediment			N/A
F1 (C6 to C10)	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	modified from MOE PHC-E3421	P&T GC/FID
Toluene-d8	VOL-91- 5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	modified from MOE PHC-E3421	BALANCE
Terphenyl	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Benzene	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS
Toluene	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24Z134306**
PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**
SAMPLING SITE:130 Slater St. Ottawa, ON **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Ethylbenzene	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS
m & p-Xylene	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS
o-Xylene	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS
Xylenes (Total)	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS
F1 (C6 to C10)	VOL-91- 5010	modified from MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	modified from MOE PHC-E3421	P&T GC/FID
Toluene-d8	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	modified from MOE PHC-E3421	BALANCE
Terphenyl	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	modified from MOE PHC-E3421	(P&T)GC/FID
F3 (C16 to C34)	VOL-91-5010	modified from MOE PHC-E3421	GC/FID
Dichlorodifluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromomethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Acetone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
trans- 1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chloroform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Benzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24Z134306**

PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**

SAMPLING SITE:130 Slater St. Ottawa, ON **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Bromodichloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Bromoform	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Styrene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
o-Xylene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Xylenes (Total)	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
n-Hexane	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
Toluene-d8	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	modified from EPA 5030B & EPA 8260D	(P&T)GC/MS

Method Summary

CLIENT NAME: PINCHIN LTD. **AGAT WORK ORDER: 24Z134306**

PROJECT: 334803.001 **ATTENTION TO: Alicia McDonald**

SAMPLING SITE:130 Slater St. Ottawa, ON **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Dissolved Antimony	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Beryllium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cobalt	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Molybdenum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Nickel	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Selenium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Silver	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Thallium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Uranium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Vanadium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Chromium VI	INOR-93-6073	modified from SM 3500-CR B	LACHAT FIA

AGAT Laboratories

Have feedback?
Scan here for a quick survey!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 24Z134306

Cooler Quantity: one - ice pack.

Arrival Temperatures: 19.0 | 19.8 | 19.1
2.7 | 2.0 | 2.2

Custody Seal Intact: ☐Yes ☐No ☒N/A

Notes: bagged ice

Report Information:

Company: Pinchin Ltd.

Contact: Alicia McDonald

Address:

Phone: Fax:

Reports to be sent to:

1. Email: amcdonald@pinchin.com
2. Email: jmccann@pinchin.com

Regulatory Requirements:

(Please check all applicable boxes)

☒ Regulation 153/04

Table ____ *Indicate One*

☐Ind/Com
☐Res/Park
☐Agriculture

Soil Texture *(Check One)*

☐Coarse
☐Fine

☐ Regulation 406

Table ____ *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use
☐Sanitary ☐Storm

____ *Region*

☐ Prov. Water Quality Objectives (PWQO)

☐ Other

____ *Indicate One*

Is this submission for a **Record of Site Condition?**

☒ Yes ☐ No

Report Guideline on *Certificate of Analysis*

☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): **4 DAYS**

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 334803.001

Site Location: 130 Slater St. Ottawa, ON

Sampled By:

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Sample Matrix Legend

GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:

Contact:

Address:

Email:

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y / N	O. Reg 153 Metals & Inorganics	O. Reg 153 Metals - ☑ CrVI, ☑ Hg, ☐ HWSB	O. Reg 153 BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558 Landfill Disposal Characterization TCLP: TCLP: ☐M&I ☐VOCs ☐ABNs ☐B(a)P ☐PCBs	O. Reg 406 Regulation 406 SPLP Rainwater Leach SPLP: ☐Metals ☐VOCs ☐SVOCs	O. Reg 406 Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐ Moisture ☐ Sulphide							Potentially Hazardous or High Concentration (Y/N)
1. MW1	2024-03-27	AM PM	7	GW					X		X													
2. MW2		AM PM	9	GW			✓	X	X	X														
3. MW3		AM PM	9	GW			✓	X	X	X														
4. MW4		AM PM	11	GW			✓	X	X	X	X													
5. DUP-1		AM PM	7	GW					X		X													
6. TRIP BLANK		AM PM	[illegible]							☑														
7. DUP2		AM PM	7	GW			✓	X		X														
8.		AM PM																						
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign): Mandy Witteman	Date MAR.27/24	Time PM	Samples Received By (Print Name and Sign): C. Griffith	Date 03/27/24	Time 16h30	
Samples Relinquished By (Print Name and Sign): Jeanette McCann	Date	Time PM	Samples Received By (Print Name and Sign):	Date Mar 30	Time 11:05 AM	Page ____ of ____
Samples Relinquished By (Print Name and Sign): Tovam Shah	Date	Time PM	Samples Received By (Print Name and Sign):	Date	Time	Nº:

CC to Puro 03/28/24 15h00