LOPERS & ASSOCIATES

Phase Two Environmental Site Assessment

715 Mikinak Road
Ottawa, Ontario

Prepared for:

Ottawa Community Housing Corporation

July 15, 2020

Table of Contents

List of Figures

List of Tables

List of Appendices

1. Executive Summary

Lopers & Associates (Lopers) was retained by Ottawa Community Housing Corporation (OCH) to complete a Phase Two Environmental Site Assessment (Phase Two ESA) of the vacant property with Civic address No. 715 Mikinak Road, Ottawa, Ontario ("Phase Two Property", "Property" or "Site").

This Phase Two ESA is being completed as part of due diligence requirements associated with the submission of a Development Application to the City of Ottawa Municipal Planning Department.

Lopers has previously completed a Phase One Environmental Site Assessment (Phase One ESA) (Reference No. LOP20-001A, dated July 7, 2020) for OCH at the Property. The Phase One ESA identified the presence of two potentially contaminating activities (PCAs) at the Property which were interpreted to represent areas of potential environmental concern (APECs). The presence of a former retail fuel outlet was identified on the north portion of the Phase One Property (APEC #1). The contaminants of potential concern associated with retail fuelling are petroleum hydrocarbons (PHCs) and benzene, toluene, ethylbenzene and xylenes (BTEXs), and metals, since this was an older facility and lead was historically present in gasoline. The practice of backfilling following decommissioning, demolition and remediation activities was identified in various locations at the Phase One Property (APEC #2). The contaminants of potential concern commonly found in poor environmental quality backfill are PHCs/BTEXs, polycyclic aromatic hydrocarbons (PAHs) and metals. A Phase Two ESA was recommended to assess the soil and groundwater quality in the vicinity of the identified APECs.

The scope of work for the Phase Two ESA included drilling 13 boreholes at the Phase Two Property; this drilling and sampling program was completed concurrently with a geotechnical investigation completed by others. Four of the boreholes were instrumented with groundwater monitoring wells with screens installed in the overburden.

Nine soil samples, including one duplicate sample, were submitted for laboratory analysis for a combination of PHCs, BTEXs, volatile organic compounds (VOCs), PAHs, metals and inorganics. One sample was also submitted for toxicity leaching characteristic procedure (TCLP) for waste characterization purposes.

Groundwater sampling was completed of the newly installed monitoring wells and select existing groundwater monitoring wells at the Phase Two Property, which were installed as part of historical investigations. A total of seven groundwater samples, including a duplicate sample and a trip blank, were submitted for laboratory analysis for a combination of PHCs, BTEXs, VOCs, PAHs, metals and inorganics.

The applicable sites standard was determined to be the full depth generic site condition standard, in a non-potable groundwater condition, with course textured soil, for residential property use, as specified in Table 3 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011.

The soil sample BH13-20-SS2, collected from a depth of approximately 0.8-1.3 m below ground surface (BGS) on the north-northwest portion of the Phase Two Property, had a conductivity measurement of 1950 µS/cm compared to the site condition standard of 700 µS/cm. This sample was collected from backfill material, consisting primarily of silty sand and gravel. This backfill was placed as part of remediation activities following decommissioning of the former retail fuel outlet on the north portion of the Phase Two Property. This sample was collected in a location that would have been subject to de-icing activities with the application of salts applied to ground surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both and is suspected to exceed the site condition standard solely as a result of these activities. Based on this application and the exemption set forth in Section 49.1 of O.Reg. 153/04, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act. Based on additional soil analysis in other locations at the Phase Two Property, the presence of elevated conductivity appears to be isolated into localized area(s) and is not considered to have migrated or impacted the Phase Two Property groundwater quality.

All of the soil and groundwater results for the Phase Two Property are in compliance with the applicable site condition standards as of the certification date of June 23, 2020.

It should be noted that, based on field observations, a high degree of heterogeneity is expected in the imported backfill which has been historically placed at the Phase Two Property as part of previous remediation, demolition/decommissioning and grading work. It is recommended that an environmental consultant periodically review the excavation work during redevelopment to ensure that excess soil generated as part of the redevelopment is managed appropriately. Best management practices would also include preparation of a soil management plan in accordance with O.Reg. 406/19.

2. Introduction

Lopers & Associates (Lopers) was retained by Ottawa Community Housing Corporation (OCH) to complete a Phase Two Environmental Site Assessment (Phase Two ESA) of the vacant property with Civic address No. 715 Mikinak Road, Ottawa, Ontario ("Phase Two Property", "Property" or "Site"). The location of the Phase Two Property within the City of Ottawa is presented on Figure 1: Key Plan.

i. Site Description

The Phase Two Property has a Civic address of 715 Mikinak Road, Ottawa, Ontario. The Property is legally described as Part of Block 21, on Registered Plan 4M-1581, in the City of Ottawa and has a property identifier number of 04273-0612. The boundaries of the Phase Two Property are presented on Figure 2: Site Plan.

Based on approximate dimensions obtained from the City of Ottawa's GIS mapping software, the Phase Two Property has an approximate area of 12,260 m2 (1.23 Hectares). The Phase Two Property is bounded to the north by Hemlock Road, to the east by Michael Stoqua Street, to the south by Mikinak Road and to the west by Barielle-Snow Street.

ii. Property Ownership

The Phase Two Property is currently owned by The Corporation of the City of Ottawa ("City"). It is Lopers' understanding that OCH has an agreement with the City for future development and occupancy of the Phase Two Property.

This Phase Two ESA was commissioned by Mr. Barron Meyerhoffer, Director of Development for OCH. Ottawa Community Housing Corporation has a business address of 39 Auriga Drive, Ottawa, Ontario, K2E 7Y8 and a business telephone number of 613-731-1182.

iii. Current and Proposed Future Use

It is Lopers' understanding that OCH intends to redevelop the Phase Two Property for residential purposes, including the current concept for construction of approximately three buildings ranging from four to nine storeys in height, with surface parking and subgrade mechanical spaces.

A record of site condition (RSC) was filed with the Ministry of Environment, Conservation and Parks (MECP) in 2020 for the Phase Two Property, which designated the Property for residential land use, as such, further RSC filings are not required for the proposed land use.

iv. Applicable Site Condition Standard

Through Ontario Regulation 153/04 (O.Reg. 153/04) the Ministry of Environment, Conservation and Parks (MECP) prescribes the conditions to determine the applicable site condition standard for a property.

The MECP site condition standards selected for the Phase Two Property during the aforementioned previously filed RSC were the full depth generic site condition standards, with non-potable groundwater, course textured soil, for residential property use. The proposed future use of the Phase Two Property is for residential use.

The Phase Two Property and all other properties within 250 m of the property boundaries are supplied by a municipal drinking water system. The RSC does not specify agricultural use and there are no wells within 250 m of the property boundaries that are intended for use as a source of water for human consumption or agriculture. As such, the designation of non-potable groundwater setting is determined to be applicable [O.Reg. 153/04, section 35].

The soil and groundwater quality over the full depth of overburden was considered for this Phase Two ESA. The full depth generic site condition standards were selected for comparison for the Phase Two Property [O.Reg. 153/04, sections 36, 37, 38, 39 and 40].

The Phase Two Property is not situated within or adjacent to an area of natural significance and does not include any land within 30 m of an area of natural significance. The pH of the soil was analyzed as part of this Phase Two ESA and was found to range from 7.24 to 7.51. As such, the Phase Two Property is not considered to be an environmentally sensitive area [O.Reg. 153/04, section 41].

A substantial layer of fill material, consisting of silty sand and gravel, which would be classified as coarse grained soil, is present to full depth to bedrock on the north portion of the Phase Two Property and near surface elsewhere at the Property. It is interpreted that greater than 1/3 of the Phase Two Property has coarse grained soil. For the purposes of this Phase Two ESA, the soil conditions are considered to be coarse grained, which provides a more conservative comparison to the MECP site condition standards than the fine-grained values [O.Reg. 153/04, section 42].

Review of the drilling program and borehole/monitoring well logs completed as part of this Phase Two ESA and previous investigations was completed. It was determined that greater than 2/3 of the Phase Two Property has greater than 2 m of overburden soil. The Phase Two Property is not considered a shallow soil property [O.Reg. 153/04, section 43.1].

The Phase Two Property does not include and does not have any land located within 30 m of a water body. The MECP site condition standards for use within 30 m of a water body do not apply [O.Reg. 153/04, section 43.1].

The full depth generic site condition standards, with non-potable groundwater, course textured soil, for residential property use, as specified in Table 3 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011 were determined to be the applicable site condition standards for the Phase Two Property as part of this Phase Two ESA.

3. Background Information

i. Physical Setting

No water bodies or areas of natural significance are located at the Phase One Property or in the Phase One Study Area. There were no areas of natural and scientific interest (ANSIs) or areas of natural significance identified in the Phase One Study Area.

The regional topography in the general area of the Phase Two Property slopes downward to the north, toward the Ottawa River. The Ottawa River is located approximately 1.2 km north of the Phase Two Property. Surface water drainage at the Phase Two Property is by infiltration, while catch basins are present on the adjacent municipal Right-of-Ways, which drain into the municipal stormwater sewer system.

No drinking water wells are located at the Phase One Property and the Phase One Study Area is serviced by municipally treated non-potable water. The Phase One Property and Study Area are not located in the vicinity of any well-head protection areas or other designation identified by the City of Ottawa in its official plan for the protection of ground water. The Phase One Study Area is serviced by municipally treated drinking water. No private or agricultural water supply wells are located within the Phase One Study Area.

ii. Past Investigations

A Phase One ESA report was prepared concurrently with this Phase Two ESA: "Phase One Environmental Site Assessment, 715 Mikinak Road, Ottawa, Ontario" dated July 7, 2020 prepared for Ottawa Community Housing Corporation by Lopers & Associates. The Phase One ESA identified two potentially contaminating activities (PCAs) at the Phase One Property, which include:

- The presence of a former retail fuel outlet was identified on the north portion of the Phase One Property (O.Reg. PCA item #28). This former retail fuel outlet is a significant potentially contaminating activity (PCA) which represents area of potential environmental concern # 1 (APEC #1) for the Property. The contaminants of potential concern associated with retail fuelling are generally PHCs and BTEXs, and metals, since this was an older facility and lead was historically present in gasoline.

- The practice of backfilling following decommissioning, demolition and remediation activities was identified in various locations at the Phase One Property (O.Reg. PCA item #30). Backfilling with fill of unknown environmental quality is a significant PCA which represents APEC #2 for the Property. The contaminants of potential concern commonly found in poor environmental quality backfill are PHCs/BTEXs, PAHs and metals.

Based on the identification of PCAs and APECs at the Phase One Property, a Phase Two Environmental Site Assessment was recommended to be completed to assess the soil and/or groundwater quality in the vicinity of the APECs.

Additional reports and sources were reviewed and/or referenced as part of the aforementioned Phase One ESA, and included:

1. "Limited Environmental Due Diligence and Groundwater Quality Assessment, October 2019 Sampling Event, 715 Mikinak Road, Ottawa, Ontario", dated November 8, 2019, completed by GHD Limited (Author: Luke Lopers) for Ottawa Community Housing Corporation.
2. "2010 Phase III Environmental Site Assessment (ESA), Former CANEX/Shell Site, CFB Rockcliffe, Ottawa, Ontario", prepared for Public Works and Government Services Canada (PWGSC), prepared by DST Consulting Engineers (DST), dated September, 2010.
3. "Phase One Environmental Site Assessment, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated March, 2015.
4. "Phase Two Environmental Site Assessment Update, Volume 5, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated May, 2015.
5. "Additional Groundwater Sampling in Support of RSC Submission – RSC 7, Wateridge Development, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated March 13, 2019.
6. Record of Site Condition 226318 (and supporting documents), 715 Mikinak Road, Ottawa, Ontario, submitted by DST on behalf of CLC, filed to the Environmental Site Registry January 7, 2020.

These reports confirm the findings of the Phase One ESA completed by Lopers & Associates in 2020 and provide some additional detail of historical investigation and remediation work at the Phase Two Property.

There were no discrepancies identified in review of documentation, information or data from previous investigations. As such, previous investigations are considered to be of adequate quality such that they can be relied upon for the purposes of this Phase Two ESA.

4. Scope of Investigation

i. Overview of Site Investigation

This Phase Two ESA has been completed as per the details of scope presented in Lopers' Letter entitled "Proposal for Phase Two Environmental Site Assessment, Proposed Residential Development, 715 Mikinak Road, Ottawa, ON", dated May 6, 2020, reference No. LOP-001B-20-OCH. The scope of work for investigation was discussed with OCH and a geotechnical investigation was completed by others, concurrently with the Phase Two ESA for efficiency in the drilling program and to supplement additional coverage of the Property for both programs. A sampling and analysis plan (SAP) was prepared to achieve the objectives of the Phase Two ESA and geotechnical investigation; the SAP is provided in Appendix A.

Underground utility locates were completed through Ontario 1-Call to identify any active services on the Phase Two Property prior to initiating the field program. There are no active services at the Property, however, some vacant service trenches were noted to be present upon review of the locates. Copies of the underground locates are provided in Appendix B.

On June 15 and 16, 2020, a total of 13 boreholes (BH1-20 through BH13-20) were drilled at the Phase Two Property. The boreholes were drilled using a track mounted CME 55 drill rig. Soil samples were collected from auger cuttings (near ground surface) and using stainless steel split spoons for samples at deeper depths. Soil samples recovered during the sampling program were screened in the field for volatile vapour concentrations, as well as visual and olfactory observations.

A total of four groundwater monitoring wells (BH1-20, BH6-20, BH12-20 and BH13-20) were installed on the north and southeast portions of the Phase Two Property. The boreholes to be instrumented with groundwater monitoring wells were drilled to the localized depth of bedrock and were screened with the intention of straddling the shallow groundwater table. When possible, these groundwater monitoring wells were developed on second day of drilling by removing at least three well volumes or by purging the wells dry three times.

A total of 10 existing groundwater monitoring wells were present on the north portion of the Phase Two Property prior to under taking the field program for this Phase Two ESA. The existing monitoring wells were installed as part of past investigations by others. Based on the depths of some of these wells and the depth to bedrock in boreholes in the vicinity of these wells which were drilled as part of this Phase Two ESA, some of the existing monitoring wells are suspected to have their screens set within the bedrock. Select existing groundwater monitoring wells were developed on second day of drilling by removing at least three well volumes.

The locations of the boreholes/monitoring wells drilled/installed as part of this Phase Two ESA as well as existing monitoring wells at the Phase Two Property are presented on Figure 2: Site Plan. The rationale for the placement of the boreholes/monitoring wells is provided below:

BH1-20 was drilled in the vicinity of the former commercial/kiosk building at the Phase Two Property. This borehole was placed in a location to assess fill quality in the footprint of this former building (APEC #2) as well as to assess potential impact and/or migration of contaminants from the former retail fuel outlet located immediately south (inferred up-gradient APEC #1). This borehole was instrumented with a groundwater monitoring well, with its screen installed above the bedrock surface and within soil which was observed to be wet during the drilling/soil sample collection. It is a down-gradient location at the property line. This borehole also serves geotechnical purposes.

BH2-20 was drilled in the northwest portion of the Phase Two Property. This borehole was placed in a location to assess fill quality (APEC #2) in the footprint of this former building as well as to assess potential impact and/or migration of contaminants from the former retail fuel outlet located immediately southeast (inferred up-gradient APEC #1). This borehole also serves geotechnical purposes.

BH3-20 was drilled in the northeast portion of the Phase Two Property. This borehole was placed in a location primarily for geotechnical purposes and was also used to assess fill quality (APEC #2) in this portion of the Phase Two Property.

BH4-20 and BH5-20 were drilled in the central-east portion of the Phase Two Property. These boreholes were placed in locations primarily for geotechnical purposes and were also used to assess fill quality (APEC #2) in this portion of the Phase Two Property.

BH6-20 was drilled in the southeast portion of the Phase Two Property. This borehole was placed in a location primarily for geotechnical purposes and was also used to assess fill placement (APEC #2) in this portion of the Phase Two Property. Based on observations during drilling and sample collection/screening, this location was considered to be up-gradient and therefore suitable for an assessment of background soil and groundwater conditions at the Phase Two Property and was instrumented with a groundwater monitoring well, with its screen installed above the bedrock surface and within soil which was observed to be wet during the drilling/soil sample collection.

BH7-20 was drilled in the central-south portion of the Phase Two Property. This borehole was placed in a location to assess fill quality (APEC 2#) in the vicinity of a footprint of a former residential building. This borehole also serves geotechnical purposes.

BH8-20 was drilled in the southwest portion of the Phase Two Property. This borehole was placed in a location primarily for geotechnical purposes and was also used to assess fill quality (APEC #2) in this portion of the Phase Two Property.

BH9-20 was drilled in the central-west portion of the Phase Two Property. This borehole was placed in a location to assess fill quality (APEC #2) in the vicinity of a footprint of a former residential building. This borehole also serves geotechnical purposes.

BH10-20 and BH11-20 were drilled in the central portion of the Phase Two Property. These boreholes were placed in locations primarily for geotechnical purposes and were also used to assess fill quality (APEC #2) in this portion of the Phase Two Property.

BH12-20 was drilled in the vicinity of the former pump islands at the Phase Two Property. This borehole was placed in a location to assess fill quality (APEC #2) in the footprint of this former remediation area as well as to assess potential impact of contaminants from the former retail fuel outlet (APEC #1). This borehole was instrumented with a groundwater monitoring well, with its screen installed above the bedrock surface and within soil which was observed to be wet during the drilling/soil sample collection.

BH13-20 was drilled in the vicinity of the former underground fuel storage tanks at the Phase Two Property. This borehole was placed in a location to assess fill placement (APEC #2) in the footprint of this former remediation area as well as to assess potential impact of contaminants from the former retail fuel outlet (APEC #1). This borehole was instrumented with a groundwater monitoring well, with its screen installed above the bedrock surface and within soil which was observed to be wet during the drilling/soil sample collection.

Soil samples were selected for laboratory analysis of select contaminants of potential concern (CPCs) based on APECs and CPCs identified in the Phase One ESA, as described in Section 3.ii. above as well as field screening observations.

A waste characterization sample was selected for laboratory analysis of toxicity characteristic leaching procedure (TCLP) analysis for flashpoint, leachate metals & inorganics, leachate VOCs and leachate organics (PAHs and polychlorinated biphenyls (PCBs)). This sample was comprised of a composite of worst case samples, as determined by field screening parameters, from BH2-20, BH10-20, BH12-20 and BH13-20.

Groundwater monitoring and sampling of the monitoring wells installed as part of this Phase Two ESA (BH1-20, BH6-20, BH12-20, BH13-20) as well as select existing groundwater monitoring wells (BH8-1, BH18-1, BH18-2 which were interpreted as being screened in bedrock) was completed on June 23, 2020. Static groundwater levels were measured prior to disturbance of the water column. During purging, water quality parameters were measured at regular intervals to monitoring groundwater quality stabilization; once groundwater quality parameters stabilized (were within approximately 10% on successive readings), groundwater samples were collected. Groundwater samples were selected for laboratory analysis of select CPCs based on APECs and CPCs identified in the Phase One ESA.

An elevation survey was completed of the boreholes/monitoring wells drilled as part of the Phase Two ESA as well as select existing monitoring wells at the Phase Two Property. The

boreholes/monitoring wells were surveyed relative to a temporary benchmark of the top of spindle of the City of Ottawa fire hydrant located at the southeast corner of the Hemlock Road and Barielle-Snow Street intersection; this benchmark was assigned a reference elevation of 100.000 m ("Site Datum") for the purposes of this Phase Two ESA.

ii. Media Investigation

Based on the finding of the Phase One ESA, the following APECs, and CPCs were identified for the following media:

The presence of a former retail fuel outlet was identified on the north portion of the Phase One Property. This former retail fuel outlet is a significant potentially contaminating activity (PCA) which represents area of potential environmental concern #1 (APEC #1) for the Property. The contaminants of potential concern (CPCs) associated with retail fueling are generally PHCs and BTEXs, and metals, since this was an older facility and lead was historically present in gasoline. The media potentially impacted by this APEC and associated CPCs are soil and groundwater at the Phase Two Property.

The practice of backfilling following decommissioning, demolition and remediation activities was identified in various locations at the Phase One Property. Backfilling with fill of unknown environmental quality is a significant PCA which represents APEC #2 for the Property. The CPCs commonly found in poor environmental quality backfill are PHCs/BTEXs, PAHs and metals. The media potentially impacted by this APEC and associated CPCs is the soil at the Phase Two Property.

Soil quality at the Phase Two Property was investigated through the collection of soil samples at varying depths facilitated by drilling using a track mounted CME drill rig with stainless steel split spoon sampling.

Groundwater quality at the Phase Two Property was investigated through the installation and sampling of groundwater monitoring wells. The monitoring wells installed as part of the Phase Two ESA were drilled to the bedrock surface and screens were installed with the intent to straddle the shallow groundwater table. The existing monitoring wells at the Phase Two Property were suspected to have monitoring well screens installed within the bedrock. A bentonite seal was installed above the monitoring well screen's sand pack in each of the monitoring wells to prevent surface and precipitation water influence. Groundwater monitoring wells were sampled using a peristaltic pump.

There were no natural surface water bodies at the Phase Two Property, and as such no sediment sampling was completed as part of the Phase Two ESA.

iii. Phase One Conceptual Site Model

The Phase One Property, which has the same location orientation and property boundaries as the Phase Two Property, is located at Civic No. 715 Mikinak Road, Ottawa, Ontario and has an approximate area of 1.23 Hectares.

The Phase One Property was undeveloped prior to the 1950's when initial development was completed as part of CFB Rockcliffe. The north portion of the Phase One Property was formerly occupied by a retail fuel outlet (Canex/Shell), while the remainder of the property was occupied by residential (military) buildings and Rights-of-Way. Decommissioning/demolition of the Property's structures began in the 1990's and the Property was vacant by 2008.

The Property is currently vacant, is zoned for mixed use. The City of Ottawa purchased the Phase One Property in November of 2019, and it is understood that the intended future use is for residential purposes. The Phase One Property is immediately surrounded my municipal Right-of-Ways followed by residential properties under development or proposed parkland.

The Phase One Study Area includes the Phase One Property and properties with the boundaries within 250 m of the Phase One Property limits. Based on a review of the Phase One Property and properties in the Phase One Study Area, their associated historical and/or current uses and operations and physical characteristics of the Phase One Study Area, it was determined that an assessment of properties within 250 m of the Phase One property was sufficient to meet the objectives of the scope of this investigation for a Phase One ESA.

No water bodies or areas of natural significance are located at the Phase One Property or in the Phase One Study Area. No drinking water wells are located at the Phase One Property and the Phase One Study Area is serviced by municipally treated non-potable water. Ten existing groundwater monitoring wells were present at the Phase One Property; the locations of these wells are presented on Figure 2.

The regional topography in the Phase One Study Area slopes downward to the north, toward the Ottawa River. The Ottawa River is located approximately 1.2 km north of the Phase One Property.

Based on the historical research, the general stratigraphy of the Phase One Property and Phase One Study Area consists of sand and gravel fill, underlain by Silty Clay, occasionally underlain by silty sand. Overburden soils are expected to be underlain by Limestone bedrock. Groundwater is expected at a depth of approximately 2 m BGS.

The presence of a former retail fuel outlet was identified on the north portion of the Phase One Property. This former retail fuel outlet is a significant potentially contaminating activity which represents APEC #1 for the Property. The contaminants of potential concern associated with retail fueling are generally PHCs and BTEXs, and metals since this was an older facility and lead was historically present in gasoline.

The practice of backfilling following decommissioning, demolition and remediation activities was identified in various locations at the Phase One Property. Backfilling with fill of unknown environmental quality is a significant potentially contaminating activity which represents APEC #2 for the Property. The contaminants of potential concern commonly found in poor environmental quality backfill are PHCs/BTEXs, PAHs and metals.

Four potentially contaminating activities (historical fuel storage tanks) were identified at neighbouring properties in the Phase One Study Area. The PCAs at neighbouring properties in the Phase One Study Area are located significant distances and at down- or cross-gradient orientations with respect to the Phase One Property and are not considered to represent APECs for the Phase One Property.

Historically, underground utility service trenches would have been present at the Phase One Property. It is unknown if the former underground utilities were removed, however, if present the former underground utility corridors do have the potential to affect contaminant distribution and transport, as they would create preferential pathways for lateral migration.

Given that PCAs and APECs have been identified at the Phase One Property, any uncertainty or absence of information obtained in the components of this Phase One ESA are not expected to affect the validity of the conceptual site model.

iv. Deviations from Sampling and Analysis Plan

Monitoring wells installed as part of this Phase Two ESA were intended to have their screens installed in the overburden with the intention of straddling the groundwater table in the shallow aquifer at the Phase Two Property. Based on previously reported groundwater elevations and depth to bedrock, it was expected that this could be completed without coring bedrock.

The monitoring wells installed in BH1-20 and BH12-20 as part of this investigation were found to be dry following installation and a period of stabilization. Existing monitoring wells installed as part of historical investigations at the Phase Two Property in the vicinity of BH1-20 and BH12-20, respectively, with screens installed within the bedrock, were sampled as alternative sampling points for assessment of the groundwater quality in these areas of the Property. Northward overburden groundwater flow direction in the conceptual site model was verifiable none-the-less from groundwater elevations in BH13-20 and BH6-20 which span the Site.

v. Impediments

The location of a localized depression in the surficial grading on the central-north portion of the Phase Two Property represents a potential impediment to the Phase Two ESA investigation method as it limited the potential drilling locations for BH12-20. Due to the size of the area of the former pump islands, which were investigated through drilling of BH12-20, this borehole was still able to be placed within the former pump island locations and the presence of this impediment is not considered to have significantly affected the validity of the conclusions presented in this Phase Two ESA.

5. Investigation Method

i. General

The investigation method for this Phase Two ESA involved an assessment of the soil and/or groundwater quality for the associated CPCs in the vicinity of the APECs identified during the Phase One ESA. The Phase Two ESA field program was completed concurrently with a geotechnical investigation, which provided supplemental data for both investigations.

Investigation of soil was completed using a track mounted CME drill rig, with stainless steel split spoons used to recover soil samples. Soil samples were screened in the field for volatile vapour concentrations, as well as visual and olfactory observations. Select soil samples were submitted based on all the indications mentioned above as well as to capture representative soil and fill layers for laboratory analysis for the CPCs.

Groundwater was assessed using groundwater monitoring wells which were installed as part of the Phase Two ESA drilling program and/or were present at the Phase Two Property as part of historical investigations. The wells selected for monitoring/sampling were purged during the drilling program. Static groundwater levels were measured in the monitoring wells prior to disturbance of the water column on the day of sampling. Groundwater samples were collected using a peristaltic pump using low-flow procedures and were submitted for laboratory analysis for the CPCs.

An elevation survey of the boreholes and groundwater monitoring wells was completed and was referenced to a temporary benchmark, the top of spindle of a fire hydrant located to the northwest of the Phase Two Property.

The following sections provide further detailed information regarding the investigation methodology completed as part of the Phase Two ESA.

ii. Drilling

The drilling field program was completed on June 15 and 16, 2020 under full time supervision of Lopers & Associates personnel. Thirteen (13) boreholes were drilled for the Phase Two ESA by the drilling subcontractor George Downing Estate Drilling, located at 410 Principale Rue, Grenville-Sur-la-Rouge, Quebec, J0V 1B0. The drill rig used for the Phase Two ESA was a track mounted CME drill, equipped with hollow stem augers and stainless-steel split spoons. Ten of the 13 boreholes were advanced to auger or cone refusal on suspected bedrock.

Samples were collected from auger cuttings at the ground surface for surficial samples (0-0.6 m below ground surface (m BGS)) and then using split spoons for subsequent samples. Split spoon samples were not collected from the near surface, as poor recovery of loose packed fill material did not yield sufficient volume of samples required for field screening or laboratory

analysis. Split spoon samples, collected in 0.6 m segments, were recovered at continuous 0.76 m intervals; the additional 0.16 m between split spoon samples was over-drilled to provide undisturbed field measurement of geotechnical parameters (blow counts) and to prevent cave in materials from stratigraphic units above the intended sampling intervals from being collected at unrepresentative depths during sampling.

The split spoons, which were the only media to come into contact with the soil samples, were washed using soap and water and a scrub brush between samples to minimize the potential for cross-contamination among samples. The field technician used sterile nitrile gloves, which were changed prior to the handling of each soil sample to further reduce the potential of cross-contamination. The flights of the hollow stem augers were cleaned manually following each borehole.

iii. Soil Sampling

As described above, with the exceptions of surficial samples, which were collected directly from soil cuttings generated in the upper 0.6 m, soil samples were recovered using stainless steel split spoons.

Soil samples were initially collected in Ziploc bags for initial screening as part of sample selection. Soil samples selected for laboratory analysis were collected in dedicated clear glass jars prepared and provided by the analytical laboratory. Soil samples collected for BTEXs/VOCs and the F1 range of PHCs analysis were collected using a dedicated graduated syringe provided by the laboratory and placed directly into a glass vial with a known quantity of methanol preservative. Analytes and associated preservatives were specified on each jar/vial by the laboratory. Each jar/vial sample set was provided with a unique sample identifier, project number and date of sampling in the field.

Detailed soil descriptions of the stratigraphy for each borehole/monitoring are included on the borehole logs provided in Appendix C.

Based on the observations of soil samples collected during the Phase Two ESA field program, there were four stratigraphic units identified at the Phase Two Property, which include:

Topsoil

A thin layer of topsoil, approximately 0.05 to 0.15 m in thickness, was encountered at the ground surface in BH2-20 and BH4-20 through BH7-20. This material was identified to consist of silty sand with some gravel and organics (grass and roots), loose, brown and was moist or damp.

Silty Sand and Gravel (Fill)

A layer of fill material, ranging from approximately 0.6 to 4.7 m in thickness, was encountered from ground surface or immediately below the topsoil layer in all of the boreholes drilled as part of the Phase Two ESA. This material was identified to consist of silty sand and gravel with some cobbles, some clay, was loose to compact and generally grey. This layer was encountered at

varying moisture conditions, generally dry at shallow depths becoming wet at approximately 3.0 m BGS. In BH1-20, BH3-20, BH12-20 and BH13-20 this fill material extended down to suspected bedrock.

Cinders and black staining were observed in BH2-20 at an approximate depth of 1.1 m BGS. Occasional asphalt pieces were observed in BH10-20 at an approximate depth of 3.5 m BGS and in BH12-20 at depths of approximately 2.3 m BGS and 3.8 m BGS.

Silty Clay

A layer of silty clay, ranging from approximately 2.6 to 7.5 m in thickness, was encountered immediately below the silty sand and gravel fill layer in BH2-20 and BH4-20 through BH11-20. This material was identified to consist of silty clay, firm (near surface) to soft (saturated conditions) and was grey or brown-grey. This layer was encountered at varying moisture conditions, generally dry at shallow depths becoming wet at approximately 3.4 m BGS. With the exception of BH5-20 and BH6-20, this material was found to be underlain by suspected bedrock.

Silty Sand and Gravel (Native)

A layer of silty sand and gravel, approximately 0.1 to 0.2 m in thickness, was encountered below the silty clay layer right above refusal in BH2-20, BH5-20 and BH6-20. This material consisted of brown silty sand and gravel, was loose and wet. Where present, this material was found to be underlain by suspected bedrock.

iv. Field Screening Measurements

Initial field screening of the soil samples consisted of visual and olfactory observations made at the time of sample collection during the drilling program.

Additional field screening of the soil samples was completed using an RKI Instruments Model Eagle-2 combustible gas detector ("RKI Eagle"). The RKI Eagle used for soil sample screening as part of this Phase Two ESA was obtained from Maxim Environmental and Safety Inc. and was calibrated on June 9, 2020. The RKI Eagle is capable of measuring combustible vapours at concentrations ranging from 0 parts per million (PPM) to 50% of the lower explosive limit (LEL). The RKI Eagle is also capable of measuring VOC vapours at concentrations ranging from 0 ppm to 1000 ppm. Additional equipment and calibration information for the RKI Eagle is provided on the certificate of calibration included in Appendix D.

Where soil samples were selected in a borehole within an APEC and the SAP identified proposed soil analysis in that borehole, the field screening was used as follows to select the appropriate sample for laboratory analysis.

1. Select sample with evidence of visual and/or olfactory indications of suspected contamination, such as staining, PHC odours or deleterious fill material.
2. Select sample with most significant elevated soil vapour concentration.

3. Select sample based on stratigraphy and/or moisture content, as certain CPCs are generally expected to be found in these defined conditions (i.e. fill material at shallow depths or PHC impacts near the groundwater table interface).

v. Groundwater: Monitoring Well Installation

Installation of monitoring wells in BH1-20, BH6-20, BH12-20 and BH13-20 were completed by George Downing Estate Drilling. The wells were installed using slotted PVC No. 10 monitoring well screens, which were 51 mm in diameter; these screens were installed at the base of each of the aforementioned boreholes, directly above the bedrock surface. Well screens were 1.5 m in length in BH1-20 and BH12-20, 3.0 m in length in BH13-20 and 4.5 m in length in BH6-20. The monitoring wells were extended to approximately 1.0 m above the surface grade with PVC riser, also 51 mm in diameter. A threaded PVC end cap was installed at the base of the screen to prevent sediment infiltration, while a J-Plug was installed at the top of the riser to present surface influence.

The annular space in each monitoring well was backfilled with clean silica sand to approximately 0.3 m above the monitoring well screens. A layer of bentonite chips was then used to make a hydraulic seal above the sand pack to near the ground surface. The monitoring wells were completed with steel stickup protective casings, which were backfilled with sand to provide stability to the casing and PVC riser.

Development of each of the monitoring wells was completed using dedicated Waterra low density polyethylene (LDPE) tubing and a Waterra footvalve. The monitoring wells were developed on June 16, 2020 by removing at approximately 10 well volumes from BH6-20 and purging BH13-20 dry at least three times. The monitoring wells installed in BH1-20 and BH12-20 were dry and were not developed. The wells were left to stabilize for a period of seven days prior to groundwater sampling.

vi. Groundwater: Field Measurement of Water Quality Parameters

Measurements of the groundwater quality field parameters were completed to determine stabilization of these parameters prior to sampling. These measurements were completed using Horiba U-52 groundwater quality measurement device ("Horiba"). The Horiba used for groundwater quality parameter stabilization measurements as part of this Phase Two ESA was obtained from Maxim Environmental and Safety Inc. and was calibrated on June 17, 2020. The Horiba is capable of measuring temperature, pH, conductivity, turbidity, dissolved oxygen and oxidation reduction potential. Additional equipment and calibration information for the Horiba is provided on the certificate of calibration included in Appendix D.

Field measurement of water quality parameters were collected at regular intervals (0 L, 0.5 well volumes, 1 well volume, 2 well volumes, etc.) during purging of the monitoring wells prior to sampling. The Horiba was placed in a flow-through cell and water quality parameters were

measured until they were found to stabilize to within approximately 10% of the previous measurements prior to sample collection.

vii. Groundwater: Sampling

Groundwater sampling was completed on June 23, 2020. Groundwater samples were collected from monitoring wells BH6-20 and BH13-20, which were installed as part of this Phase Two ESA. Monitoring wells installed in BH1-20 and BH12-20 were installed in the overburden and were found to be dry during the groundwater sampling event. Monitoring wells BH8-1, BH18-2 and BH18-1, which were previously installed at the Phase Two Property within the APECs and in close proximity to BH1-20 and BH12-20 were sampled as substitutes for BH1-20 and BH12-20; it is suspected that these monitoring wells have their screens set into the bedrock.

Stabilized groundwater levels were measured in each of the groundwater monitoring wells prior to disturbance of the water column prior to sampling. The dedicated Waterra LDPE tubing and footvalve was removed from each of the monitoring wells and 6 m Waterra LDPE tubing was placed in each of the monitoring wells. The LDPE tubing was connected to a dedicated length of silicon tubing, run through a peristaltic pump set to low flow (approximately 0.2-0.5 L/minute) during purging and sampling while monitoring groundwater level to minimize the drop in head. The monitoring wells were purged on the day of sampling while water quality parameters were measured as noted above.

Groundwater samples were collected in dedicated amber glass bottles and vials or plastic bottles prepared and provided by the analytical laboratory. Analytes and associated preservatives were specified on each bottle by the laboratory. Each bottle sample set was provided with a unique sample identifier, project number and date of sampling in the field. Samples for PHCs, BTEXs, VOCs, PAHs and general chemistry were unfiltered, while metals samples were field filtered using a dedicated 0.45 µm Waterra filter for each sample.

The field technician changed dedicated sterile nitrile gloves prior to initiating work at each monitoring well and changed gloves prior to sample collection to minimize the potential for cross-contamination.

viii. Sediment: Sampling

There were no natural surface water bodies at the Phase Two Property, and as such no sediment sampling was completed as part of the Phase Two ESA.

ix. Analytical Testing

Soil and groundwater analytical testing was conducted by Paracel Laboratories Ltd. (Paracel). Paracel is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) and the National Institute of Standards and Technology (NIST), Standard Services Division, National Voluntary Laboratory Accreditation Program (NVLAP) for specific environmental and IAQ tests listed in the Scopes of Accreditation registered with each association. For the scope of

accreditation under CALA Membership Number 1262, Paracel is accredited for analysis including, but not limited to, metals, organics, conventionals, bacteria, mold, and asbestos in various matrices.

x. Residue Management Procedures

Excess soil cuttings from drilling and monitoring well installations were containerized in steel 205 L drums, which were stored in the immediate vicinity to the borehole/monitoring well from which they were generated. These drums were marked with a wax crayon indicating the origin location(s) of the cuttings containerized within each.

Groundwater from well development and purging was initially placed in a graduated plastic bucket for volume measurements and then was transferred to a dedicated plastic 205 L drum, which was stored in the vicinity of BH12-20. This drum was marked with a wax crayon indicating the origin location(s) of the water containerized within.

Fluids from equipment cleaning and decontamination were containerized within the purge water drum.

xi. Elevation Surveying

An elevation survey was completed of the boreholes/monitoring wells drilled as part of the Phase Two ESA as well as select existing monitoring wells at the Phase Two Property. The boreholes/monitoring wells were surveyed relative to a temporary benchmark of the top of spindle of the City of Ottawa fire hydrant located at the southeast corner of the Hemlock Road and Barielle-Snow Street intersection; this benchmark was assigned a reference elevation of 100.000 m ("Site Datum") for the purposes of this Phase Two ESA. The reference elevations of each borehole/monitoring well are provided on the borehole logs in Appendix C.

xii. Quality Assurance and Quality Control Measures

Soil samples were collected in dedicated clear glass jars prepared and provided by the analytical laboratory. Soil samples collected for BTEXs/VOCs and the F1 range of PHCs analysis were collected using dedicated graduated syringes provided by the laboratory and placed directly into a glass vial with methanol preservative. Analytes and associated preservatives were specified on each jar/vial by the laboratory. Each jar/vial sample set was provided with a unique sample identifier, project number and date of sampling in the field.

Groundwater samples were collected in dedicated amber glass bottles and vials or plastic bottles prepared and provided by the analytical laboratory. Analytes and associated preservatives were specified on each bottle by the laboratory. Each bottle sample set was provided with a unique sample identifier, project number and date of sampling in the field.

Following sample collection, the soil and groundwater samples were stored in an ice pack chilled cooler to minimize volatilization and begin the cooling process on the day of sampling. On each day of sample collection, following completion of the fieldwork, samples were delivered directly

to the analytical laboratory. Standard chain of custody procedures were used to maintain a custody record of soil and groundwater samples between the field technician and the analytical laboratory.

The split spoons, which were the only media to come into contact with the soil samples, were washed using soap and water and a scrub brush between samples to minimize the potential for cross contamination among samples. The field technician used sterile nitrile gloves, which were changed prior to the handling of each soil sample to prevent cross-contamination. The field technician changed dedicated sterile nitrile gloves prior to initiating work at each monitoring well and changed gloves prior to sample collection to minimize the potential for cross-contamination.

A trip blank water sample for VOCs was submitted for laboratory analysis from the groundwater sampling event completed on June 23, 2020.

The soil sample (BH22-20-SS5) was submitted to the laboratory as a blind field duplicate sample of BH12-20-SS5). The ratio of soil duplicates to samples was 1 to 8 or 12.5%, which meets the required ratio. These samples were analyzed for PHCs, VOCs (including BTEXs), PAHs and metals & inorganics, which provide a blind quality assurance and quality control QA/QC validation for all soil parameters analyzed as part of this Phase Two ESA.

The groundwater sample (BHD-1) was submitted to the laboratory as a blind field duplicate sample of BH8-1. The ratio of groundwater duplicates to samples was 1 to 5 or 20% which meets the required ratio. These samples were analyzed for PHCs, VOCs (including BTEXs), PAHs and metals & inorganics, which provide a blind quality assurance and quality control QA/QC validation for all groundwater parameters analyzed as part of this Phase Two ESA.

No equipment blank of groundwater was required since the groundwater samples were collected using dedicated tubing.

6. Review and Evaluation

i. Geology

Based on the observations of soil samples collected during the Phase Two ESA field program, there were four stratigraphic units identified at the Phase Two Property, which include:

Topsoil

A thin layer of topsoil, approximately 0.05 to 0.15 m in thickness, was encountered at the ground surface in BH2-20 and BH4-20 through BH7-20. This material was identified to consist of silty sand with some gravel and organics (grass and roots), loose, brown and was moist or damp.

Silty Sand and Gravel (Fill)

A layer of fill material, ranging from approximately 0.6 to 4.7 m in thickness, was encountered from ground surface or immediately below the topsoil layer in all of the boreholes drilled as part of the Phase Two ESA. This material was identified to consist of silty sand and gravel with some cobbles, some clay, was loose to compact and generally grey. This layer was encountered at varying moisture conditions, generally dry at shallow depths becoming wet at approximately 3.0 m BGS. In BH1-20, BH3-20, BH12-20 and BH13-20 this fill material extended down to suspected bedrock.

Cinders and black staining were observed in BH2-20 at an approximate depth of 1.1 m BGS. Occasional asphalt pieces were observed in BH10-20 at an approximate depth of 3.5 m BGS and in BH12-20 at depths of approximately 2.3 m BGS and 3.8 m BGS.

Silty Clay

A layer of silty clay, ranging from approximately 2.6 to 7.5 m in thickness, was encountered immediately below the silty sand and gravel fill layer in BH2-20 and BH4-20 through BH11-20. This material was identified to consist of silty clay, firm (near surface) to soft (saturated conditions) and was grey or brown-grey. This layer was encountered at varying moisture conditions, generally dry at shallow depths becoming wet at approximately 3.4 m BGS. With the exception of BH5-20 and BH6-20, this material was found to be underlain by suspected bedrock.

Silty Sand and Gravel (Native)

A layer of silty sand and gravel, approximately 0.1 to 0.2 m in thickness, was encountered below the silty clay layer right above refusal in BH2-20, BH5-20 and BH6-20. This material consisted of brown silty sand and gravel, was loose and wet. Where present, this material was found to be underlain by suspected bedrock.

Aquifer

The shallow (unconfined) aquifer is the aquifer of interest based on the nature of APECs and PCAs identified for the Phase Two Property. It is present in across several geological units, including the silty sand and gravel (fill) layer and in the upper limestone bedrock on the north portion of the Phase Two Property and in the silty clay layer in the undisturbed areas of the Phase Two Property (primarily south and central portions). The fill (silty sand and gravel) and shallow (suspected fractured) limestone bedrock units are expected to have higher permeability, while the silty clay layer is expected to have low permeability and restrict the movement of groundwater and associated contaminants. The shallow aquifer present in the silty clay unit is expected to have response delays associated with groundwater recharge from precipitation and snow melt events, due to the presence of low permeability silty clay (acting as an aquitard) present above the aquifer.

Based on moisture contents observed in the soil samples collected as part of this Phase Two ESA and recorded groundwater measurements reported in previous investigations is expected that seasonal and annual variability affect the groundwater table elevation in the shallow aquifer.

ii. Groundwater and Elevations and Flow Direction

Based on the nature of the primary CPCs identified for groundwater at the Phase Two Property (including light non-aqueous phase liquids (LNAPLs)), the screened intervals for the groundwater monitoring wells installed as part of this Phase Two ESA was selected to straddle the shallow groundwater table within the overburden. Based on previous investigations, it was suspected that existing monitoring wells located within the APECs at the Phase Two Property had monitoring well screens that spanned the bedrock interface, and are thus in same aquifer as the 2020 monitoring wells and could be used for supplemental sampling as part of this Phase Two ESA in the event that the shallow groundwater was not be present in the overburden monitoring wells.

The groundwater table was measured at depths ranging between 4.11 and 5.43 m BGS on June 23, 2020, seven days after installation (see Table 2). In general, the shallow groundwater aquifer was not present within the overburden on the north portion of the Phase Two Property, with the exception of BH13-20. Given the general consistency in depth of the groundwater table in different geological units at the north portion of Phase Two Property, it is suspected that the same shallow aquifer exists across these units and can be used for a determination of groundwater flow direction and hydraulic gradient. Monitoring well construction details are presented in Table 1 below.

Table 1: Monitoring Well Construction Details

Monitoring Well	Ground Surface Elevation	Top of Piezometer Elevation	Screen Elevation	Sand Pack Elevation	Bentonite Seal
BH1-20	97.86	98.58	93.96 – 95.48	93.96 – 95.78	95.78 – 97.86
BH6-20	97.90	98.86	91.23 – 95.80	91.23 – 96.10	96.10 – 97.90
BH12-20	97.67	98.40	93.82 – 95.34	93.82 – 95.64	95.64 – 97.67
BH13-20	98.07	98.85	93.39 – 96.44	93.39 – 96.74	96.74 – 98.07
BH8-1	97.96	99.07	88.78 - unknown	unknown	unknown
BH18-1	97.70	98.62	89.89 - unknown	unknown	unknown
BH18-2	97.75	98.72	88.33 - unknown	unknown	unknown

m RSD – metres Below Referenced to Datum

The boreholes/monitoring wells were surveyed relative to a temporary benchmark of the top of spindle of the City of Ottawa fire hydrant located at the southeast corner of the Hemlock Road and Barielle-Snow Street intersection; this benchmark was assigned a reference elevation of 100.000 m ("Site Datum") for the purposes of this Phase Two ESA. Following a period of seven days for stabilization after drilling and developing the monitoring wells, the groundwater levels were measured and are presented in Table 2 below.

Table 2: Groundwater Table Elevations Measured on June 23, 2020

Monitoring Well	Ground Surface Elevation (m RSD)	Top of Piezometer (TOP) Elevation	Depth to Groundwater (m below TOP)	Groundwater Table Elevation (m RSD)	Groundwater Depth m BGS
BH1-20	97.86	98.58	Dry	-	-
BH6-20	97.90	98.86	6.39	92.47	5.43
BH12-20	97.67	98.40	Dry	-	-
BH13-20	98.07	98.85	5.30	93.55	4.53
BH8-1	97.96	99.07	5.41	93.66	4.30
BH18-1	97.70	98.62	5.03	93.59	4.11
BH18-2	97.75	98.72	5.13	93.59	4.16

m RSD – meters Referenced to Site Datum
m BGS – metres below Ground Surface.

Three groundwater monitoring well water table elevations are required to triangulate groundwater elevations and determine an approximate groundwater flow direction. The

groundwater table elevations in BH13-20, BH18-1 and BH18-2 were used for a determination of groundwater flow direction. Based on the measured groundwater table elevations in these monitoring wells, the local groundwater flow direction is towards the north-northwest. This interpreted groundwater flow direction is reasonable based on the regional topography and the location of the nearest significant surface water body, the Ottawa River, to the north of the Phase Two Property. The water table in BH6-20 is in the silty clay unit and does not appear to have equilibrated by the time of measurement.

No observations or indications of free product were observed in any of the monitoring wells accessed as part of this Phase Two ESA, as measured with an interface probe during water level measurements, and through observations of the purge water during development and sampling of the monitoring wells.

Based on the depth to groundwater observed in the monitoring wells as part of this investigation, at greater than 4 m BGS and the general expected depth of underground utility service trenches (generally approximately 2 m BGS), natural groundwater at the Phase Two Property is not expected to migrate through buried service trenches.

iii. Groundwater: Hydraulic Gradients

The horizontal hydraulic gradient was determined by plotting groundwater contours interpreted from groundwater elevations presented in Table 2 and then by dividing the difference in hydraulic head by the lateral separation distance in the groundwater contours. Based on the measured groundwater elevations in BH13-20, BH18-1 and BH18-2 the horizontal hydraulic gradient at the Phase Two Property is approximately 0.004 m/m.

iv. Fine-Medium Soil Texture

A substantial layer of fill material, consisting of silty sand and gravel, which would be classified as coarse-grained soil, is present to full depth to bedrock on the north portion of the Phase Two Property and near surface elsewhere at the Property. It is interpreted that greater than 1/3 of the Phase Two Property has coarse grained soil. For the purposes of this Phase Two ESA, the soil conditions are considered to be coarse grained, which provides a more conservative comparison to the MECP site condition standards

v. Soil Field Screening

Initial field screening of the soil samples consisted of visual and olfactory observations made at the time of sample collection during the drilling program. There were no olfactory observations of PHC contamination encountered in any of the samples recovered as part of this Phase Two ESA. Samples recovered from boreholes BH2-20 and BH12-20 on the north portion of the Phase Two Property had visual indications of the presence of poor environmental quality fill; cinder and black staining were observed at a depth of approximately 1.1 m BGS in BH2-20, while asphalt pieces were observed at depths of approximately 2.3 m BGS and 3.8 m BGS in BH12-20.

Additional field screening of the soil samples was completed using an RKI Eagle gas detector. Combustible soil vapour screening concentrations were found to range from 0 to 60 ppm, which is low and generally not considered indicative of significant PHC contamination.

vi. Soil Quality

Location and Depth of Soil Samples

The following soil samples, which were collected from the boreholes drilled as part of this Phase Two ESA, were submitted for laboratory analysis.

Table 3: Soil Samples Selected for Laboratory Analysis

Sample Location	Sample ID	Sample Depth (m BGS)	Analytical Parameters
BH1-20	BH1-20-SS5	3.3 – 3.9	PHCs, VOCs, PAHs
BH2-20	BH2-20-SS2	0.8 – 1.3	PHCs, BTEXs, PAHs, Metals & Inorganics
BH6-20	BH6-20-SS7	4.9 – 5.5	PHCs, BTEXs
BH9-20	BH9-20-SS3	1.6 – 2.3	PHCs, BTEXs
BH10-20	BH10-20-SS5	3.3 – 3.9	PHCs, VOCs, PAHs
BH12-20	BH12-20-SS5	3.3 – 3.9	PHCs, VOCs, PAHs, Metals & Inorganics
Duplicate of BH12-20	BH22-20-SS5	3.3 – 3.9	PHCs, VOCs, PAHs, Metals & Inorganics
BH13-20	BH13-20-SS2	0.8 – 1.3	PHCs, BTEXs, PAHs, Metals & Inorganics
BH13-20	BH13-20-SS5	3.3 – 3.9	PHCs, VOCs

Comparison of Soil Analytical Results to Applicable Site Conditions Standards

The analytical soil results were compared to the full depth generic site condition standards, with non-potable groundwater, course textured soil, for residential property use, as specified in Table 3 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011.

The aforementioned soil samples selected for laboratory analysis were submitted to Paracel under chain of custody Nos. 55470 and 55471 on June 15 and 16, 2020. The laboratory certificates of analysis (Paracel Report #s 2025116 and 2025227) are provided in Appendix E. The following soil sample results were in exceedance of the site condition standards:

- BH13-20-SS2, collected from a depth of approximately 0.8-1.3 m BGS, had a conductivity measurement of 1950 µS/cm compared to the site condition standard of 700 µS/cm.

All of the other analyzed soil samples were in compliance with the site condition standards. A full summary of the soil analytical results and comparison to the applicable site condition standards are presented in Table 1: Soil Analytical Results following the text of this report.

Comparison of TCLP Analytical Results to O.Reg. 558/00

A waste characterization sample was selected for laboratory analysis of toxicity characteristic leaching procedure (TCLP) analysis for flashpoint, leachate metals & inorganics, leachate VOCs and leachate organics (PAHs and polychlorinated biphenyls (PCBs)). This sample was comprised of a composite of worst case samples, as determined by field screening parameters, from BH2-20, BH10-20, BH12-20 and BH13-20.

The aforementioned composite soil sample selected for TCLP laboratory analysis was submitted to Paracel under chain of custody No. 55471 on June 16, 2020. The laboratory certificate of analysis (Paracel Report # 2025228) is provided in Appendix E.

This composite sample was compared to the criteria specified in schedule IV of O.Reg. 558/00 and no measured parameter exceeded the toxicity criteria. Based on the analytical results and field screening, if excess soil generated from redevelopment of the Site cannot be reused as clean fill at an appropriate receiving site, it can be treated as solid non-hazardous waste.

A full summary of the soil analytical results and comparison to the Schedule IV of O.Reg. 558/00 standards are presented in Table 2: TCLP Analytical Results following the text of this report.

Contaminants of Concern

The contaminants of potential concern associated with retail fueling (APEC #1) are generally PHCs and BTEXs and metals, since this was an older facility and lead was historically present in gasoline. The contaminants of potential concern commonly found in poor environmental quality backfill (APEC #2) are PHCs/BTEXs, PAHs and metals. The contaminants of concern for a particular sample were based on the relative location and depth of the sample, visual and/or olfactory observations and combustible vapour screening concentrations.

Contaminants Related to Chemical and Biological Transformations

Contaminants related to chemical and biological transformations were not suspected to be present at the Phase Two Property and were not identified as part of the Phase Two ESA soil analysis.

Soil Serving as a Source of Contaminant Mass Contributing to Groundwater

Based on the analytical results, there is no soil that serves as a source of contaminant mass contributing to groundwater at the Phase Two Property.

Light or Dense Non-Aqueous Phase Liquids

The analytical results do not indicate the presence of light or dense non-aqueous phase liquids at the Phase Two Property.

vii. Groundwater Quality

Locations and Sample Depth Interval of Groundwater Samples

The groundwater samples were collected using a peristaltic pump with tubing lowered to between the top and approximate (vertical) center of the water column within each monitoring well and withdrawing the water at low flow rates. The groundwater sample locations, screen depths and parameters analyzed are presented in Table 4 below.

Table 4: Groundwater Samples Selected for Laboratory Analysis

Sample Location	Groundwater Level (m RSD)	Screen Depth (m RSD)	Analytical Parameters
BH6-20	92.47	91.23 – 95.80	PHCs, VOCs, PAHs, Metals & Inorganics
BH13-20	93.55	93.39 – 96.44	PHCs, BTEXs
BH8-1	93.66	88.78 - unknown	PHCs, VOCs, PAHs, Metals & Inorganics
BHD-1 (Duplicate of BH8-1)	93.66	88.78 - unknown	PHCs, VOCs, PAHs, Metals & Inorganics
BH18-1	93.59	89.89 - unknown	PHCs, VOCs, PAHs, Metals & Inorganics
BH18-2	93.59	88.33 - unknown	PHCs, VOCs, PAHs, Metals & Inorganics

m RSD – metres Referenced to Site Datum

Field Filtering

Samples for PHCs, BTEXs, VOCs, PAHs and general chemistry were unfiltered, while metals samples were field filtered using a dedicated 0.45 µm Waterra filter for each sample.

Comparison of Groundwater Analytical Results to Applicable Site Conditions Standards

The analytical groundwater results were compared to the full depth generic site condition standards, with non-potable groundwater, course textured soil, as specified in Table 3 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011.

The groundwater samples selected for laboratory analysis were submitted to Paracel under chain of custody No. 125319 on June 23, 2020. The laboratory certificate of analysis (Paracel Report # 2026213) is provided in Appendix E.

All of the groundwater samples were in compliance with the site condition standards. A full summary of the groundwater analytical results and comparison to the applicable site condition standards are presented in Table 3: Groundwater Analytical Results following the text of this report.

Contaminants of Concern

The contaminants of potential concern associated with retail fueling (APEC #1) are generally PHCs and BTEXs, and metals, since this was an older facility and lead was historically present in gasoline. The contaminants of potential concern commonly found in poor environmental quality backfill (APEC #2) are PHCs/BTEXs, PAHs and metals.

The contaminants of concern for a particular sample were based on the relative location and depth of the sample, visual and/or olfactory observations of soil samples collected which could have come into contact with the groundwater table.

Contaminants Related to Chemical and Biological Transformations

Contaminants related to chemical and biological transformations were not suspected to be present at the Phase Two Property and were not identified as part of the Phase Two ESA groundwater analysis.

Soil Serving as a Source of Contaminant Mass Contributing to Groundwater

Based on the groundwater analytical results, there is no soil that serves as a source of contaminant mass contributing to groundwater at the Phase Two Property.

Light or Dense Non-Aqueous Phase Liquids

The analytical results do not indicate the presence of light or dense non-aqueous phase liquids at the Phase Two Property.

viii. Sediment Quality

There were no natural surface water bodies at the Phase Two Property, and as such no sediment sampling was completed as part of the Phase Two ESA.

ix. Quality Assurance and Quality Control Results

The soil sample (BH22-20-SS5) was submitted to the laboratory as a blind field duplicate sample of BH12-20-SS5). These samples were analyzed for PHCs, VOCs (including BTEXs), PAHs and metals & inorganics, which provide a blind quality assurance and quality control QA/QC validation for all soil parameters analyzed as part of this Phase Two ESA.

The groundwater sample (BHD-1) was submitted to the laboratory as a blind field duplicate sample of BH8-1). These samples were analyzed for PHCs, VOCs (including BTEXs), PAHs and metals & inorganics, which provide a blind quality assurance and quality control QA/QC validation for all groundwater parameters analyzed as part of this Phase Two ESA.

The relative percent difference of the original and duplicate sample results were calculated for each parameter. In general, where significant detections of a parameter (over five times the detection limit) were reported by the laboratory, the relative percent difference was within 10-15% for the two results. Relative percent difference calculations with low or non-detected parameter concentrations do not provide a good comparison of analytical soil results, as there can be a high degree of variability in parameter results at concentrations near to the detection limit.

The QA/QC duplicate sample results demonstrate that the data are reliable, appropriate and accurate in the determination of whether the phase two property meets the applicable site condition standards

The laboratory made qualifying statements for login criteria on several sample results due to the difference in naming convention on the soil jars and vials compared to what was presented on the chain of custody. In these circumstances, the labeling on the jar was made for simplicity and no concerns are present with respect to the validity of any of the laboratory results. The laboratory qualified the login temperature of soil samples submitted on June 16, 2020 as greater than 25℃; it is suspected that only one temperature measurement was taken by laboratory staff and it was collected from the TCLP sample jars, which were the final sample placed into soil jars during sampling. The remaining samples were placed in jars following collection and were kept in an ice chilled cooler throughout the fieldwork and during transportation to the laboratory. The qualifying remarks in certificates of analysis are not expected to impact the validity of any results qualified.

All certificates of analysis were received pursuant to clause 47 (2) (b) of O.Reg. 153/04 and comply with subsection 47 (3) of O.Reg. 153/04.

The overall quality of the field data from the investigation with respect to the data quality objectives, demonstrate that decision-making was not affected, and the overall objectives of the investigation and the assessment were met.

x. Phase Two Conceptual Site Model

The presence of a former retail fuel outlet was identified on the north portion of the Phase Two Property. This former retail fuel outlet is a significant potentially contaminating activity which represents APEC #1 for the Property. The contaminants of potential concern associated with retail fueling are generally PHCs and BTEXs and metals, since this was an older facility and lead was historically present in gasoline. .

The practice of backfilling following decommissioning, demolition and remediation activities was identified in various locations at the Phase Two Property. Backfilling with fill of unknown environmental quality is a significant potentially contaminating activity which represents APEC #2 for the Property. The contaminants of potential concern commonly found in poor environmental quality backfill are PHCs/BTEXs, PAHs and metals.

Historically, underground utility service trenches would have been present at the Phase Two Property. It is unknown if all of the former underground utilities have been removed, however, if present, the former underground utility corridors do have the potential to affect contaminant distribution and transport, as they would create preferential pathways for lateral migration. As noted, based on the depth to groundwater observed in the monitoring wells as part of this investigation, at greater than 4 m BGS and the general expected depth of underground utility service trenches (generally approximately 2 m BGS), natural groundwater at the Phase Two Property is not expected to migrate through buried service trenches.

The overburden stratigraphy of the Phase Two Property is present in four geological units, including a topsoil layer near ground surface, silty sand and gravel (fill) layer primarily present on the north portion of the Property, a native silty clay layer present on the central and south portions of the Property and undisturbed areas on the north portion and a native silty sand and gravel layer, found below the silty clay on the southeast portion of the Property.

The shallow aquifer present in the fill (silty sand and gravel) and shallow (suspected fractured) limestone bedrock units is expected to have higher permeability, while the shallow aquifer in the silty clay layer is expected to have low permeability and restrict the movement of groundwater and associated contaminants. The shallow aquifer present in the silty clay unit is expected to have response delays associated with groundwater recharge from precipitation and snow melt events, due to the presence of low permeability silty clay (acting as an aquitard) present above the aquifer.

The overburden soil is underlain by the limestone bedrock at depths ranging from 3.6 m BGS on the northwest north portion of the Phase Two Property to 8.3 m BGS on the southwest portion of the Property.

The groundwater table was measured at depths ranging between 4.11 and 5.43 m BGS. In general, the shallow groundwater aquifer was not present within the overburden on the north portion of the Phase Two Property, with the exception of BH13-20. Given the general consistency in depth measured to the should groundwater table in different geological units at the north portion of Phase Two Property, it is suspected that the same shallow aquifer exists across these units and can be used for a determination of groundwater flow direction and hydraulic gradient. The horizontal hydraulic gradient on the north portion of the Phase Two Property was calculated to be approximately 0.004 m/m with a groundwater flow direction towards the north-northwest.

The proposed redevelopment of the Phase Two Property includes construction of four residential buildings, ranging from four to nine stories, with mechanical rooms below grade. The orientation of the proposed buildings includes one building located along Mikinak Road on the south portion of the Phase Two Property, two buildings located along Michael Stoqua Street on the east portion of the Property and one building located along Hemlock Road on the north portion of the Property. A paved parking area and access to the Phase Two Property has been proposed along Barielle-Snow Street on the west portion of the Property.

The Phase Two Property and all other properties within 250 m of the property boundaries are supplied by Ottawa's municipal potable water supply system. The RSC does not specify agricultural use and there are no wells within 250 m of the property boundaries that are intended for use as a source of water for human consumption or agriculture. As such, the designation of non-potable groundwater setting is determined to be applicable [O.Reg. 153/04, section 35].

The Phase Two Property is not situated within or adjacent to an area of natural significance and does not include any land within 30 m of an area of natural significance. The pH of the soil was analyzed as part of this Phase Two ESA and was found to range from 7.24 to 7.51. As such, the Phase Two Property is not considered to be an environmentally sensitive area [O.Reg. 153/04, section 41].

Review of the drilling program and borehole/monitoring well logs completed as part of this Phase Two ESA and previous investigations was completed. It was determined that greater than 2/3 of the Phase Two Property has greater than 2 m of overburden soil. The Phase Two Property is not considered a shallow soil property [O.Reg. 153/04, section 43.1].

The Phase Two Property does not include and does not have any land located within 30 m of a water body. The MECP site condition standards for use within 30 m of a water body do not apply [O.Reg. 153/04, section 43.1].

The full depth generic site condition standards, with non-potable groundwater, course textured soil, for residential property use, as specified in Table 3 of the MECP Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, April 15, 2011 were determined to be the applicable site condition standards for the Phase Two Property as part of this Phase Two ESA.

The soil sample BH13-20-SS2, collected from a depth of approximately 0.8-1.3 m BGS on the north-northwest portion of the Phase Two Property, had a conductivity measurement of 1950 µS/cm compared to the site condition standard of 700 µS/cm. This sample was collected from backfill material, consisting primarily of silty sand and gravel. This backfill was placed as part of remediation activities following decommissioning of the former retail fuel outlet on the north portion of the Phase Two Property. This sample was collected in a location that would have been subject to de-icing activities with the application of salts applied to ground surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both and is suspected

to exceed the site condition standard solely as a result of these activities. Based on this application and the exemption set forth in Section 49.1 of O.Reg. 153/04, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act. Based on additional soil analysis in other locations at the Phase Two Property, the presence of elevated conductivity appears to be isolated into localized area(s) and is not considered to have migrated or impacted the Phase Two Property groundwater quality.

All of the soil and groundwater results for the Phase Two Property are in compliance with the applicable site condition standards as of the certification date of June 23, 2020.

7. Conclusions

The soil sample BH13-20-SS2, collected from a depth of approximately 0.8-1.3 m BGS on the north-northwest portion of the Phase Two Property, had the only exceedance of the MECP Table 3 Standards. It had a conductivity measurement of 1950 µS/cm compared to the site condition standard of 700 µS/cm. This sample was collected from backfill material, consisting primarily of silty sand and gravel. This backfill was placed as part of remediation activities following decommissioning of the former retail fuel outlet on the north portion of the Phase Two Property. This sample was collected in a location that would have been subject to de-icing activities with the application of salts applied to ground surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both and is suspected to exceed the site condition standard solely as a result of these activities. Based on this application and the exemption set forth in Section 49.1 of O.Reg. 153/04, the applicable site condition standard is deemed not to be exceeded for the purpose of Part XV.1 of the Act. Based on additional soil analysis in other locations at the Phase Two Property, the presence of elevated conductivity appears to be isolated into localized area(s) and is not considered to have migrated or impacted the Phase Two Property groundwater quality.

All of the soil and groundwater results for the Phase Two Property are in compliance with the applicable site condition standards as of the certification date of June 23, 2020.

It should be noted that, based on field observations, a high degree of heterogeneity is expected in the imported backfill which has been historically placed at the Phase Two Property as part of previous remediation, demolition/decommissioning and grading work. It is recommended that an environmental consultant periodically review the excavation work during redevelopment to ensure that excess soil generated as part of the redevelopment is managed appropriately. Best management practices would also include preparation of a soil management plan in accordance with O.Reg. 406/19.

i. Signatures

The Qualified Person for this study is Mr. Luke Lopers, P. Eng. Mr. Lopers has been a Professional Engineer, registered in Ontario since 2012 and has been working on environmental site assessments since 2006. Mr. Lopers has been an author, project manager and/or peer reviewer for hundreds of Phase One ESAs and Phase Two ESAs as well as previously filed RSCs.

The reviewer for this study is Mr. Don Plenderleith, P.Eng. Mr. Plenderleith is a Professional Engineer registered in Ontario since 1994 and has authored and/or reviewed hundreds of Phase One and Two ESAs in Ontario and the rest of Canada. The qualifications of the assessor/Qualified Person and reviewer are included in Appendix F.

Sincerely,

Luke Lopers, P.Eng., QP_{ESA}

Don Plenderleith, P.Eng., QP_{ESA}

LICENSED PROFESSIONAL ENGINEER
L. A. LOPERS
100176730
LOP20-001B
JULY 15, 2020
PROVINCE OF ONTARIO

8. Limitations

The findings and conclusions of this Phase Two ESA are based on the information provided and/or reviewed as part of this study.

This Phase Two ESA has been completed with the standard of care generally expected in the industry for a study of this nature.

This Phase Two ESA has been prepared for the sole use of Ottawa Community Housing Corporation for the purposes of a due diligence assessment of the potential liabilities which may exist at the Phase Two Property. No other party is permitted to rely on the conclusions or findings of this report without the written consent of Lopers & Associates and Ottawa Community Housing Corporation.

Changes to the physical setting of the Phase Two Property, Phase One Study Area and applicable regulations governing Phase One and Two Environmental Site Assessments have the potential to influence the validity of the conclusions and opinions presented in this Phase Two ESA.

9. References

Legal Survey Plan, Farley, Smith & Denis Surveying Ltd., dated May 12, 2020.

City of Ottawa, geoOttawa mapping website, Visited June through July, 2020. http://maps.ottawa.ca/geoottawa/

Google Earth, Visited June through July, 2020.

"Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", produced by the Ontario Ministry of the Environment, dated April 15, 2011.

"Phase One Environmental Site Assessment, 715 Mikinak Road, Ottawa, Ontario" dated July 7, 2020 prepared for Ottawa Community Housing Corporation by Lopers & Associates.

"Limited Environmental Due Diligence and Groundwater Quality Assessment, October 2019 Sampling Event, 715 Mikinak Road, Ottawa, Ontario", dated November 8, 2019, completed by GHD Limited (Author: Luke Lopers) for Ottawa Community Housing Corporation.

"2010 Phase III Environmental Site Assessment (ESA), Former CANEX/Shell Site, CFB Rockcliffe, Ottawa, Ontario", prepared for Public Works and Government Services Canada (PWGSC), prepared by DST Consulting Engineers (DST), dated September, 2010.

"Phase One Environmental Site Assessment, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated March, 2015.

"Phase Two Environmental Site Assessment Update, Volume 5, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated May, 2015.

"Additional Groundwater Sampling in Support of RSC Submission – RSC 7, Wateridge Development, Former CFB Rockcliffe, Ottawa, Ontario", prepared for Canada Lands Company (CLC) Limited, prepared by DST Consulting Engineers (DST), dated March 13, 2019.

Record of Site Condition 226318 (and supporting documents), 715 Mikinak Road, Ottawa, Ontario, submitted by DST on behalf of CLC, filed to the Environmental Site Registry January 7, 2020.

Paracel Certificate of Analysis – Report # 2025116 - Soil Sample Submission June 15, 2020

Paracel Certificate of Analysis – Report # 2025227 - Soil Sample Submission June 16, 2020

Paracel Certificate of Analysis – Report # 2025228 - TCLP Sample Submission June 16, 2020

Paracel Certificate of Analysis – Report # 2026213 - Groundwater Sample Submission June 23, 2020

10. Appendices

Appendix A – Sampling and Analysis Plan

Appendix B – Underground Utility Locates

Appendix C – Borehole Logs

Appendix D – Certificates of Equipment Calibration

Appendix E – Laboratory Certificates of Analysis

Appendix F – Qualifications of Assessors

Figures

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LOPERS & ASSOCIATES

Figure 1: Key Plan
Phase Two Environmental Site Assessment
715 Mikinak Road, Ottawa, Ontario
Ottawa Community Housing Corporation

Project Reference No:	LOP20-001B
Drawing No.:	LOP20-001B-1
Date:	July 12, 2020
Author:	L. Lopers
Source:	geoOttawa, Base Mapping

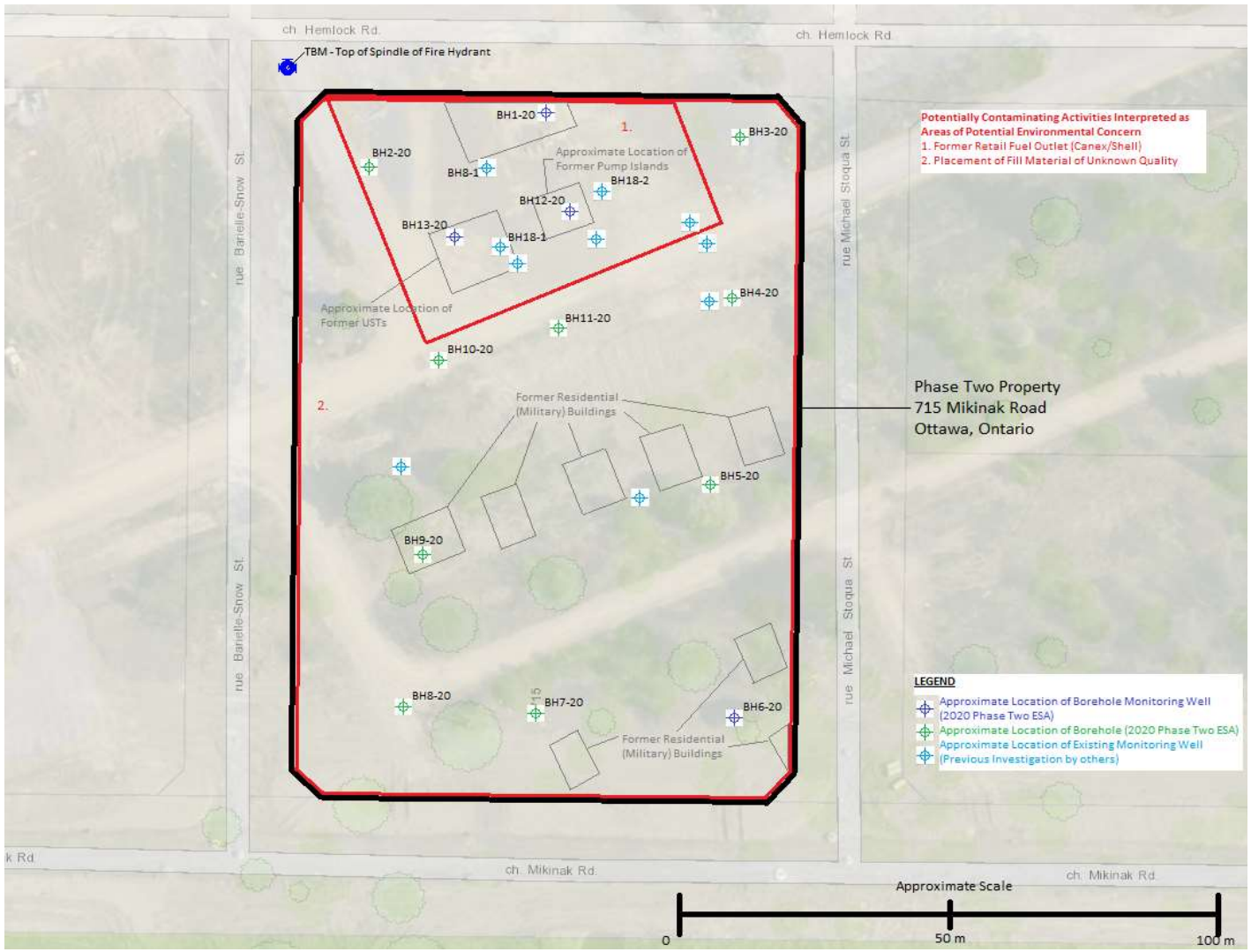

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Figure 2: Site Plan
Phase Two Environmental Site Assessment
715 Mikinak Road, Ottawa, Ontario
Ottawa Community Housing Corporation

Project Reference No:	LOP20-001B
Drawing No.:	LOP20-001B-2
Date:	July 12, 2020
Author:	L. Lopers
Source:	geoOttawa, 2017 Aerial Imagery

Tables

Table 1: Soil Analytical Results

715 Mikinak Road, Ottawa, Ontario

			Sample Location:	BH1-20-SS5	BH2-20-SS2	BH6-20-SS7	BH9-20-SS3	BH10-20-SS5	BH12-20-SS5	BH22-20-SS5	BH13-20-SS2	BH13-20-SS5
			Sample Depth:	3.3-3.9 m BGS	0.8-1.3 m BGS	4.9-5.5 m BGS	1.6-2.3 m BGS	3.3-3.9 m BGS	3.3-3.9 m BGS	Duplicate of BH12-20-SS5	0.8-1.3 m BGS	3.3-3.9 m BGS
			Sample Date:	June 15, 2020	June 15, 2020	June 15, 2020	June 16, 2020	June 16, 2020	June 16, 2020	June 16, 2020	June 16, 2020	June 16, 2020
			Laborartory Sample ID:	2025116-01	2025116-02	2025116-03	2025227-01	2025227-02	2025227-03	2025227-06	2025227-04	2025227-05
Parameter	Units	Method Detection Limit (MDL)	MECP Table 3: Residential Property Use Standard Coarse Grain Soil									
Petroluem Hydrocarbons (PHCs)												
F1 PHCs (C6-C10)	ug/g	7	55	ND	ND	ND	ND	ND	ND	ND	ND	ND
F2 PHCs (C10-C16)	ug/g	4	98	ND	ND	ND	ND	ND	ND	ND	ND	ND
F3 PHCs (C16-C34)	ug/g	8	300	ND	45	9	ND	46	50	53	31	ND
F4 PHCs (C34-C50)	ug/g	6	2800	ND	103	11	ND	45	263	315	88	ND
F4G PHCs (gravimetric)	ug/g	50	2800	-	-	-	-	-	630	630	-	-
Volatile Organic Compounds (VOCs)												
Acetone	ug/g	0.50	16	ND	-	-	-	ND	ND	ND	-	ND
Benzene	ug/g	0.02	0.21	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/g	0.05	13	ND	-	-	-	ND	ND	ND	-	ND
Bromoform	ug/g	0.05	0.27	ND	-	-	-	ND	ND	ND	-	ND
Bromomethane	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Carbon Tetrachloride	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Chlorobenzene	ug/g	0.05	2.4	ND	-	-	-	ND	ND	ND	-	ND
Chloroform	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Dibromochloromethane	ug/g	0.05	9.4	ND	-	-	-	ND	ND	ND	-	ND
Dichlorodifluoromethane	ug/g	0.05	16	ND	-	-	-	ND	ND	ND	-	ND
1,2-Dichlorobenzene	ug/g	0.05	3.4	ND	-	-	-	ND	ND	ND	-	ND
1,3-Dichlorobenzene	ug/g	0.05	4.8	ND	-	-	-	ND	ND	ND	-	ND
1,4-Dichlorobenzene	ug/g	0.05	0.083	ND	-	-	-	ND	ND	ND	-	ND
1,1-Dichloroethane	ug/g	0.05	3.5	ND	-	-	-	ND	ND	ND	-	ND
1,2-Dichloroethane	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
1,1-Dichloroethylene	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
cis-1,2-Dichloroethylene	ug/g	0.05	3.4	ND	-	-	-	ND	ND	ND	-	ND
trans-1,2-Dichloroethylene	ug/g	0.05	0.084	ND	-	-	-	ND	ND	ND	-	ND
1,2-Dichloropropane	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
cis-1,3-Dichloropropylene	ug/g	0.05		ND	-	-	-	ND	ND	ND	-	ND
trans-1,3-Dichloropropylene	ug/g	0.05		ND	-	-	-	ND	ND	ND	-	ND
1,3-Dichloropropene, total	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Ethylbenzene	ug/g	0.05	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylene dibromide (dibromoethane, 1,2-)	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Hexane	ug/g	0.05	2.8	ND	-	-	-	ND	ND	ND	-	ND
Methyl Ethyl Ketone (2-Butanone)	ug/g	0.50	16	ND	-	-	-	ND	ND	ND	-	ND
Methyl Isobutyl Ketone	ug/g	0.50	1.7	ND	-	-	-	ND	ND	ND	-	ND
Methyl tert-butyl ether	ug/g	0.05	0.75	ND	-	-	-	ND	ND	ND	-	ND
Methylene Chloride	ug/g	0.05	0.1	ND	-	-	-	ND	ND	ND	-	ND
Styrene	ug/g	0.05	0.7	ND	-	-	-	ND	ND	ND	-	ND
1,1,1,2-Tetrachloroethane	ug/g	0.05	0.058	ND	-	-	-	ND	ND	ND	-	ND
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Tetrachloroethylene	ug/g	0.05	0.28	ND	-	-	-	ND	ND	ND	-	ND
Toluene	ug/g	0.05	2.3	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ug/g	0.05	0.38	ND	-	-	-	ND	ND	ND	-	ND
1,1,2-Trichloroethane	ug/g	0.05	0.05	ND	-	-	-	ND	ND	ND	-	ND
Trichloroethylene	ug/g	0.05	0.061	ND	-	-	-	ND	ND	ND	-	ND
Trichlorofluoromethane	ug/g	0.05	4	ND	-	-	-	ND	ND	ND	-	ND
Vinyl Chloride	ug/g	0.02	0.02	ND	-	-	-	ND	ND	ND	-	ND
m/p-Xylene	ug/g	0.05	NV	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ug/g	0.05	NV	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	ug/g	0.05	3.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Polycyclic Aromatic Hydrocarbons												
Acenaphthene	ug/g	0.02	7.9	ND	ND	-	-	0.02	0.04	ND	ND	-
Acenaphthylene	ug/g	0.02	0.15	ND	ND	-	-	ND	ND	ND	ND	-
Anthracene	ug/g	0.02	0.67	ND	0.02	-	-	0.08	0.11	0.04	ND	-
Benzo[a]anthracene	ug/g	0.02	0.5	ND	0.05	-	-	0.15	0.15	0.08	ND	-
Benzo[a]pyrene	ug/g	0.02	0.3	ND	0.06	-	-	0.14	0.13	0.07	ND	-
Benzo[b]fluoranthene	ug/g	0.02	0.78	ND	0.07	-	-	0.16	0.14	0.08	ND	-
Benzo[g,h,i]perylene	ug/g	0.02	6.6	ND	0.04	-	-	0.07	0.08	0.05	ND	-
Benzo[k]fluoranthene	ug/g	0.02	0.78	ND	0.04	-	-	0.08	0.07	0.04	ND	-
Chrysene	ug/g	0.02	7	ND	0.07	-	-	0.16	0.16	0.09	ND	-
Dibenzo[a,h]anthracene	ug/g	0.02	0.1	ND	ND	-	-	0.02	0.02	ND	ND	-
Fluoranthene	ug/g	0.02	0.69	ND	0.14	-	-	0.38	0.38	0.18	ND	-
Fluorene	ug/g	0.02	62	ND	ND	-	-	0.02	0.05	ND	ND	-
Indeno[1,2,3-cd]pyrene	ug/g	0.02	0.38	ND	0.03	-	-	0.07	0.07	0.04	ND	-
1-Methylnaphthalene	ug/g	0.02	0.99	ND	0.02	-	-	ND	ND	ND	ND	-
2-Methylnaphthalene	ug/g	0.02	0.99	ND	0.03	-	-	ND	ND	ND	ND	-
Methylnaphthalene (1&2)	ug/g	0.04	0.99	ND	0.05	-	-	ND	ND	ND	ND	-
Naphthalene	ug/g	0.01	0.6	ND	0.01	-	-	ND	0.04	ND	ND	-
Phenanthrene	ug/g	0.02	6.2	ND	0.08	-	-	0.26	0.37	0.11	ND	-
Pyrene	ug/g	0.02	78	ND	0.11	-	-	0.31	0.31	0.15	ND	-
Metals												
Boron, available	ug/g	0.5	1.5	-	ND	-	-	-	0.6	0.6	0.5	-
Chromium (VI)	ug/g	0.2	8	-	ND	-	-	-	ND	ND	ND	-
Mercury	ug/g	0.1	0.27	-	ND	-	-	-	ND	ND	ND	-
Antimony	ug/g	1.0	7.5	-	ND	-	-	-	ND	ND	ND	-
Arsenic	ug/g	1.0	18	-	4.0	-	-	-	3.1	3.2	3.1	-
Barium	ug/g	1.0	390	-	115	-	-	-	197	195	144	-
Beryllium	ug/g	0.5	4	-	1.4	-	-	-	0.5	0.6	0.5	-
Boron	ug/g	5.0	120	-	5.5	-	-	-	ND	ND	17.2	-
Cadmium	ug/g	0.5	1.2	-	ND	-	-	-	ND	ND	ND	-
Chromium	ug/g	5.0	160	-	35.7	-	-	-	51.3	52.9	22.6	-
Cobalt	ug/g	1.0	22	-	8.0	-	-	-	12.0	12.0	9.0	-
Copper	ug/g	5.0	140	-	31.6	-	-	-	26.6	26.0	15.5	-
Lead	ug/g	1.0	120	-	84.7	-	-	-	7.3	7.9	12.9	-
Molybdenum	ug/g	1.0	6.9	-	ND	-	-	-	ND	ND	1.1	-
Nickel	ug/g	5.0	100	-	21.7	-	-	-	29.3	29.9	19.0	-
Selenium	ug/g	1.0	2.4	-	1.3	-	-	-	ND	ND	ND	-
Silver	ug/g	0.3	20	-	ND	-	-	-	ND	ND	ND	-
Thallium	ug/g	1.0	1	-	ND	-	-	-	ND	ND	ND	-
Uranium	ug/g	1.0	23	-	ND	-	-	-	ND	ND	ND	-
Vanadium	ug/g	10.0	86	-	44.3	-	-	-	56.1	56.0	22.4	-
Zinc	ug/g	20.0	340	-	81.3	-	-	-	60.1	60.1	28.5	-
General Inorganics												
SAR	N/A	0.01	5	-	0.83	-	-	-	2.17	2.24	0.09	-
Conductivity	uS/cm	5	700	-	244	-	-	-	423	442	1950	-
Cyanide, free	ug/g	0.03	0.051	-	ND	-	-	-	ND	ND	ND	-
pH	pH Units	0.05	NV	-	7.24	-	-	-	7.32	7.51	7.40	-

NV - No value listed in MECP site condition standards

- - Not Analyzed

ND - Not detected above laboratory method detection limits

Exceeds MECP site condition standards

Table 2: TCLP Analytical Results
715 Mikinak Road, Ottawa, Ontario

Parameter	Units	Method Detection Limit (MDL)	Reg 558 Schedule IV	TCLP
			Sample ID:	**TCLP**
			Laborartory Sample ID:	2025228-01
			Sample Date:	June 16, 2020
Physical Characteristics				
Flashpoint	°C			>70
TCLP Leachate Inorganics				
Fluoride	mg/L	0.05	150	0.13
Nitrate as N	mg/L	1	1000	ND
Nitrite as N	mg/L	1	1000	ND
Cyanide, free	mg/L	0.02	20	ND
TCLP Leachate Metals				
Mercury	mg/L	0.005	0.1	ND
Arsenic	mg/L	0.05	2.5	ND
Barium	mg/L	0.05	100	0.94
Boron	mg/L	0.05	500	0.07
Cadmium	mg/L	0.01	0.5	ND
Chromium	mg/L	0.05	5	ND
Lead	mg/L	0.05	5	ND
Selenium	mg/L	0.05	1	ND
Silver	mg/L	0.05	5	ND
Uranium	mg/L	0.05	10	ND
TCLP Leachate Volatiles				
Benzene	mg/L	0.005	0.5	ND
Carbon Tetrachloride	mg/L	0.005	0.5	ND
Chlorobenzene	mg/L	0.004	8	ND
Chloroform	mg/L	0.006	10	ND
1,2-Dichlorobenzene	mg/L	0.004	20	ND
1,4-Dichlorobenzene	mg/L	0.004	0.5	ND
1,2-Dichloroethane	mg/L	0.005	0.5	ND
1,1-Dichloroethylene	mg/L	0.006	1.4	ND
Methyl Ethyl Ketone (2-Butanone)	mg/L	0.30	200	ND
Methylene Chloride	mg/L	0.04	5	ND
Tetrachloroethylene	mg/L	0.005	3	ND
Trichloroethylene	mg/L	0.004	5	ND
Vinyl Chloride	mg/L	0.005	0.2	ND
TCLP Leachate Organics				
Benzo[a]pyrene	mg/L	0.0001	0.001	ND
PCBs, total	mg/L	0.003	0.3	ND

ND - Not detected above laboratory method detection limits

Table 3: Groundwater Analytical Results

715 Mikinak Road, Ottawa, Ontario

			Sample Location:	BH6-20	BH13-20	BH8-1	BH D-1 Duplicate of BH8-1	BH18-2	BH18-1	Trip Blank
			Sample Date:	June 23, 2020	June 23, 2020	June 23, 2020	June 23, 2020	June 23, 2020	June 23, 2020	June 23, 2020
			Laborartory Sample ID:	2026213-01	2026213-02	2026213-03	2026213-06	2026213-04	2026213-05	2026213-07
Parameter	Units	Method Detection Limit (MDL)	MECP Table 3 Standards Coarse Grain Soil							
Petroluem Hydrocarbons (PHCs)										
F1 PHCs (C6-C10)	ug/L	25	750	ND	ND	ND	ND	ND	ND	-
F2 PHCs (C10-C16)	ug/L	100	150	ND	ND	ND	ND	ND	ND	-
F3 PHCs (C16-C34)	ug/L	100	500	ND	ND	ND	ND	ND	ND	-
F4 PHCs (C34-C50)	ug/L	100	500	ND	ND	ND	ND	ND	ND	-
Volatile Organic Compounds (VOCs)										
Acetone	ug/L	5.0	130000	ND	-	ND	ND	ND	ND	ND
Benzene	ug/L	0.5	44	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ug/L	0.5	85000	ND	-	ND	ND	ND	ND	ND
Bromoform	ug/L	0.5	380	ND	-	ND	ND	ND	ND	ND
Bromomethane	ug/L	0.5	5.6	ND	-	ND	ND	ND	ND	ND
Carbon Tetrachloride	ug/L	0.2	0.79	ND	-	ND	ND	ND	ND	ND
Chlorobenzene	ug/L	0.5	630	ND	-	ND	ND	ND	ND	ND
Chloroform	ug/L	0.5	2.4	ND	-	ND	ND	ND	ND	ND
Dibromochloromethane	ug/L	0.5	82000	ND	-	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ug/L	1.0	4400	ND	-	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ug/L	0.5	4600	ND	-	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ug/L	0.5	9600	ND	-	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ug/L	0.5	8	ND	-	ND	ND	ND	ND	ND
1,1-Dichloroethane	ug/L	0.5	320	ND	-	ND	ND	ND	ND	ND
1,2-Dichloroethane	ug/L	0.5	1.6	ND	-	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ug/L	0.5	1.6	ND	-	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	ug/L	0.5	1.6	ND	-	ND	ND	ND	ND	ND
trans-1,2-Dichloroethylene	ug/L	0.5	1.6	ND	-	ND	ND	ND	ND	ND
1,2-Dichloropropane	ug/L	0.5	16	ND	-	ND	ND	ND	ND	ND
cis-1,3-Dichloropropylene	ug/L	0.5	NV	ND	-	ND	ND	ND	ND	ND
trans-1,3-Dichloropropylene	ug/L	0.5	NV	ND	-	ND	ND	ND	ND	ND
1,3-Dichloropropene, total	ug/L	0.5	5.2	ND	-	ND	ND	ND	ND	ND
Ethylbenzene	ug/L	0.5	2300	ND	ND	ND	ND	ND	ND	ND
Ethylene dibromide (dibromoethane, 1,	ug/L	0.2	0.25	ND	-	ND	ND	ND	ND	ND
Hexane	ug/L	1.0	51	ND	-	ND	ND	ND	ND	ND
Methyl Ethyl Ketone (2-Butanone)	ug/L	5.0	470000	ND	-	ND	ND	ND	ND	ND
Methyl Isobutyl Ketone	ug/L	5.0	140000	ND	-	ND	ND	ND	ND	ND
Methyl tert-butyl ether	ug/L	2.0	190	ND	-	ND	ND	ND	ND	ND
Methylene Chloride	ug/L	5.0	610	ND	-	ND	ND	ND	ND	ND
Styrene	ug/L	0.5	1300	ND	-	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	ug/L	0.5	3.3	ND	-	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	3.2	ND	-	ND	ND	ND	ND	ND
Tetrachloroethylene	ug/L	0.5	1.6	ND	-	ND	ND	ND	ND	ND
Toluene	ug/L	0.5	18000	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ug/L	0.5	640	ND	-	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ug/L	0.5	4.7	ND	-	ND	ND	ND	ND	ND
Trichloroethylene	ug/L	0.5	1.6	ND	-	ND	ND	ND	ND	ND
Trichlorofluoromethane	ug/L	1.0	2500	ND	-	ND	ND	ND	ND	ND
Vinyl Chloride	ug/L	0.5	0.5	ND	-	ND	ND	ND	ND	ND
m/p-Xylene	ug/L	0.5	NV	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ug/L	0.5	NV	ND	ND	ND	ND	ND	ND	ND
Xylenes, total	ug/L	0.5	4200	ND	ND	ND	ND	ND	ND	ND
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	ug/L	0.05	600	ND	-	ND	ND	ND	ND	-
Acenaphthylene	ug/L	0.05	1.8	ND	-	ND	ND	ND	ND	-
Anthracene	ug/L	0.01	2.4	ND	-	ND	ND	ND	ND	-
Benzo[a]anthracene	ug/L	0.01	4.7	ND	-	ND	ND	ND	ND	-
Benzo[a]pyrene	ug/L	0.01	0.81	ND	-	ND	ND	ND	ND	-
Benzo[b]fluoranthene	ug/L	0.05	0.75	ND	-	ND	ND	ND	ND	-
Benzo[g,h,i]perylene	ug/L	0.05	0.2	ND	-	ND	ND	ND	ND	-
Benzo[k]fluoranthene	ug/L	0.05	0.4	ND	-	ND	ND	ND	ND	-
Chrysene	ug/L	0.05	1	ND	-	ND	ND	ND	ND	-
Dibenzo[a,h]anthracene	ug/L	0.05	0.52	ND	-	ND	ND	ND	ND	-
Fluoranthene	ug/L	0.01	130	ND	-	ND	ND	ND	ND	-
Fluorene	ug/L	0.05	400	ND	-	ND	ND	ND	ND	-
Indeno[1,2,3-cd]pyrene	ug/L	0.05	0.2	ND	-	ND	ND	ND	ND	-
1-Methylnaphthalene	ug/L	0.05	1800	ND	-	ND	ND	ND	ND	-
2-Methylnaphthalene	ug/L	0.05	1800	ND	-	ND	ND	ND	ND	-
Methylnaphthalene (1&2)	ug/L	0.10	1800	ND	-	ND	ND	ND	ND	-
Naphthalene	ug/L	0.05	1400	ND	-	ND	ND	ND	ND	-
Phenanthrene	ug/L	0.05	580	ND	-	ND	ND	ND	ND	-
Pyrene	ug/L	0.01	68	ND	-	ND	ND	ND	ND	-
Metals										
Mercury	ug/L	0.1	0.29	ND	-	ND	ND	ND	ND	-
Antimony	ug/L	0.5	20000	ND	-	ND	ND	ND	ND	-
Arsenic	ug/L	1	1900	ND	-	ND	ND	ND	ND	-
Barium	ug/L	1	29000	230	-	70	66	95	75	-
Beryllium	ug/L	0.5	67	ND	-	ND	ND	ND	ND	-
Boron	ug/L	10	45000	41	-	143	148	71	42	-
Cadmium	ug/L	0.1	2.7	ND	-	ND	ND	ND	ND	-
Chromium	ug/L	1	810	ND	-	ND	ND	ND	ND	-
Chromium (VI)	ug/L	10	140	ND	-	ND	ND	ND	ND	-
Cobalt	ug/L	0.5	66	0.8	-	ND	ND	ND	ND	-
Copper	ug/L	0.5	87	0.6	-	ND	ND	3.0	ND	-
Lead	ug/L	0.1	25	ND	-	ND	ND	ND	ND	-
Molybdenum	ug/L	0.5	9200	2.2	-	1.7	1.8	1.1	2.1	-
Nickel	ug/L	1	490	3	-	1	ND	3	1	-
Selenium	ug/L	1	63	1	-	ND	ND	ND	ND	-
Silver	ug/L	0.1	1.5	ND	-	ND	ND	ND	ND	-
Sodium	ug/L	200	2300000	26200	-	62900	65200	67800	42000	-
Thallium	ug/L	0.1	510	ND	-	ND	ND	ND	ND	-
Uranium	ug/L	0.1	420	2.5	-	1.1	1.1	2.5	2.1	-
Vanadium	ug/L	0.5	250	1.4	-	ND	ND	ND	ND	-
Zinc	ug/L	5	1100	ND	-	8	7	ND	ND	-
General Inorganics										
Cyanide, free	ug/L	2	66	ND	-	ND	ND	ND	ND	-
pH	pH Units	0.1	NV	7.8	-	7.6	7.6	7.6	7.5	-
Chloride	mg/L	1	2300	55	-	67	66	125	25	-

NV - No value listed in MECP site condition standards

- - Not Analyzed

ND - Not detected above laboratory method detection limits

Exceeds MECP site condition standards

Appendix A

Sampling and Analysis Plan

LOPERS & ASSOCIATES

Sampling and Analysis Plan

715 Mikinak Road
Ottawa, Ontario

Prepared for:

Ottawa Community Housing Corporation

6/12/2020

Table of Contents

1. Background

Lopers & Associates (Lopers) was retained by Ottawa Community Housing Corporation (OCH) to complete a Phase Two Environmental Site Assessment (Phase Two ESA) of the vacant property with Civic address No. 715 Mikinak Road, Ottawa, Ontario ("Phase Two Property", "Property" or "Site").

Lopers has previously completed a Phase One Environmental Site Assessment (Phase One ESA) for OCH at the Property. The Phase One ESA identified the presence of two potentially contaminating activities (PCAs) at the Property which were interpreted to represent areas of potential environmental concern (APECs).

The presence of a former retail fuel outlet was identified on the north portion of the Phase One Property (APEC #1).

- The contaminants of potential concern associated with retail fuelling are generally PHCs and BTEXs, with older facilities also having concerns associated with metals, as lead was historically present in gasoline.

The practice of backfilling following decommissioning, demolition and remediation activities was identified in various locations at the Phase One Property (APEC #2).

- The contaminants of potential concern commonly found in poor environmental quality backfill are PHCs/BTEXs, PAHs and metals. A Phase Two ESA was recommended to assess the soil and groundwater quality in the vicinity of the identified APECs.

The scope of work for the Phase Two ESA includes drilling 13 boreholes at the Phase Two Property; this drilling program will be completed and supplemented a concurrent geotechnical investigation completed by others.

Four of the boreholes will be instrumented with groundwater monitoring wells with screens installed in the overburden. Select existing groundwater monitoring wells at the Phase Two Property, which were installed as part of historical investigations, may also be accessed and sampled to supplement the groundwater quality assessment.

In the event that additional contaminants of APECs are identified during the drilling or sampling fieldwork, additional scope of work will be discussed with OCH to complete the Phase Two ESA.

2. Planning Site Investigation - Specific Objectives

The following are the specific objectives for planning a site investigation of the Phase Two Environmental Site Assessment, as defined in O.Reg. 153/04.

1. To plan an investigation that will achieve the general objectives of a Phase Two Environmental Site Assessment,

   i. through the use of an appropriate and complete information base concerning the Phase Two Property, and

   ii. through the conduct of an investigation based both on information obtained before the Phase Two Environmental Site Assessment begins and on the incorporation of information obtained during the Phase Two Environmental Site Assessment.

2. To develop a sampling and analysis plan that will adequately assess all areas of the Phase Two Property where contaminants may be present in land or water on, in or under the Property.

3. To develop a quality assurance program that is designed to effectively limit errors and bias in sampling and analysis through implementation of assessment and control measures that will ensure data are useful, appropriate and accurate in the determination of whether the Phase Two Property, or any record of site condition (RSC) property within it, meets applicable site condition standards and any standards specified in a risk assessment.

3. Underground Utility Service Locates

Prior to completing the Phase Two ESA field investigation activities, public underground locates will be coordinated through Ontario One Call. As it is understood that the Site is vacant with no active privately owned underground services or infrastructure, private locates have not been included in this mandate.

The locations of the proposed boreholes will be reviewed in relation to the public underground locates and locations will be modified accordingly if conflicts exist between any location or if the location is in close proximity to an active underground service.

A copy of the public underground locates will be retained by Lopers' field personnel during all excavation components of the fieldwork.

4. Planning Site Investigation - Specific Requirements

The qualified person has ensured the following requirements were met in planning a site investigation. The Phase One conceptual site model for the Phase One Environmental Site Assessment report was used in conjunction with other information in determining:

i. Media for Investigation

Soil and groundwater sampling and analysis for the purpose of assessing environmental quality will be completed as part of the Phase Two ESA.

There are no surface water bodies at the Phase Two Property, as such, sediment and surface water quality sampling and analysis will not be completed as part of this Phase Two ESA.

ii. Locations and Depths for Sampling

A total of 13 borehole locations have been proposed to provide coverage of the APECs identified at the Phase Two Property. Boreholes will be located in the northern portion of the Property to assess APEC #1. A distribution of boreholes will be spread over the remaining areas of the Property, with some to be situated in locations of suspected historical fill placement, to assess APEC #2.

Sampling depths will include as a minimum, collection of samples in 0.6 m intervals from the ground surface to native soil conditions within the groundwater table. Borehole/monitoring wells depths are proposed to be drilled to approximately 6 m to intercept the groundwater table in APECs were groundwater quality assessment is required. Boreholes are proposed to be drilled to a depth of approximately 3 to 4 m in APECs were an assessment of the fill quality is required.

iii. Parameters for Laboratory Analysis.

The parameters for laboratory analysis will be selected based on the contaminants of potential concern for each APEC as well as the field screening observations.

The contaminants of potential concern associated with retail fueling (APEC #1) are generally PHCs and BTEXs, with older facilities also having concerns associated with metals, as lead was historically present in gasoline.

The contaminants of potential concern commonly found in poor environmental quality backfill (APEC #2) are PHCs/BTEXs, PAHs and metals.

The contaminants of concern for a particular sample will be based on the relative location and depth of the sample, visual and/or olfactory observations and combustible vapour screening concentrations.

Information obtained after the completion of the phase one environmental site assessment shall be used to modify the investigation, as appropriate.

5. Quality Assurance and Quality Control

The qualified person has ensured that there is a quality assurance and quality control program, data quality objectives, standard operating procedures and a description of any physical impediments that interfere with or limit the ability to conduct sampling and analysis.

The quality assurance and quality control program includes the following requirements:

5.1 Field Equipment Decontamination

All non-dedicated sampling and monitoring equipment must be cleaned following each use.

The split spoons, which are the only media to come into contact with the soil samples, will be washed using soap and water and a scrub brush between samples to minimize the potential for cross-contamination among samples. The field technician will use sterile nitrile gloves, which are to be changed prior to the handling of each soil sample to further reduce the potential of cross-contamination. The flights of the hollow stem augers are to be cleaned manually following each borehole.

Water level monitoring equipment, including water level meters and interface probes will be decontaminated with an environmentally safe cleaning solution and rinsed with deionized water between water level readings to prevent cross contamination.

The field technician will change dedicated sterile nitrile gloves prior to initiating work at each monitoring well and change gloves prior to sample collection to minimize the potential for cross-contamination.

5.2 Trip Blanks

Since groundwater samples are to be analyzed for benzene, toluene, ethylbenzene and xylenes (BTEXs), which are components of volatile organic compounds (VOCs), one trip blank sample shall be submitted for laboratory analysis with each laboratory submission of groundwater samples.

5.3 Field Duplicates

Sufficient field duplicate samples shall be collected in each medium (soil and groundwater) being sampled, so that at least one field duplicate sample can be submitted for laboratory analysis for every ten samples submitted for laboratory analysis.

At least one field duplicate sample shall be submitted for laboratory analysis for every ten samples submitted for laboratory analysis.

One field duplicate will be submitted from each medium sampled for each parameter suite analyzed as part of this Phase Two ESA.

5.4 Equipment Calibration

Field screening of the soil samples will be completed using an RKI Instruments Model Eagle-2 combustible gas detector ("RKI Eagle"). The RKI Eagle used for soil sample screening as part of this Phase Two ESA will be obtained from Maxim Environmental and Safety Inc. and will be calibrated prior to use.

Measurements of the groundwater quality field parameters will be completed to determine stabilization of these parameters prior to sampling. These measurements will be completed using Horiba U-52 groundwater quality measurement device ("Horiba"). The Horiba used for groundwater quality parameter stabilization measurements as part of this Phase Two ESA will be obtained from Maxim Environmental and Safety Inc. and will be calibrated prior to use.

5.5 Data Quality Objectives

The data quality objectives for all types of field data collected during the Phase Two Environmental Site Assessment field investigation that set the level of uncertainty in environmental data shall be such that,

(a) the decision-making is not affected; and

(b) the overall objectives of the investigation are met.

6. Standard Operating Procedures

Standard operating procedures were developed for all of the following field investigation methods used in the field investigation.

6.1 Borehole Drilling

The drilling field program will be completed under full time supervision of Lopers & Associates personnel. The drilling subcontractor retained for the Phase Two ESA is George Downing Estate Drilling, located at 410 Principale Rue, Grenville-Sur-la-Rouge, Quebec, J0V 1B0. The drill rig

used for the Phase Two ESA will be a track mounted CME drill, equipped with hollow stem augers and stainless steel split spoons. Operation of the drilling equipment is the responsibility of the drilling subcontractor, who is trained and competent in the operation of this equipment.

The field technician logs the drilling and recovery of soil samples from each borehole, noting the soil type, physical and environmental characteristics at each borehole location on the field borehole logs.

6.2 Soil Sampling

Samples are to be collected from auger cuttings at the ground surface for surficial samples (0-0.6 m below ground surface (m BGS)) and then using split spoons for subsequent samples. Split spoon samples are generally not collected from surficial depths, as poor recovery of loose packed fill material does not yield sufficient volume of samples required for field screening or laboratory analysis. Split spoon samples, collected in 0.6 m segments, are to be recovered at continuous 0.76 m intervals; the additional 0.16 m between split spoon samples will be over-drilled to provide undisturbed field measurement of geotechnical parameters (blow counts) and to prevent cave in materials from stratigraphic units above the intended sampling intervals from being collected at unrepresentative depths during sampling.

Soil samples are initially collected in Ziploc bags for initial screening as part of sample selection. Soil samples selected for laboratory analysis are collected in dedicated clear glass jars prepared and provided by the analytical laboratory. Soil samples collected for BTEXs/VOCs and the F1 range of PHCs analysis are collected using a dedicated graduated syringe provided by the laboratory and placed directly into a glass vial with methanol preservative. Analytes and associated preservatives are specified on each jar/vial by the laboratory. Each jar/vial sample set is provided with a unique sample identifier, project number and date of sampling in the field.

6.3 Field Soil Screening Measurements

Initial field screening of the soil samples will consist of visual and olfactory observations made at the time of sample collection during the drilling program.

Additional field screening of the soil samples will be completed using an RKI Instruments Model Eagle-2 combustible gas detector ("RKI Eagle"). The RKI Eagle is capable of measuring combustible vapours at concentrations ranging from 0 parts per million (PPM) to 50% of the lower explosive limit (LEL). The RKI Eagle is also capable of measuring VOC vapours at concentrations ranging from 0 ppm to 1000 ppm.

6.4 Monitoring Well Installation

Installation of monitoring wells in selected boreholes is to be completed by George Downing Estate Drilling, who is a licensed well driller in accordance with O.Reg. 903. The wells will be installed using slotted PVC No. 10 monitoring well screens, which are 51 mm in diameter; these screens are to be installed at the base of each of the aforementioned boreholes, directly above

the bedrock surface. Well screens can range from 1.5 m to 4.5 m in length. The monitoring wells are extended to approximately 1.0 m above the surface grade with PVC riser, also 51 mm in diameter. A threaded PVC end cap should be installed at the base of the screen to prevent sediment infiltration, while a J-Plug is installed at the top of the riser to present surface influence.

The annular space in each monitoring well is to be backfill with clean silica sand to approximately 0.3 m above the monitoring well screens. A layer of bentonite chips is then used to make a hydraulic seal above the sand pack to near the ground surface. The monitoring wells are to be completed with steel stickup protective casings, which were backfilled with sand to provide stability to the casing and PVC riser.

6.5 Elevation Survey

An elevation survey of all boreholes and monitoring wells will be conducted following the completion of the drilling program. A fixed temporary benchmark should be used as a reference elevation; the top of the spindle of a fire hydrant is preferred for this purpose as geodetic elevations can be obtained for these points. The reference benchmark should be assigned a field site datum of 100.00 m for the purposes of the elevation survey. The ground surface elevation of all boreholes should be surveyed. The top of piezometer of each monitoring well should also be surveyed; this allows for higher accuracy in the interpretation of groundwater elevations.

6.6 Monitoring Well Development;

Groundwater monitoring wells will be developed on the day of drilling using LDPE tubing and a footvalve. At least three and up to ten well volumes will be removed from the monitoring wells in order to remove as much sediment as possible from the wells. In cases where the monitoring well goes dry prior to purging three well volumes, the well should be purged dry a minimum of three times, waiting at least one hour between purging events. The LDPE tubing should be removed from the monitoring wells following well development.

6.7 Field Measurement of Water Quality Indicators

Field measurement of water quality parameters were collected at regular intervals (0 L, 0.5 well volumes, 1 well volume, 2 well volumes, etc.) during purging of the monitoring wells prior to sampling. The Horiba was placed in a flow-through cell and water quality parameters were measured until they were found to stabilize to within approximately 10% of the previous measurements prior to sample collection.

6.8 Groundwater Sampling

Follow a period of stabilization after drilling and monitoring well development (1 week recommended), static groundwater elevations are measured relative to the top of piezometer at

each groundwater monitoring well on the day of sampling, prior to disturbance of the water column.

Following static groundwater elevation measurements, 6 mm LDPE tubing is placed in each of the monitoring wells. The LDPE tubing is connected to silicon tubing, run through a peristaltic pump set to low flow (approximately 0.2-0.5 L/minute) during purging and sampling. The peristaltic pump is used to avoid mixture of sediment into the groundwater column and prevent volatilization during sample collection. The monitoring wells are purged on the day of sampling while water quality parameters were measured and stabilize as noted above.

Groundwater samples are collected in dedicated amber glass bottles and vials or plastic bottles prepared and provided by the analytical laboratory. Analytes and associated preservatives are specified on each bottle by the laboratory. Each bottle sample set will be provided with a unique sample identifier, project number and date of sampling in the field. Samples for PHCs, BTEXs, VOCs, PAHs and general chemistry are unfiltered, while metals samples are to be field filtered using a dedicated 0.45 µm filter for each sample.

Appendix B

Underground Utility Locates

Service Request Details

LP : LOCATES - PROVIDE

Attribute Description	Values	Comments
ON1CALL LOCATE ADDRESS	Street Range:715- | Street:MIKINAK RD | Intersect 1:BAREILLE SNOW ST | Intersect 2:MICHAEL STOQUA ST | Door Numbers:- | Municipality:	
IF THERE IS AN ADDRESS NUMBEF		
ARE YOU A HOMEOWNER, CONTRA	CONTRACTOR	
WHO ARE YOU WORKING FOR?		
WHAT IS THE CALLER'S TITLE?	Principal	
WHAT IS YOUR COMPANY NAME?	Lopers & Associates	
PLEASE PROVIDE A CONTACT PHONE NUMBER	6133279073	
PLEASE PROVIDE AN ALTERNATE (		
PLEASE PROVIDE CONTACT PHONE INFORMATION FOR PERSON ON SITE	6133279073	
PLEASE PROVIDE A FAX NUMBER		
PLEASE PROVIDE AN EMAIL ADDRE	Luke@Lopers.ca	
WHAT TYPE OF WORK ARE YOU DOING?	DRILLING	
WHERE ARE YOU WORKING ON THE PROPERTY?	CORLOT=U Work program to involve initial drilling followed by test pits, excavation and earthworks. Please mark entire Site as locations for digging subject to change following findings and delineation requirements of program.	
HOW DEEP ARE YOU DIGGING/ EXCAVATING?	12.192000	
WHAT IS THE UNIT OF MEASURE Y	METERS	
ARE YOU DIGGING BY HAND OR B'	Mach. Dig;	
WILL THERE BE DIRECTIONAL DRI		
IS THE AREA MARKED OUT?	Area Not Marked;Mark + Fax;	
IS A SITE MEETING REQUIRED?		
EXTRA MARKING INSTRUCTIONS?	Site was former Gas station/service garage (north portion) and PMQs (residential buildings - central and south portions) and former roadways through.	
EXCAVATION ON PUBLIC PROPERT	Publ. Prop.;Priv. Prop	
WHAT DATE IS THE WORK STARTI	2020-05-06	
OTHER AGENCIES ALSO NOTIFIED	BCOE01; ROGOTT01; OTWAWS01; ENOE01; HOT1;	
WHAT TYPE OF REQUEST, IF NOT (		
IF NOT ORIGINAL, THE PREVIOUS		
FURTHER COMMENTS:		

20201813995

ENBRIDGE GAS INC.; operating as Enbridge Gas Distribution

Thank you for calling for a locate prior to starting your project.

Please note Enbridge Gas Distribution has changed the locate validity period and this completed locate is valid for a period of **60 days** from the completion date on the Primary Locate Sheet.

You must adhere to the following:

- You must follow all STOP letters associated with your locate if provided in your locate package.
- You should always review the Primary and all the Auxiliary Sheets of your locate package and understand the validity period for all utilities / infrastructure owners.
- It is the responsibility of Excavators to protect and preserve the original yellow paint markings. White paint can be used to preserve/maintain the markings but should be place beside or at the top / bottom of the original markings ensuring not to replace the yellow paint.

When winter conditions exist, such as snow, pink paint and stakes or flags can be used.

Please be aware new gas services or mains can be installed after this locate was completed. Newly buried gas plant flags will be installed as visual identifier if this occurs.

If flags are present please contact Enbridge Gas Damage Prevention at 1-866-922-3622

Enbridge Gas Distribution's Third Party Requirements in the Vicinity of Natural Gas Facilities must always be followed.

A copy of this document can be found at:

https://www.enbridgegas.com/~/media/Extranet-Pages/Safety/Before-you-dig/Third-Party-Requirements-in-the-Vicinity-of-Natural-Gas-Facilities

Thank you

20201813995_BCOE01

Promark telecon
Location of underground infrastructures

Primary Locate Sheet

UNION GAS EMERGENCY #
1-877-969-0999

Fax: 613-723-9277
Toll free: 1-800-371-8866
Email:

Request #
20201813995
NORMAL

Utilities Located	Revised Excavation Date	Excavation Date	Status
● Bell ● Gas ● Hydro Ottawa ☐ Hydro One ☐ Zayo ☐ Videotron ☐ Lakefront Utilities ☐ Elexicon Energy	N/A mm/dd/yyyy	05/06/2020 00:00:00 mm/dd/yyyy	STANDARD Homeowner ☐ Contractor ● Project ☐

Requested by:	Company:	Phone:	Fax/email:
LUKE LOPERS	LOPERS & ASSOCIATES	(613)-327-9073 ext.	N/A

Appt Date:	Received Date:	Locate Address:
N/A mm/dd/yyyy	04/29/2020 mm/dd/yyyy	**715, MIKINAK RD** 1st Inters.: BAREILLE SNOW ST 2nd Inters.: MICHAEL STOQUA ST

Type of work: DRILLING

City: **OTTAWA**

Caller's Remarks:
SITE WAS FORMER GAS STATION/SERVICE GARAGE (NORTH PORTION) AND PMQS (RESIDENTIAL BUILDINGS - CENTRAL AND SOUTH PORTIONS) AND FORMER ROADWAYS THROUGH.
MACH. DIG
CORLOT=U WORK PROGRAM TO INVOLVE INITIAL DRILLING FOLLOWED BY TEST PITS, EXCAVATION AND EARTHWORKS. PLEASE MARK ENTIRE SITE AS
-75.631545, 45.452354, NB_SEGMENTS::3, NO_PLAN::613 748, BCOE01, ROGOTT01, OTWAWS01, ENOE01, HOT1

Bell Mark | Clear	Gas Mark | Clear	Hydro Ottawa Mark | Clear	Street Lighting Mark | Clear	Lakefront Mark | Clear	Hydro One Mark | Clear	Zayo Mark | Clear	Elexicon Energy Mark | Clear	Videotron Mark | Clear
1	1	1	N/A	N/A	N/A	N/A	N/A	N/A

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE.

Records Reference:
_ Map ● GMOBILE #
_ Byers ● Datapak:
Field Notes: 6N6367-3 ● LAC Multiviewer
Other: PMOTTP1448 CPU #P14-48
DPT Remarks: N/A gl126

_ Third Party Notification N/A

*****DANGER DO NOT PROCEED*****
BURIED HIGH VOLTAGE CABLES WITHIN THE LOCATED AREA. YOU MUST SEND LOCATE TO
HOLsupervisions@hydroottawa.com
OR CONTACT HydroOttawa AT 613-738-6418
FOR FURTHER INFORMATION
"EMERGENCY" NUMBER IS 613-738-0188

Apply Sticker Here if Required

Excavator shall notify & receive a clearance from Utility prior to excavation for the following:
Telecon ☐ High Priority Cable ☐ Central Office Vicinity

Gas Material Type: ☐ Steel(st) ☐ Plastic(PE) ☐ Copper(CO)

Method of Field Marking: ● Paint ☐ Stakes ● Flags ☐ Offset Flags ☐ Other (Telecom=Orange, Gas=Yellow, Hydro Ott. =Red)

Caution: Bell locate valid for life of excavation see attached document. Hydro One - Hydro Ottawa - Enbridge Gas - Lakefront Utilities - Elexicon Energy valid for 60 days, 360 valid for life of excavation. See disclaimer for Facility Owner Guidelines.

Caution: Any changes to location or nature of work require new locate. The Excavator must not work outside the Located Area without a new locate. Privately owned services within the located area have not been marked - check with service / property owner. For all Locate requests including remarks contact: Ontario One Call at **1-800-400-2255** or **www.on1call.com**

Locator Name: GRUICH RYAN	Start Time: 14:00	_ Mark & Fax _ Left on Site ● Emailed
ID #: 16109	End Time: 15:00	Print:
Date 13/05/2020	Total Hours: 1.0HRS	Signature:

A copy of this Primary Locate Sheet and Auxiliary Locate Sheet(s) must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.

This form revised September 2019

Promark telecon
Locators of underground infrastructure

Auxiliary Locate Sheet

Union Gas Emergency # 1-877-969-0999

Fax: 613-723-9277 Toll free: 1-800-371-8866 Email

Utilities Located: ☐ Bell ● Gas ☐ HydroOttawa ☐ Hydro One ☐ Videotron ☐ Peel Fibre ☐ Elexicon Energy

Date Located: 13-05-2020

Request # 20201813995

Number of Services marked: (Specify building/house numbers) N/A

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE

FROM: S.AE HEMLOCK RD TO: W.AE MICHAEL STOQUA ST

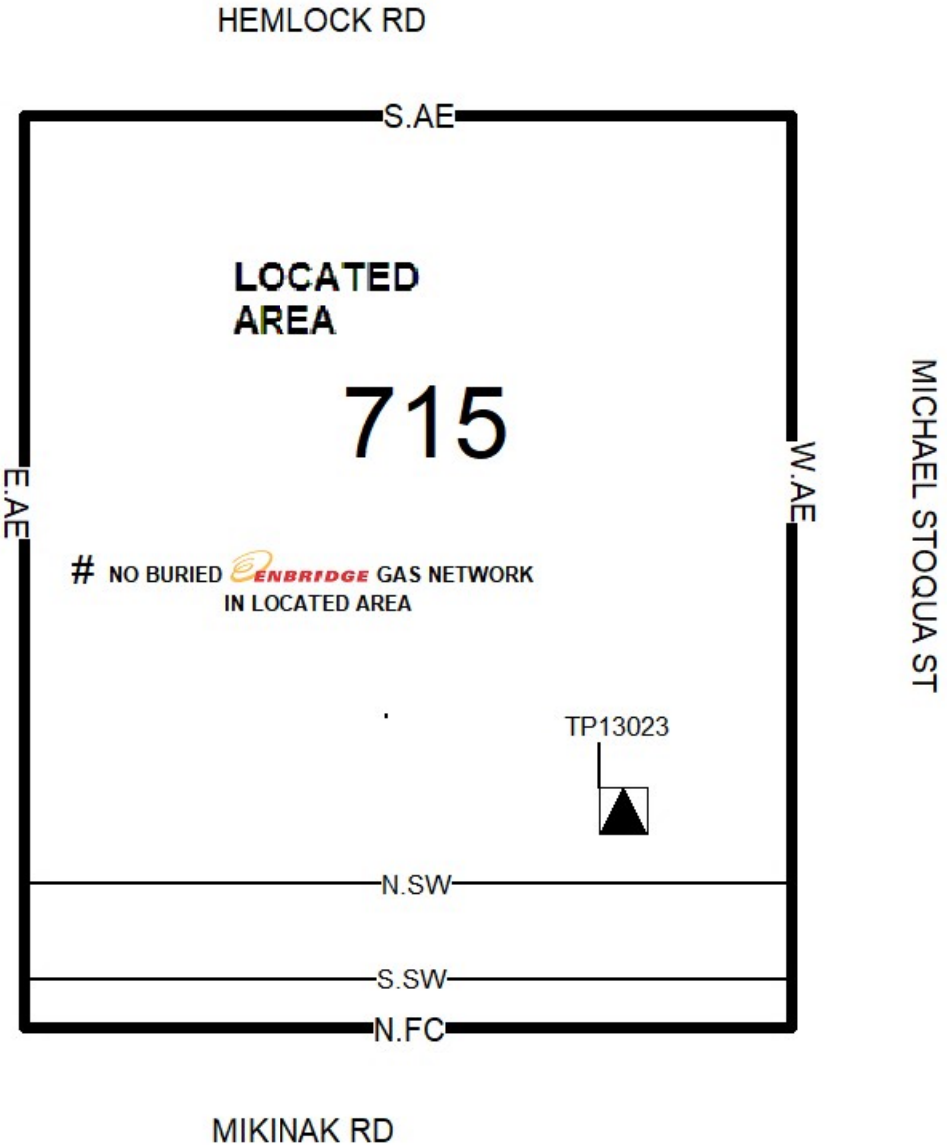
FROM: BARRIELLE SNOW ST TO: N.FC MIKINAK RD

Legend

- Building Line —BL—
- Fence Line —FL—
- Face of Curb —FC—
- Asphalt Edge —AE—
- Sidewalk —SW—
- Driveway —DW—
- Manhole M/H
- Pedestal
- Flush to Grade Pedestal FTG
- Buried Service Wire —BSW—
- Buried Cable —B—
- Conduit —C—
- Fiber Optic Cable —FO—
- Bell Hydro Service —BH—
- Gas Valve
- Gas Service —GS—
- Gas Main —GM—
- Transformer
- Demarcation DM
- Hydro —H—
- Hydro Primary —HP—
- Hydro Secondary —HS—
- Catch Basin CB
- Sewer Manhole
- Water Valve
- Hydrant
- Water Valve Chamber W
- Hydro / Bell Pole X
- Railway
- End Cap
- Traffic Manhole T
- Street Light Cable —SL—
- Street Light
- Measurement

CAUTION: Hand dig within 1 M as measured horizontally from the field markings to avoid damaging the underground utilities. If you damage the plant, you may be held liable. **If you damage underground plant, contact the facility owner immediately. Depth varies and MUST be verified by hand digging or vacuum excavation.**

LOCATED AREA HAS BEEN ALTERED AS PER: N/A



THIS FORM VALID ONLY WITH Primary Locate Form. This sketch is not to scale.
Any privately owned services within the located area have not been marked- check with service/property owner.

A copy of this Auxiliary Locate Sheet(s) and the Primary Locate Sheet must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.

Promark telecon
Locates of underground infrastructure

Auxiliary Locate Sheet

Union Gas Emergency # 1-877-969-0999

Fax: 613-723-9277 Toll free: 1-800-371-8866 Email

Utilities ☐ Bell ☐ Gas ● HydroOttawa ☐ Street Lighting
Located: ☐ Blink ☐ Peel Fibre ☐ ☐

Date Located: 13-05-2020

Request # 20201813995

Number of Services marked: (Specify building/house numbers) N/A

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE.

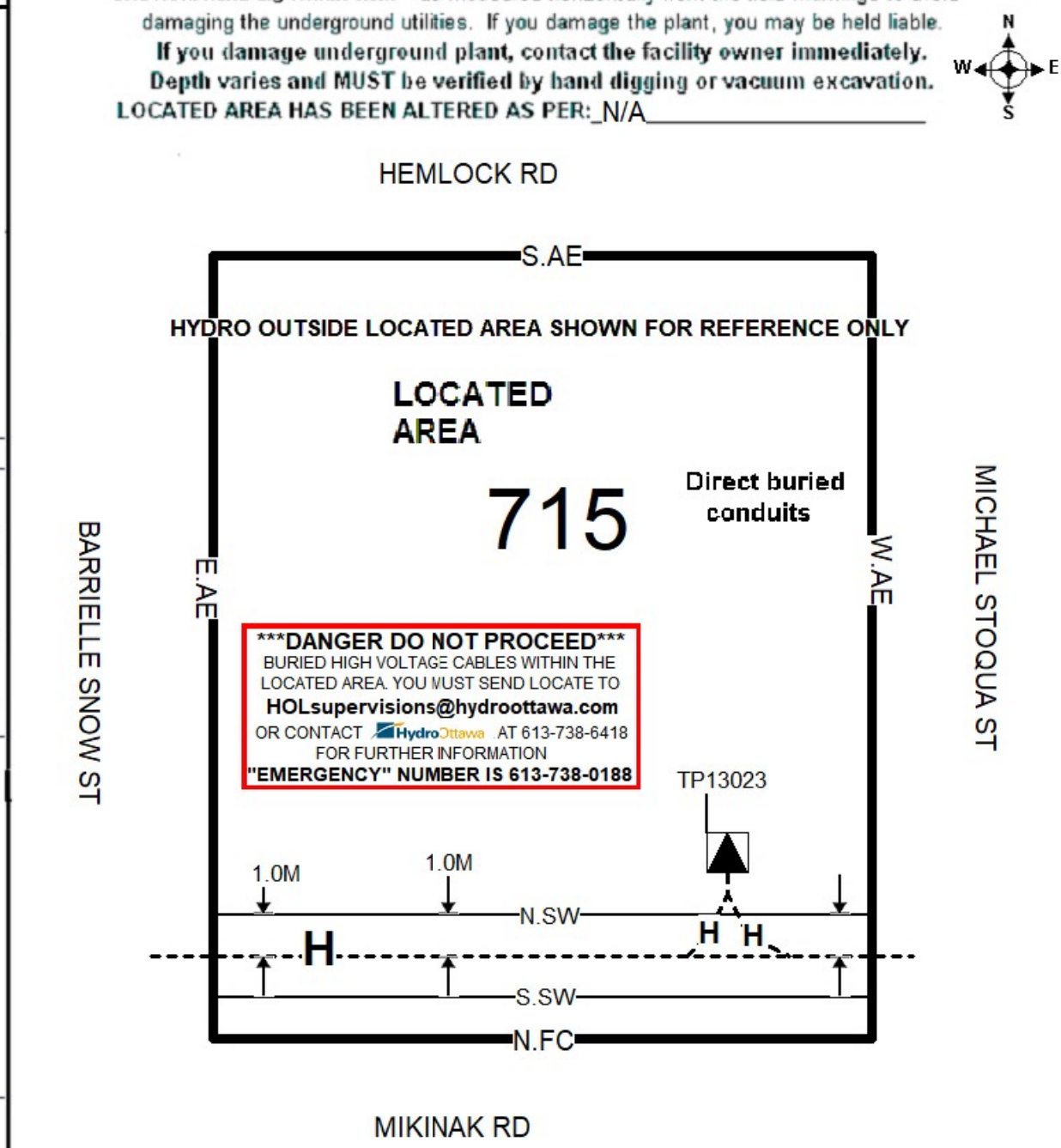
FROM: S.AE HEMLOCK RD TO: W.AE MICHAEL STOQUA ST

FROM: BARRIELLE SNOW ST TO: N.FC MIKINAK RD

Legend

- Building Line — BL —
- Fence Line — FL —
- Face of Curb — FC —
- Asphalt Edge — AE —
- Sidewalk — SW —
- Driveway — DW —
- Manhole M/H
- Pedestal
- Flush to Grade Pedestal FTG
- Buried Service Wire — BSW —
- Buried Cable — B —
- Conduit — C —
- Fiber Optic Cable — FO —
- Bell Hydro Service — BH —
- Gas Valve
- Gas Service — GS —
- Gas Main — GM —
- Transformer
- Demarcation DM
- Hydro — H —
- Hydro Primary — HP —
- Hydro Secondary — HS —
- Catch Basin CB
- Sewer Manhole
- Water Valve
- Hydrant
- Water Valve Chamber W
- Hydro / Bell Pole X
- Railway
- End Cap
- Traffic Manhole T
- Street Light Cable — SL —
- Street Light
- Measurement

CAUTION: Hand dig within 1.5M as measured horizontally from the field markings to avoid damaging the underground utilities. If you damage the plant, you may be held liable.
If you damage underground plant, contact the facility owner immediately.
Depth varies and MUST be verified by hand digging or vacuum excavation.
LOCATED AREA HAS BEEN ALTERED AS PER: N/A



THIS FORM VALID ONLY WITH Primary Locate Form. This sketch is not to scale.
Any privately owned services within the located area have not been marked- check with service/property owner.

A copy of this Auxiliary Locate Sheet(s) and the Primary Locate Sheet must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.

Promark telecon
Location of underground infrastructure

Auxiliary Locate Sheet

Union Gas Emergency # 1-877-969-0999

Fax: 613-723-9277 Toll free: 1-800-371-8866 Email

Utilities Located: ● Bell ☐ Gas ☐ HydroOttawa ☐ Hydro One ☐ Videotron ☐ Peel Fibre ☐ Elexicon Energy

Date Located: 13-05-2020

Request # 20201813995

Number of Services marked: (Specify building/house numbers) N/A

LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE

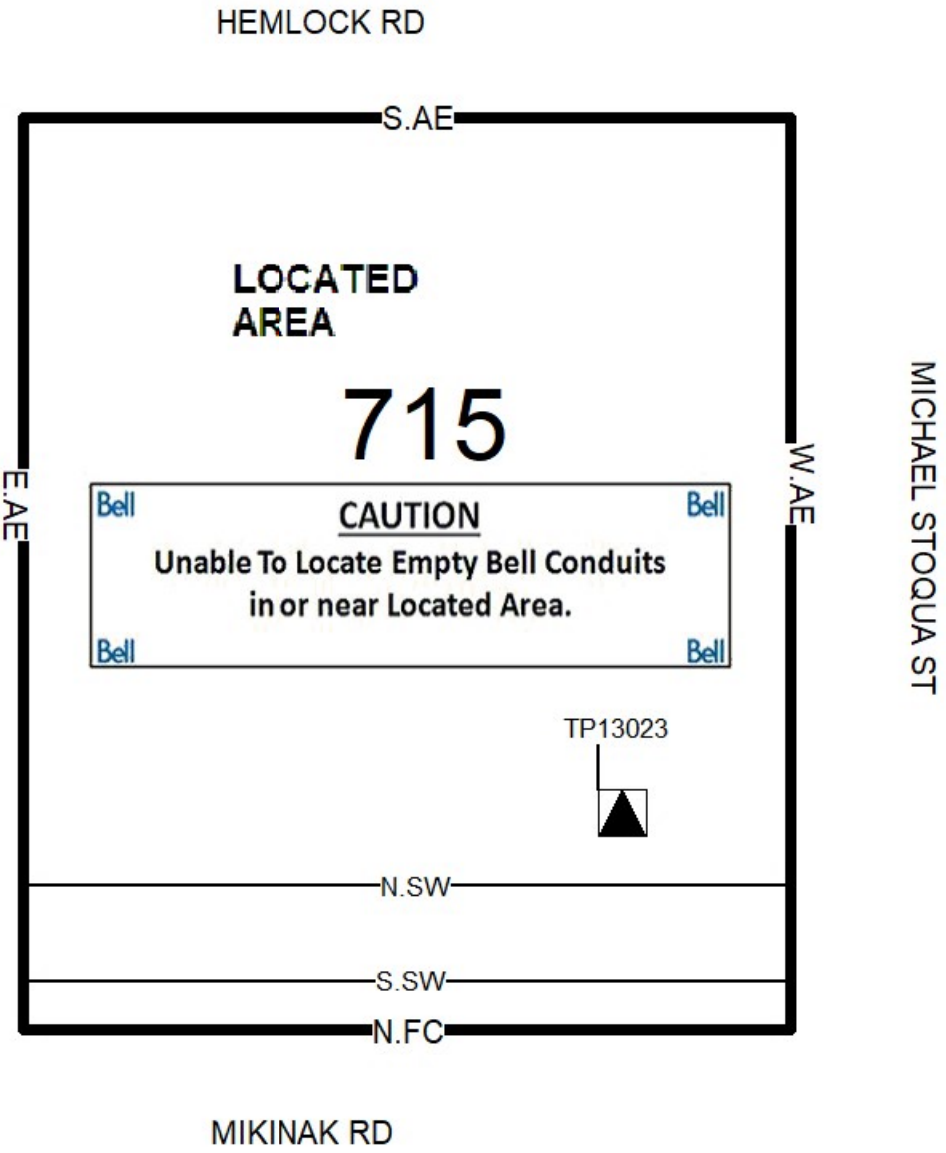
FROM: S.AE HEMLOCK RD TO: W.AE MICHAEL STOQUA ST

FROM: BARRIELLE SNOW ST TO: N.FC MIKINAK RD

Legend

- Building Line — BL —
- Fence Line — FL —
- Face of Curb — FC —
- Asphalt Edge — AE —
- Sidewalk — SW —
- Driveway — DW —
- Manhole M/H
- Pedestal
- Flush to Grade Pedestal FTG
- Buried Service Wire — BSW —
- Buried Cable — B —
- Conduit — C —
- Fiber Optic Cable — FO —
- Bell Hydro Service — BH —
- Gas Valve
- Gas Service — GS —
- Gas Main — GM —
- Transformer
- Demarcation DM
- Hydro — H —
- Hydro Primary — HP —
- Hydro Secondary — HS —
- Catch Basin CB
- Sewer Manhole
- Water Valve
- Hydrant
- Water Valve Chamber W
- Hydro / Bell Pole X
- Railway
- End Cap
- Traffic Manhole T
- Street Light Cable — SL —
- Street Light
- Measurement

CAUTION: Hand dig within 1 M as measured horizontally from the field markings to avoid damaging the underground utilities. If you damage the plant, you may be held liable.
If you damage underground plant, contact the facility owner immediately.
Depth varies and MUST be verified by hand digging or vacuum excavation.
LOCATED AREA HAS BEEN ALTERED AS PER: N/A



THIS FORM VALID ONLY WITH Primary Locate Form. This sketch is not to scale.
Any privately owned services within the located area have not been marked- check with service/property owner.

A copy of this Auxiliary Locate Sheet(s) and the Primary Locate Sheet must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.

Bell

February 9 2015

To all Excavators:

Bell locates are now valid for the life of the excavation project and will not automatically be relocated every 60 days.

Please note the following for the above to apply:

a) Construction within the located area begins within 60 days of the "locate completed" date on the original ticket.

b) The construction company named on the locate remains active on the site.

Bell expects excavators will protect and preserve the paint marks put down on the original locate ticket. If markings are removed due to weather or excavation work the excavator is expected to recreate the markings based on the tie-in measurements provided on the original locate ticket.

If an excavator would like their markings freshened up they can contact Promark (the Bell Canada Locate Service Provider in this area) directly to arrange for them to place fresh markings on the ground however this will be at the excavators expense. Promark can be reached at 613-723-9888.

The locate will be considered officially expired one day after the final day of construction.

Thank you,

Bell Canada

TICKET #: 20201813995

ROGERS™

ROGERS LOCATE SERVICE

8200 Dixie Rd
East Bldg., 2nd Floor
Brampton, Ontario, L6T OC1
Tel.: (855) 232-0342
Fax.: (905) 780-7379

LOCATE CONFIRMATION

LOCATOR: CLI Phone: 905-479-5674

CONFIRMATION DATE: 2020-04-30 10:08:27A Station Code: ROGOTT01

Requested by Company: Lopers & Associates

Contact Name: Luke Lopers Ph: 6133279073 Fax:

Dig Site Location and Details

Municipality: OTTAWA Call Date: 2020-04-29 10:42:51PM Start Date: 2020-05-06 12:00:0(

Address: 715 MIKINAK RD Intersection: BAREILLE SNOW ST

Type of Work: DRILLING

Remarks (Additional Dig Information):

CORLOT=U Work program to involve initial drilling followed by test pits, excavation and earthworks. Please mark entire Site as locations for digging subject to change following findings and delineation requirements of program.

Important Comments to Excavator:

YOU WILL BE LIABLE FOR ANY DAMAGES TO ROGERS FACILITIES IF EXCAVATING/ DIGGING PRIOR TO RECEIVING A COMPLETED LOCATE OR CLEARANCE NUMBER FROM ROGERS OR IT'S AGENTS.

PLEASE CALL ROGERS LOCATE SERVICES AT (800) 738-7893. IF THERE ARE ANY CHANGES TO THIS LOCATE REQUEST. LOCATES AND CLEARANCES ARE VALID FOR 60 DAYS ONLY.

CAUTION: Stakes and or markings may disappear or be displaced. Should the sketches and markings not coincide. a new stake out must be obtained.

FOR ALL CUT CABLES CALL
1-800-265-9501

CANADIAN LOCATORS INC.
Servicing the Utilities Industry

Ph: (905)479-5674 Email: ontario@canadianlocators.com

ROGERS
Primary Locate Sheet

ON 1 Call Ticket # : 20201813995

Contractor / Excavator : Lopers & Associates			**Contact Name :** Luke Lopers
Tel : 613-327-9073	**Alt. Phone :** 613-327-9073	**Email :** Luke@Lopers.ca	
Received Date : Apr 30 2020	**Excavation Date :** May 6 2020	**Revised Excavation Date:**	**Type of Work :** DRILLING
Locate Address : 715 MIKINAK RD			**City / Municipality :** OTTAWA, ONTARIO

Nearest Intersection : BAREILLE SNOW ST & MICHAEL STOQUA ST

Method of Field Marking : ☑ Paint ☐ Stakes ☐ Flags

Caller's Remarks *(Additional Info)* **:**
CORLOT=U Work program to involve initial drilling followed by test pits, excavation and earthworks. Please mark entire Site as locations for digging subject to change following findings and delineation requirements of program.//Site was former Gas station/service garage (north portion) and PMQs (residential buildings - central and south portions) and former roadways through.

Utilities Marked :					**This locate has multiple work areas which are greater than 100 m apart :**
☐ Coaxial Plant	☑ Fibre Optics Plant				☐ Yes ☐ No
Total Length : m	**Total Length :** 105 m				

Field sketch and Located Area shown on auxiliary locate sheet(s)

This locate is for ROGERS plant / infrastructure ONLY !

Apply sticker here if required

CAUTION : Locate is VOID after 60 days !

CAUTION : Hand dig within one (1) meter or 3.28 feet of markings. The Located Area defined on the Auxiliary Locate Sheet(s) contains all known ROGERS infrastructure. Any changes to excavation area or nature of work requires a new locate.

For all cut cable, please call :
1-800-265-9501

Locator's Comments :

Locator's Name : *(Please Print)* Courtney Stoddard

Date :	**Start Time :**	**End Time :**
May 4 2020	2:15 PM	3:00 PM

A copy of this Primary Locate Sheet and Auxiliary Locate Sheet(s) must be on site and in the hands of the machine operator during work operations. Should sketch and markings not coincide, a new locate MUST be obtained.

CANADIAN LOCATORS INC.
Servicing the Utilities Industry

Ph: (905)479-5674 Email: ontario@canadianlocators.com

ROGERS
Auxiliary Locate Sheet

ON 1 Call Ticket # : 20201813995

Utilities Marked :

☐ Coaxial Plant m ☑ Fibre Optics Plant 105 m

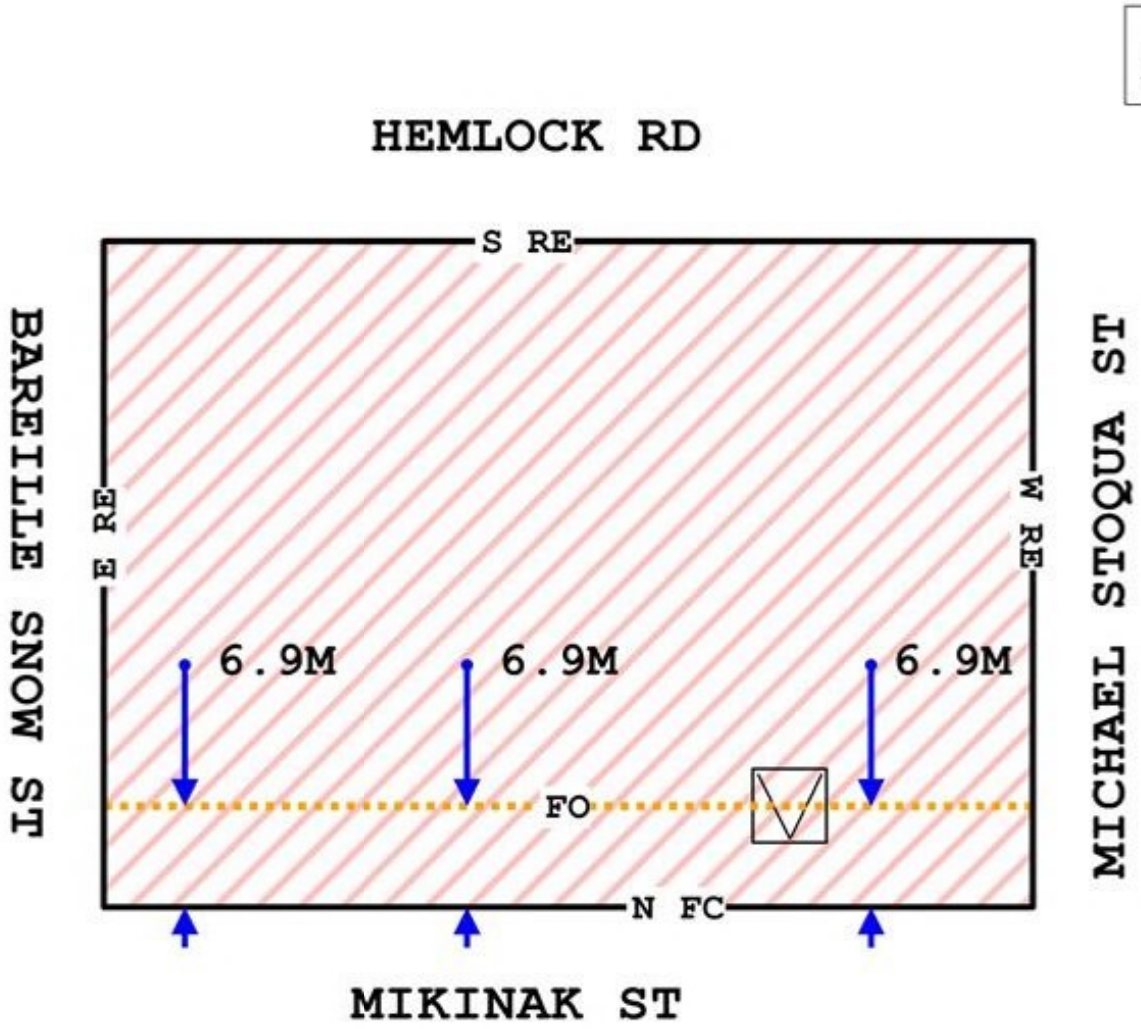
Number of Services Marked : (specify building/house numbers)

NA

LOCATED AREA CONTAINS ALL KNOWN ROGERS INFRASTRUCTURE

FROM :	TO :
S RE OF HEMLOCK RD	N FC OF MIKINAK ST
FROM :	TO :
E RE OF BAREILLE SNOW ST	W RE OF MICHAEL STOQUA ST

Hand dig within 1 meter or 3.28 feet as measured horizontally from the field markings to avoid damaging the underground utilities.
If you damage the utilities, you may be held liable. **For all cut cable, please call: 1-800-265-9501 immediately!**
Depth of cable plant varies and **MUST** be determined by hand digging or vacuum excavation.
LOCATED AREA ALTERED AS PER :

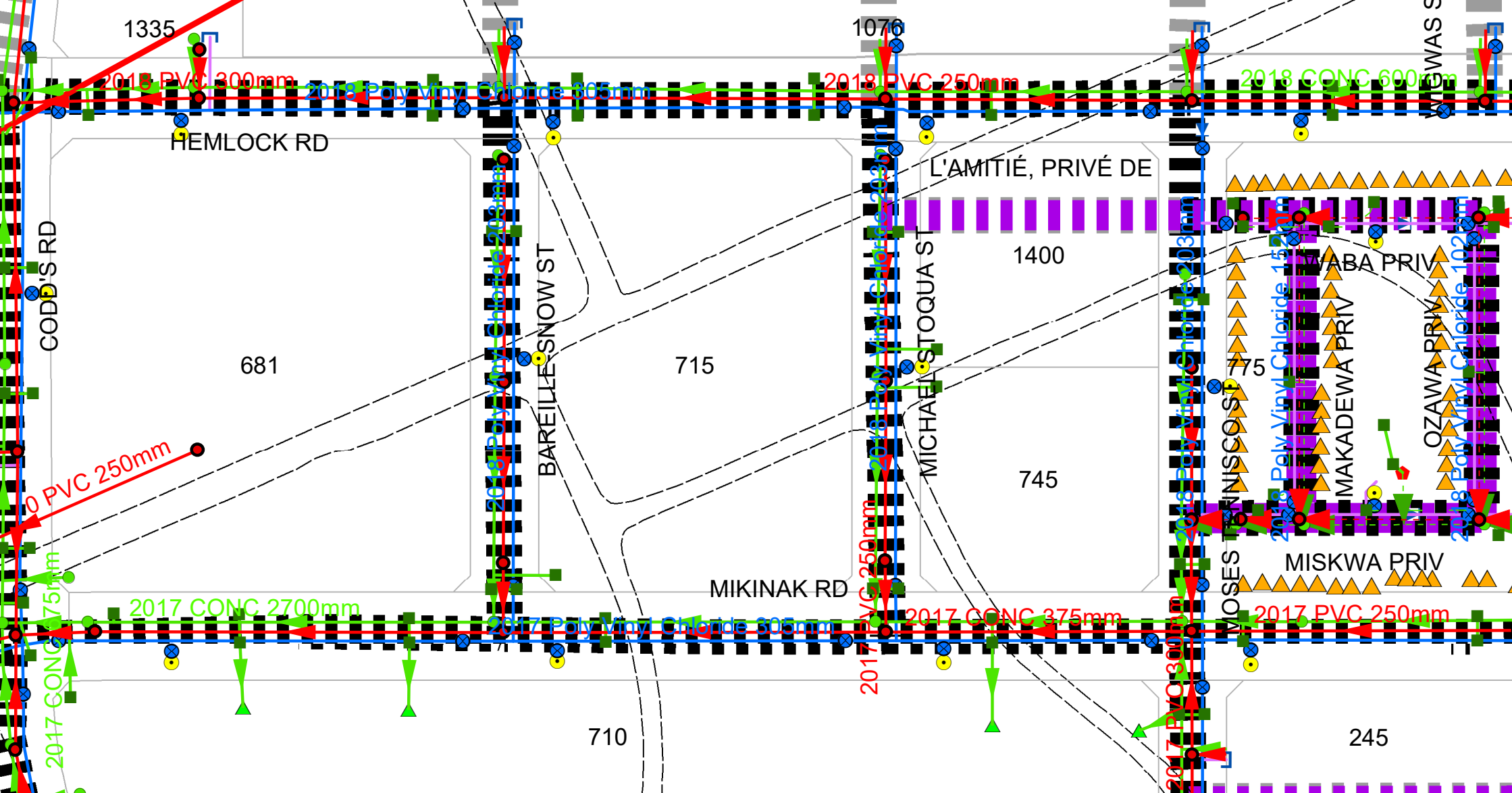


Sketch not drawn to scale

LEGEND :

Fibre Optic	FO	Road Edge	RE	Property Line	PL	Tree		Transformer	TFR	Streetlight	SL
Cable / T.V.	CATV	Bldg Line	BL	Lot Line	LL	Pedestal		Manhole		Hand Hole	HH
Conduit	C	North Direction	N	Face of Curb	FC	Pole		Catch Basin	CB	Hydrant	H
Railway		Sidewalk	SW	Driveway	DW	Valve		North	N	East	E
Work Area		Measurement		Fence Line	FL	Vault		South	S	West	W

A copy of this Auxiliary Locate Sheet(s) and the Primary Locate Sheet must be on site and in the hands of the machine operator during work operations. Should sketch and markings not coincide, a new locate MUST be obtained.


1335
1076
2018 PVC 300mm
2018 Poly Vinyl Chloride 305mm
2018 PVC 250mm
2018 CONC 600mm
HEMLOCK RD
L'AMITIÉ, PRIVÉ DE
CODD'S RD
681
BAREILLE SNOW ST
715
MICHAEL STOQUA ST
1400
WABA PRIV
775
MAKADEWA PRIV
OZAWA PRIV
745
MISKWA PRIV
MIKINAK RD
2017 CONC 2700mm
2017 Poly Vinyl Chloride 305mm
2017 CONC 375mm
2017 PVC 250mm
710
245

Service Request Details

Service Request **1350571** **Lagan Case ID:** 202018139951

Source: Contractor **Created By:** Ga Maxpusr
Priority: **Reported By:**
Status: RESOLVED **Initiated:** 2020-Apr-29 10:56 PM

Location Information

Address: MIKINAK RD **Range:** 715 **Unit:**
Between Streets: BAREILLE-SNOW ST / MICHAEL STOQUA ST **Municipality:** OO
Description:
Street Range:715-
Street:MIKINAK RD
Intersect 1:BAREILLE SNOW ST
Intersect 2:MICHAEL STOQUA ST
Door Numbers:-
Municipality:

The work area is clear of underground water and sewer pipes owned by The City of Ottawa if the excavation is not in the road. These properties are new construction. If any water or sewer infrastructure exists in the work area they are the responsibility of the builder and not The City of Ottawa. Attached is an ArcView.
Please note: City of Ottawa locates are valid for sixty (60) days. | S'il-vous-plaît notez: les localisations de la ville d'Ottawa sont valables pendant soixante (60) jours.

Requestor Information

Name: Luke Lopers **Phones**
Address: 30 LANSFIELD WAY **Res:** **Cell:** 6133279073
City: NEPEAN **Bus:** 6133279073 **Ext:**
Postal Code: K2G3V8 **Unit:** **Fax:**

Call Back & Other Assignments

Responsibilities

Service Request	Work Order #	Work Order

Request Details

Start Date: **Appointment Time:** **Service:** ESD
Finish Date: 2020-Apr-30 **Classification:** LOCATES - PROVIDE
Amount Charge to Customer: **Category:**

Structures

Structure ID	District	Description	Location	Qualifier	Unit

DISCLAIMER

The excavator must have a copy of this locate on the job site during excavation.

Locate area: The excavator must not work outside the area indicated in the location of work or located area in the diagram without an updated locate. Stakes or markings may disappear or be displaced. If any delays occur in acting on the stakeout information, or if markings become unclear, a new locate must be obtained.

Locating the plant: The plant location information provided is only an estimate. Depth of underground plant varies and the exact location must be determined by hand digging prior to excavation with mechanical equipment.

Warning: Do not use mechanical equipment within one (1) metre of the estimated location of the water or sewer plant. If the plant is larger than 406mm, mechanical equipment must not be used within three (3) meters.

Digging around exposed plants: Must do any further excavation within 0.3 metres of an exposed water or sewer plant by hand.

Contractors are to perform all work in accordance with applicable City of Ottawa By-laws and any applicable federal and provincial legislation or regulations, including but not limited to the *Public Utilities Act, R.S.O. 1990, c. P.52, s. 56(1)*; *Ontario Regulation 210/01 under the Technical Safety Standards Act, 2000 , S.O. 2000 c. 16*; *Ontario Regulation 213/91 under the Occupational Health and Safety Act, R.S.O. 1990, c. O.1.*

AVIS DE NON-RESPONSABILITÉ

L'opérateur de l'excavatrice doit avoir en sa possession ce rapport de localisation pendant l'excavation.

Zone de localisation : l'opérateur de l'excavatrice ne doit pas creuser en dehors de la zone indiquée sur l'ordre de travail ni à l'extérieur de la zone indiquée sur le diagramme, à moins d'avoir en sa possession un rapport de localisation actualisé. Les piquets ou les marques peuvent disparaître ou être déplacés. S'il y a un retard à intervenir sur la base des données de surveillance ou si le marquage devient imprécis, il faut obtenir un nouveau rapport de localisation.

Déterminer l'emplacement des conduites : les renseignements sur l'emplacement des conduites sont approximatifs. Pour déterminer l'emplacement et la profondeur, on doit creuser manuellement avant d'utiliser une excavatrice.

Avertissement : n'utilisez pas d'équipement mécanique [excavatrice] à moins d'un [1] mètre de l'emplacement supposé de la conduite d'eau ou d'égout. Si la conduite compte plus de 406 mm de diamètre, aucun équipement mécanique ne doit être utilisé à moins [3] de trois mètres de celle-ci.

Creuser autour des conduites exposées : toute excavation à moins de 0,3 m d'une conduite d'eau ou d'égout doit se faire manuellement.

Les entrepreneurs doivent exécuter tous les travaux conformément aux règlements de la Ville d'Ottawa et aux lois et règlements fédéraux ou provinciaux applicables, y compris, mais sans s'y limiter, la *Loi sur les services publics, L.R.O. 1990, chap. P.52, art. 56[1]*; le *Règlement 210/01 de l'Ontario* en vertu de la *Loi de 2000 sur les normes techniques et la sécurité, L.O. 2000, chap. 16*; et le *Règlement 213/91 de l'Ontario* en vertu de la *Loi sur la santé et la sécurité au travail L.R.O. 1990, chap. O.1.*

2020

Dear Excavator,

Re: Marking Preservation

Your City of Ottawa Water & Sewer locate request has been completed based on the information you provided Ontario One Call. The locate is valid for 60 days from the date indicated on the City of Ottawa Locate Report – Water and Sewer Utilities. Please be aware it's the requestors responsibility to contact Ontario One Call for a new locate if any changes are known, suspected or for a relocate if excavation continues beyond 60 days.

The City of Ottawa expects excavators to protect and preserve the paint marks and flags placed at the time of the original locate ticket. If markings are removed due to weather or excavation work, the excavator is expected to recreate the markings based on the tie-in measurements provided on the original locate ticket report. Valid locate documentation is always required to be on site.

This is in accordance with the below section from the Canadian Common Ground Alliance Best Practices handbook version 3.0 – October 2018 (p. 55)

4-16: Marking Preservation Practice Statement: *The excavator, where practical, protects and preserves the staking, marking, or other designations for underground facilities until no longer required for proper and safe excavation. The excavator stops excavating and notifies the notification service for re-marks if any facility mark is removed or no longer visible.*

If an excavator would like the City of Ottawa to refresh the markings, please contact Ontario One Call to request a Remark and reference the original locate ticket number.

Thank you,

City of Ottawa, Water and Sewer Locates

Appendix C

Borehole Logs

BH1-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 97.86 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0	Gravelly Sand with some silt. Grey, loose, dry.	0	Casing Top Elev: 98.56 (m) Casing Type: Stickup
0.6 / 97.25				Silty Sand and Gravel with some Clay (Fill). Grey, loose, dry		
1	SS 2	6-15-15-14 (30)	Vapor = 0		0	
2	SS 3	7-8-9-12 (17)	Vapor = 0		0	
3	SS 4	7-12-50-50 (62)	Vapor = 0		0	
	SS 5	4-4-5-3 (9)	Vapor = 0	Wet at ~ 3.35 m BGS SS5 - Laboratory Analysis for PHCs, VOCs, PAHs	0	
3.9 / 93.93	SS 6	4-50-50-50/-0.33	Vapor = 0		0	Dry

Auger Refusal at 3.93 m BGS.
Bottom of hole at 3.93 m.

BH2-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 98.16 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0	0.2	Silty Sand with some gravel and organics. Brown, loose, moist. (98.01) Silty Sand and Gravel with some Clay. Grey, loose, dry	0	
1	SS 2	7-6-7-7 (13)	Vapor = 0	1.1	Black staining and cinders SS2 - Laboratory Analysis for PHCs, BTEXs, PAHs, Metals (97.09) Silty Clay. Grey, firm, moist.	0	
2	SS 3	5-6-7-8 (13)	Vapor = 0			0	
	SS 4	4-3-5-7 (8)	Vapor = 0			0	
3	SS 5	4-15-16-50/0.13	Vapor = 0	3.4	(94.81) Silty Sand and Gravel. Brown, loose, wet.	0	
				3.6	(94.53)		

Auger Refusal at 3.63 m BGS.
Bottom of hole at 3.63 m.

BH3-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 97.94 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0		Silty Sand and Gravel with some Clay (Fill). Grey, loose, dry	0	
1	SS 2	10-13-15-12 (28)	Vapor = 0			0	
2	SS 3	6-5-7-7 (12)	Vapor = 0			0	
3	SS 4	4-5-7-6 (12)	Vapor = 0			0	
	SS 5	4-3-2-4 (5)	Vapor = 0		Becoming wet at ~ 3.4 m BGS.	0	
4	SS 6	3-2-50-50/-0.28					
4.2					Auger Refusal at 4.17 m BGS. Bottom of hole at 4.17 m.	93.77	

BH4-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 97.89 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 25		0.1 Silty Sand with some gravel and organics. Brown, loose, moist. 97.79	25	
					Silty Sand and Gravel with some Clay. Brown, loose, dry		
1	SS 2	4-6-7-7 (13)	Vapor = 5		1.1 96.82 Silty Clay. Grey, firm, moist.	5	
2	SS 3	6-7-9-12 (16)	Vapor = 15			15	
	SS 4	4-6-7-9 (13)	Vapor = 0			0	
3	SS 5	3-5-5-7 (10)	Vapor = 15			15	
4	SS 6	2-3-3-4 (6)	Vapor = 0		Becoming wet at ~ 3.96 m BGS	0	
					4.5 93.39		

Auger Refusal at 4.5 m BGS.
Bottom of hole at 4.50 m.

BH5-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 97.84 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 10		0.1 (97.79) Silty Sand with some gravel and organics. Brown, loose, moist. Silty Sand and Gravel with some Clay (Fill). Brown, loose, dry.	10	
					0.8 (97.08) Silty Clay. Grey, firm, moist.		
1	SS 2	6-8-8-10 (16)	Vapor = 0			0	
2	SS 3	5-5-7-7 (12)	Vapor = 0			0	
	SS 4	3-3-4-4 (7)	Vapor = 0			0	
3	SS 5	1-2-2-2 (4)	Vapor = 10		Becoming wet at ~ 3.35 m BGS Soft at ~ 3.51 m BGS	10	
4	SS 6	1-1-1-1 (2)	Vapor = 0			0	
5	VA 7		Vapor = 10			10	
			Vapor = 0		5.3 (92.50)	0	
	SS 8	2-50-50-50/-0.37			5.4 (92.45) Silty Sand and Gravel with some Clay (Native). Brown, loose, dry Auger Refusal at 5.39 m BGS. Bottom of hole at 5.39 m.		

BH6-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 97.9 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING 5.43 m / Elev 92.47 m
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	MATERIAL DESCRIPTION	VOC Concentration (ppm)	LEL (%)
0	AU 1		Vapor = 0	0.2 Silty Sand with some gravel and organics. Brown, loose, moist. (97.75)	0	
				Silty Sand and Gravel with some Clay. Grey, loose, dry		
1	SS 2	8-7-7-7 (14)	Vapor = 0	0.9 Silty Clay with gravel, sand (Fill). Grey, loose, moist. (96.99)	0	
2	SS 3	4-5-5-5 (10)	Vapor = 0		0	
3	SS 4	2-3-3-3 (6)	Vapor = 0		0	
	SS 5	1-2-1-1 (3)	Vapor = 0	Wet at ~ 3.35 m BGS Soft at ~ 3.51 m BGS	0	
4	VA 6	1-1-1-1 (2)		Auger Refusal at 6.71 m BGS		
5	SS 7		Vapor = 30	SS7 - Laboratory Analysis for PHCs, BTEXs	30	
	VA 8	2-50-50-50 (100)		Static Groundwater Level measured at 5.43 m BGS		
6	SS 9		Vapor = 15	6.6 Silty Sand and Gravel with some Clay (Native). Brown, loose, wet. (91.29)	15	
				6.7 (91.19) Bottom of hole at 6.71 m.		

WELL DIAGRAM
Casing Top Elev: 98.86 (m)
Casing Type: Stickup
Groundwater Level 5.43 m BGS

BH7-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-15-20 **COMPLETED** 6-15-20
GROUND ELEVATION 97.75 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0	0.1 Silty Sand with some gravel and organics. Brown, loose, moist. (97.65) Silty Sand and Gravel (Fill). Brown, loose, dry	0	
1	SS 2	5-6-7-8 (13)	Vapor = 0	0.9 (96.84) Silty Clay. Grey, firm, moist.	0	
2	SS 3	3-4-5-7 (9)	Vapor = 0		0	
3	SS 4	2-2-3-3 (5)	Vapor = 0		0	
	SS 5	1-1-1-1 (2)	Vapor = 0	Wet at ~ 3.35 m BGS Soft at ~ 3.51 m BGS	0	
4	VA 6		Vapor = 0		0	
5	VA 7		Vapor = 10		10	
6	VA 8		Vapor = 0		0	
7			Vapor = 0		0	
8	VA 9 VA 10		Vapor = 0	8.2 (89.52)	0	

Auger Refusal at 8.23 m BGS
Bottom of hole at 8.23 m.

BH8-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-16-20 **COMPLETED** 6-16-20
GROUND ELEVATION 97.45 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0	Silty Sand and Gravel. Brown, loose, dry	0	
1	SS 2	6-7-6-8 (13)	Vapor = 0		0	
				1.5 / 95.93		
2	SS 3	5-6-6-6 (12)	Vapor = 0	Silty Clay. Grey, firm, moist.	0	
3	SS 4	3-3-3-2 (6)	Vapor = 20		20	
	SS 5	1-2-1-2 (3)	Vapor = 45	Wet at ~ 3.35 m BGS Soft at ~ 3.51 m BGS	45	
4	VA 6		Vapor = 50		50	
5	VA 7		Vapor = 35		35	
6	VA 8		Vapor = 50		50	
7						
8	SPT	6-6 (12)				
	SPT	6-7 (13)				
	SPT	3-3 (6)				
	SPT	50-50 (100)		8.3 / 89.14		

Cone Refusal at 8.31 m BGS.
Bottom of hole at 8.31 m.

BH9-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-16-20 **COMPLETED** 6-16-20
GROUND ELEVATION 97.61 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 15		Silty Sand and Gravel (Fill). Brown, loose, dry	15	
1	SS 2	6-9-50-50 (59)	Vapor = 0			0	
				1.7		95.93	
2	SS 3	6-9-9-10 (18)	Vapor = 60		Silty Clay. Grey, firm, moist. SS3 - Laboratory Analysis for PHCs, BTEXs	60	
3	SS 4	6-8-6-7 (14)	Vapor = 10			10	
	SS 5	4-4-4-4 (8)	Vapor = 20		Becoming wet at ~ 3.51 m BGS	20	
				3.7		93.95	

Bottom of hole at 3.66 m.

BH10-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-16-20 **COMPLETED** 6-16-20
GROUND ELEVATION 97.71 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0		Silty Sand and Gravel. Brown, loose, dry	0	
1	SS 2	16-18-16-12 (34)	Vapor = 0			0	
	SS 3	9-7-7-10 (14)	Vapor = 0	1.7	Silty Clay. Grey, firm, moist. (96.03)	0	
2					Becoming wet at ~ 2.13 m BGS		
	SS 4	3-8-6-6 (14)	Vapor = 0			0	
3	SS 5	4-4-4-6 (8)	Vapor = 0	3.7	SS5 - Laboratory Analysis for PHCs, VOCs, PAHs Asphalt pieces encountered at ~ 3.5 m BGS (94.05)	0	

Bottom of hole at 3.66 m.

BH11-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-16-20 **COMPLETED** 6-16-20
GROUND ELEVATION 97.71 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	GRAPHIC LOG	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80	WELL DIAGRAM
0	AU 1		Vapor = 0		Silty Sand and Gravel (Fill). Brown, loose, dry	0	
1	SS 2	8-27-18-19 (45)	Vapor = 0			0	
	SS 3	5-8-3-3 (11)	Vapor = 0	1.8	Silty Clay. Grey, firm, moist. (95.88)	0	
2	SS 4	3-8-9-9 (17)	Vapor = 0			0	
3	SS 5	9-12-10-8 (22)	Vapor = 0	3.7	(94.05)	0	

Bottom of hole at 3.66 m.

BH12-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-16-20 **COMPLETED** 6-16-20
GROUND ELEVATION 97.67 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING ---
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80
0	AU 1		Vapor = 0	Silty Sand and Gravel with some Clay. Grey, loose, dry	0
1	SS 2	7-6-4-2 (10)	Vapor = 0		0
2	SS 3	2-1-2-2 (3)	Vapor = 0		0
2.1 (95.54)				Silty Clay with gravel, sand (Fill). Grey, loose, moist.	
3	SS 4	1-2-1-1 (3)	Vapor = 0	Wet at ~ 3.05 m BGS	0
	SS 5	1-1-1-1 (2)	Vapor = 0	Asphalt pieces at ~ 2.3 m BGS and 3.8 m BGS SS5 - Laboratory Analysis for PHCs, VOCs, PAHs, Metals	0
4 (4.1) (93.61)	SS 6	4-2-50-50/-0.20	Vapor = 0		0

WELL DIAGRAM
Casing Top Elev: 98.4 (m)
Casing Type: Stickup
Dry

Auger Refusal at 4.06 m BGS
Bottom of hole at 4.06 m.

BH13-20

LOPERS & ASSOCIATES

Lopers & Associates
30 Lansfield Way
Ottawa, Ontario K2G3V8

CLIENT Ottawa Community Housing Corporation
PROJECT NAME Phase Two Environmental Site Assessment
PROJECT NUMBER LOP20-001B
PROJECT LOCATION 715 Mikinak Road, Ottawa, Ontario
DATE STARTED 6-16-20 **COMPLETED** 6-16-20
GROUND ELEVATION 98.07 m **HOLE SIZE** 20 cm
DRILLING CONTRACTOR George Downing Estate Drilling
GROUND WATER LEVELS:
DRILLING METHOD Track Mounted CME 55
AFTER DRILLING 4.53 m / Elev 93.54 m
LOGGED BY L. Lopers **CHECKED BY** D. Plenderleith
NOTES Site Datum = 100.00 m Top of Spindle of Fire Hydrant NW of Property

DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA	MATERIAL DESCRIPTION	VOC Concentration (ppm) 20 40 60 80 / LEL (%) 20 40 60 80
0	AU 1		Vapor = 0	Silty Sand and Gravel with some Clay (Fill). Grey, loose, dry	0
1	SS 2	9-13-5-3 (18)	Vapor = 0	SS2 - Laboratory Analysis for PHCs, BTEXs, PAHs, Metals	0
2	SS 3	3-5-7-3 (12)	Vapor = 0		0
	SS 4	9-24-20-17 (44)	Vapor = 25		25
3	SS 5	21-35-35-31 (70)	Vapor = 30	SS5 - Laboratory Analysis for PHCs, VOCs	30
4	SS 6	8-10-10-12 (20)	Vapor = 15		15
				Wet at ~ 4.27 m BGS Static Groundwater Level measured at 4.53 m BGS	
	SS 7	6-50-50-50/-0.33	Vapor = 0	4.7	0

93.38

Auger Refusal at 4.69 m BGS.
Bottom of hole at 4.69 m.

WELL DIAGRAM
Casing Top Elev: 98.85 (m)
Casing Type: Stickup

Groundwater Level 4.53 m BGS

Appendix D

Certificates of Equipment Calibration

MAXIM ENVIRONMENTAL AND SAFETY INC.
148 Colonnade Rd, UNIT # 9
Nepean, Ontario, K2E 7R4

Phone: **(613)224-4747**

CERTIFICATE OF CALIBRATION

The RKI Instruments **Model EAGLE-2** as listed below has been inspected and calibrated following the Manufacturer's published specifications and methods.

Instrument Model: **EAGLE-2** Serial Number: E28777 Date of Calibration: June 9/2020

SENSOR	CALIBRATION GAS STANDARD	CALIBRATION GAS CONCENTRATION	READING PRIOR TO ADJUSTMENT	INSTRUMENT SPAN SETTING	ALARM LEVEL SETTINGS
Combustible	Hexane lot # 1189063	15% LEL	1650 ppm	15% LEL **"Methane Elimination" Mode**	10 & 50% LEL
Combustible	Methane lot # 1223797	50% LEL	<500 PPM	Verification Only **"Methane Elimination" Mode**	
Combustible	Hexane lot # 1189063	15% LEL	1650 ppm	15% LEL **"Methane Response Enabled" Mode**	10 & 50% LEL
VOC	Isobutylene lot # 1278604	100 PPM	100 PPM	100 PPM	400 & 1000 PPM

The calibration gas standard used is considered to be a certified standard and is traceable to the National Institute of Standards and Technology (NIST). Certificate of Analysis is available upon request.

The instrument indicated above is now certified to be operating within the Manufacturer's specifications. **This does not preclude the requirement for regular maintenance and pre-use sensor response checks in order to ensure continued complete and accurate operating condition.**

Certified: _____

RENTALS, SALES, SUPPORT

Maxim

1-888-285-2324

ENVIRONMENTAL AND SAFETY INC.

"Exceptional Customer Service!"

Certificate of Calibration

HORIBA U-52 Serial Number KVC45H5T *has been calibrated per the Manufacturers published instructions, using NIST traceable solutions and*

2, 2-Point pH	Cond.	Turb,	DO	ORP
4.00, 7.00, 10.0	4.49uS/cm	0, 100 NTU	9.09 mg/L@ 20 DegC	240mV
pH 4.0 Lot #9GD684 Exp05/21	zero checked	Zero checked	Sodium Sulfite Zero	
pH 7.0 Lot# 9GK721 Exp.11/21 pH 10.0 Lot#9GD483 Exp. 04/21	Cond.Standard Lot#9GC1263 Exp. 04/2021	StableCal Standard, 100 NTU Lot#A9151 Exp.06/21	Oakton Zero Oxygen Solution Lot# 639901	ORP Test Solution 240 mV Lot # 4318 Exp 06/2024

Solutions ref. to NIST SRM's

June 17, 2020

Calibrated

RENTALS, SALES, SERVICE, SUPPORT

9 - 170 AMBASSADOR DR., MISSISSAUGA, ONTARIO L5T 2H9
PHONE: (905) 670-1304 TOLL FREE: (888) 285-2324
E-MAIL: SALES@MAXIMENVIRONMENTAL.COM

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PHONE: (613) 224-4747 TOLL FREE: (888) 285-2324
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WWW.MAXIMENVIRONMENTAL.COM

Appendix E

Laboratory Certificates of Analysis

PARACEL LABORATORIES LTD.

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RESPONSIVE.
RELIABLE.

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1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Lopers & Associates

30 Lansfield Way
Ottawa, ONT K2G 3V8
Attn: Luke Lopers

Client PO: 2053548
Project: LOP20-001
Custody: 55470

Report Date: 22-Jun-2020
Order Date: 15-Jun-2020

Order #: 2025116

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

Paracel ID	Client ID
2025116-01	BH1-20-SS5
2025116-02	BH2-20-SS2
2025116-03	BH6-20-SS7

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	22-Jun-20	22-Jun-20
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	16-Jun-20	17-Jun-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	18-Jun-20	18-Jun-20
Conductivity	MOE E3138 - probe @25 °C, water ext	22-Jun-20	22-Jun-20
Cyanide, free	MOE E3015 - Auto Colour, water extraction	17-Jun-20	19-Jun-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	22-Jun-20	22-Jun-20
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	22-Jun-20	22-Jun-20
PHC F1	CWS Tier 1 - P&T GC-FID	16-Jun-20	17-Jun-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Jun-20	20-Jun-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	22-Jun-20	22-Jun-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	17-Jun-20	19-Jun-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	16-Jun-20	17-Jun-20
SAR	Calculated	22-Jun-20	22-Jun-20

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 15-Jun-2020

Project Description: LOP20-001

	Client ID:	BH1-20-SS5	BH2-20-SS2	BH6-20-SS7	-
	Sample Date:	15-Jun-20 09:00	15-Jun-20 09:00	15-Jun-20 09:00	-
	Sample ID:	2025116-01	2025116-02	2025116-03	-
	MDL/Units	Soil	Soil	Soil	-
General Inorganics					
SAR	0.01 N/A	-	0.83	-	-
Conductivity	5 uS/cm	-	244	-	-
Cyanide, free	0.03 ug/g dry	-	<0.03	-	-
pH	0.05 pH Units	-	7.24	-	-
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	-
Arsenic	1.0 ug/g dry	-	4.0	-	-
Barium	1.0 ug/g dry	-	115	-	-
Beryllium	0.5 ug/g dry	-	1.4	-	-
Boron	5.0 ug/g dry	-	5.5	-	-
Boron, available	0.5 ug/g dry	-	<0.5	-	-
Cadmium	0.5 ug/g dry	-	<0.5	-	-
Chromium	5.0 ug/g dry	-	35.7	-	-
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	-
Cobalt	1.0 ug/g dry	-	8.0	-	-
Copper	5.0 ug/g dry	-	31.6	-	-
Lead	1.0 ug/g dry	-	84.7	-	-
Mercury	0.1 ug/g dry	-	<0.1	-	-
Molybdenum	1.0 ug/g dry	-	<1.0	-	-
Nickel	5.0 ug/g dry	-	21.7	-	-
Selenium	1.0 ug/g dry	-	1.3	-	-
Silver	0.3 ug/g dry	-	<0.3	-	-
Thallium	1.0 ug/g dry	-	<1.0	-	-
Uranium	1.0 ug/g dry	-	<1.0	-	-
Vanadium	10.0 ug/g dry	-	44.3	-	-
Zinc	20.0 ug/g dry	-	81.3	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 15-Jun-2020

Project Description: LOP20-001

	Client ID:	BH1-20-SS5	BH2-20-SS2	BH6-20-SS7	-
	Sample Date:	15-Jun-20 09:00	15-Jun-20 09:00	15-Jun-20 09:00	-
	Sample ID:	2025116-01	2025116-02	2025116-03	-
	MDL/Units	Soil	Soil	Soil	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
4-Bromofluorobenzene	Surrogate	110%	-	-	-
Dibromofluoromethane	Surrogate	76.1%	-	-	-

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 15-Jun-2020

Project Description: LOP20-001

	Client ID:	BH1-20-SS5	BH2-20-SS2	BH6-20-SS7	-
	Sample Date:	15-Jun-20 09:00	15-Jun-20 09:00	15-Jun-20 09:00	-
	Sample ID:	2025116-01	2025116-02	2025116-03	-
	MDL/Units	Soil	Soil	Soil	-
Toluene-d8	Surrogate	114%	-	-	-
Benzene	0.02 ug/g dry	-	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	<0.05	-
Toluene	0.05 ug/g dry	-	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	-	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	-	<0.05	<0.05	-
Toluene-d8	Surrogate	-	118%	116%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	45	9	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	103	11	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	<0.02	<0.02	-	-
Anthracene	0.02 ug/g dry	<0.02	0.02	-	-
Benzo [a] anthracene	0.02 ug/g dry	<0.02	0.05	-	-
Benzo [a] pyrene	0.02 ug/g dry	<0.02	0.06	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	0.07	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	0.04	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	0.04	-	-
Chrysene	0.02 ug/g dry	<0.02	0.07	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g dry	<0.02	0.14	-	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	0.03	-	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	0.03	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	0.05	-	-
Naphthalene	0.01 ug/g dry	<0.01	0.01	-	-
Phenanthrene	0.02 ug/g dry	<0.02	0.08	-	-
Pyrene	0.02 ug/g dry	<0.02	0.11	-	-
2-Fluorobiphenyl	Surrogate	88.6%	102%	-	-
Terphenyl-d14	Surrogate	91.0%	84.9%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Cyanide, free	ND	0.03	ug/g						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.51*		*ug/g*		*113*	*50-140*			
Surrogate: Terphenyl-d14	*1.17*		*ug/g*		*88.0*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 15-Jun-2020

Project Description: LOP20-001

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*3.45*		*ug/g*		*108*	*50-140*			
Surrogate: Dibromofluoromethane	*2.28*		*ug/g*		*71.1*	*50-140*			
Surrogate: Toluene-d8	*3.56*		*ug/g*		*111*	*50-140*			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.56*		*ug/g*		*111*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	5.61	0.01	N/A	5.40			3.8	30	
Conductivity	1840	5	uS/cm	1860			1.0	5	
Cyanide, free	ND	0.03	ug/g dry	ND			NC	35	
pH	5.10	0.05	pH Units	5.11			0.2	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g wet	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g wet	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g wet	ND			NC	30	
Metals									
Antimony	1.3	1.0	ug/g dry	ND			NC	30	
Arsenic	4.3	1.0	ug/g dry	4.0			7.4	30	
Barium	84.5	1.0	ug/g dry	115			30.8	30	QR-05
Beryllium	0.7	0.5	ug/g dry	1.4			NC	30	
Boron, available	0.51	0.5	ug/g dry	0.63			20.2	35	
Boron	7.4	5.0	ug/g dry	5.5			29.7	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	31.4	5.0	ug/g dry	35.7			12.9	30	
Cobalt	6.4	1.0	ug/g dry	8.0			21.6	30	
Copper	13.2	5.0	ug/g dry	31.6			NC	30	
Lead	11.1	1.0	ug/g dry	84.7			154.0	30	QR-05
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	17.8	5.0	ug/g dry	21.7			20.2	30	
Selenium	ND	1.0	ug/g dry	1.3			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	30.8	10.0	ug/g dry	44.3			NC	30	
Zinc	52.9	20.0	ug/g dry	81.3			NC	30	
Physical Characteristics									
% Solids	100	0.1	% by Wt.	100			0.0	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	0.349			NC	40	
Acenaphthylene	0.023	0.02	ug/g dry	0.049			NC	40	
Anthracene	0.042	0.02	ug/g dry	1.04			NC	40	
Benzo [a] anthracene	0.080	0.02	ug/g dry	1.20			NC	40	
Benzo [a] pyrene	0.086	0.02	ug/g dry	0.910			NC	40	
Benzo [b] fluoranthene	0.106	0.02	ug/g dry	1.03			NC	40	
Benzo [g,h,i] perylene	0.052	0.02	ug/g dry	0.439			NC	40	
Benzo [k] fluoranthene	0.051	0.02	ug/g dry	0.530			NC	40	
Chrysene	0.096	0.02	ug/g dry	1.16			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	0.134			NC	40	
Fluoranthene	0.168	0.02	ug/g dry	2.85			NC	40	
Fluorene	ND	0.02	ug/g dry	0.453			NC	40	
Indeno [1,2,3-cd] pyrene	0.048	0.02	ug/g dry	0.443			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	0.144			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	0.222			NC	40	
Naphthalene	ND	0.01	ug/g dry	0.599			NC	40	
Phenanthrene	0.091	0.02	ug/g dry	3.24			NC	40	
Pyrene	0.143	0.02	ug/g dry	2.18			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.11*		*ug/g dry*		*83.2*	*50-140*			
Surrogate: Terphenyl-d14	*1.03*		*ug/g dry*		*77.1*	*50-140*			
Volatiles									

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*3.88*		*ug/g dry*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*2.30*		*ug/g dry*		*62.6*	*50-140*			
Surrogate: Toluene-d8	*4.17*		*ug/g dry*		*113*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*4.17*		*ug/g dry*		*113*	*50-140*			

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 22-Jun-2020
Order Date: 15-Jun-2020
Project Description: LOP20-001

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	0.215	0.03	ug/g	ND	71.6	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	164	7	ug/g	ND	82.1	80-120			
F2 PHCs (C10-C16)	94	4	ug/g	ND	118	60-140			
F3 PHCs (C16-C34)	229	8	ug/g	ND	117	60-140			
F4 PHCs (C34-C50)	109	6	ug/g	ND	88.2	60-140			
Metals									
Antimony	48.2	1.0	ug/g	ND	96.1	70-130			
Arsenic	50.4	1.0	ug/g	1.6	97.5	70-130			
Barium	82.7	1.0	ug/g	46.1	73.2	70-130			
Beryllium	52.1	0.5	ug/g	0.6	103	70-130			
Boron, available	2.69	0.5	ug/g	0.63	41.3	70-122			QM-07
Boron	48.9	5.0	ug/g	ND	93.5	70-130			
Cadmium	49.2	0.5	ug/g	ND	98.1	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	50.5	70-130			QM-05
Chromium	64.6	5.0	ug/g	14.3	101	70-130			
Cobalt	49.5	1.0	ug/g	3.2	92.7	70-130			
Copper	53.6	5.0	ug/g	12.7	81.8	70-130			
Lead	48.9	1.0	ug/g	4.4	88.9	70-130			
Mercury	1.62	0.1	ug/g	ND	108	70-130			
Molybdenum	48.8	1.0	ug/g	ND	96.9	70-130			
Nickel	56.1	5.0	ug/g	8.7	94.8	70-130			
Selenium	49.0	1.0	ug/g	ND	96.9	70-130			
Silver	42.7	0.3	ug/g	ND	85.1	70-130			
Thallium	47.9	1.0	ug/g	ND	95.6	70-130			
Uranium	47.5	1.0	ug/g	ND	94.5	70-130			
Vanadium	64.0	10.0	ug/g	17.7	92.6	70-130			
Zinc	68.5	20.0	ug/g	32.5	71.9	70-130			
Semi-Volatiles									
Acenaphthene	0.190	0.02	ug/g	ND	114	50-140			
Acenaphthylene	0.160	0.02	ug/g	ND	96.0	50-140			
Anthracene	0.188	0.02	ug/g	ND	113	50-140			
Benzo [a] anthracene	0.171	0.02	ug/g	ND	103	50-140			
Benzo [a] pyrene	0.167	0.02	ug/g	ND	100	50-140			
Benzo [b] fluoranthene	0.210	0.02	ug/g	ND	126	50-140			
Benzo [g,h,i] perylene	0.175	0.02	ug/g	ND	105	50-140			
Benzo [k] fluoranthene	0.174	0.02	ug/g	ND	105	50-140			
Chrysene	0.185	0.02	ug/g	ND	111	50-140			
Dibenzo [a,h] anthracene	0.173	0.02	ug/g	ND	104	50-140			
Fluoranthene	0.180	0.02	ug/g	ND	108	50-140			
Fluorene	0.198	0.02	ug/g	ND	119	50-140			
Indeno [1,2,3-cd] pyrene	0.175	0.02	ug/g	ND	105	50-140			
1-Methylnaphthalene	0.193	0.02	ug/g	ND	116	50-140			
2-Methylnaphthalene	0.193	0.02	ug/g	ND	116	50-140			
Naphthalene	0.154	0.01	ug/g	ND	92.4	50-140			
Phenanthrene	0.196	0.02	ug/g	ND	117	50-140			
Pyrene	0.205	0.02	ug/g	ND	123	50-140			
Surrogate: 2-Fluorobiphenyl	*1.42*		*ug/g*		*106*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Terphenyl-d14	*1.40*		*ug/g*		*105*	*50-140*			
Volatiles									
Acetone	7.09	0.50	ug/g	ND	70.9	50-140			
Benzene	2.56	0.02	ug/g	ND	63.9	60-130			
Bromodichloromethane	2.55	0.05	ug/g	ND	63.8	60-130			
Bromoform	3.95	0.05	ug/g	ND	98.8	60-130			
Bromomethane	2.75	0.05	ug/g	ND	68.7	50-140			
Carbon Tetrachloride	2.57	0.05	ug/g	ND	64.2	60-130			
Chlorobenzene	3.73	0.05	ug/g	ND	93.3	60-130			
Chloroform	2.55	0.05	ug/g	ND	63.8	60-130			
Dibromochloromethane	3.89	0.05	ug/g	ND	97.2	60-130			
Dichlorodifluoromethane	2.69	0.05	ug/g	ND	67.2	50-140			
1,2-Dichlorobenzene	3.38	0.05	ug/g	ND	84.4	60-130			
1,3-Dichlorobenzene	3.25	0.05	ug/g	ND	81.3	60-130			
1,4-Dichlorobenzene	3.45	0.05	ug/g	ND	86.2	60-130			
1,1-Dichloroethane	2.85	0.05	ug/g	ND	71.4	60-130			
1,2-Dichloroethane	2.90	0.05	ug/g	ND	72.6	60-130			
1,1-Dichloroethylene	2.46	0.05	ug/g	ND	61.5	60-130			
cis-1,2-Dichloroethylene	2.71	0.05	ug/g	ND	67.7	60-130			
trans-1,2-Dichloroethylene	2.44	0.05	ug/g	ND	61.0	60-130			
1,2-Dichloropropane	3.85	0.05	ug/g	ND	96.2	60-130			
cis-1,3-Dichloropropylene	3.95	0.05	ug/g	ND	98.7	60-130			
trans-1,3-Dichloropropylene	2.55	0.05	ug/g	ND	63.7	60-130			
Ethylbenzene	3.77	0.05	ug/g	ND	94.2	60-130			
Ethylene dibromide (dibromoethane, 1,2-	3.79	0.05	ug/g	ND	94.8	60-130			
Hexane	2.73	0.05	ug/g	ND	68.2	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.06	0.50	ug/g	ND	60.6	50-140			
Methyl Isobutyl Ketone	6.21	0.50	ug/g	ND	62.1	50-140			
Methyl tert-butyl ether	5.72	0.05	ug/g	ND	57.2	50-140			
Methylene Chloride	2.66	0.05	ug/g	ND	66.5	60-130			
Styrene	3.59	0.05	ug/g	ND	89.7	60-130			
1,1,1,2-Tetrachloroethane	3.81	0.05	ug/g	ND	95.3	60-130			
1,1,2,2-Tetrachloroethane	3.46	0.05	ug/g	ND	86.4	60-130			
Tetrachloroethylene	3.85	0.05	ug/g	ND	96.3	60-130			
Toluene	3.73	0.05	ug/g	ND	93.3	60-130			
1,1,1-Trichloroethane	2.43	0.05	ug/g	ND	60.7	60-130			
1,1,2-Trichloroethane	2.62	0.05	ug/g	ND	65.6	60-130			
Trichloroethylene	2.60	0.05	ug/g	ND	65.0	60-130			
Trichlorofluoromethane	2.47	0.05	ug/g	ND	61.9	50-140			
Vinyl chloride	2.55	0.02	ug/g	ND	63.9	50-140			
m,p-Xylenes	7.55	0.05	ug/g	ND	94.4	60-130			
o-Xylene	3.95	0.05	ug/g	ND	98.8	60-130			
Surrogate: 4-Bromofluorobenzene	*2.62*		*ug/g*		*82.0*	*50-140*			
Surrogate: Dibromofluoromethane	*2.73*		*ug/g*		*85.3*	*50-140*			
Surrogate: Toluene-d8	*2.89*		*ug/g*		*90.2*	*50-140*			
Benzene	2.56	0.02	ug/g	ND	63.9	60-130			
Ethylbenzene	3.77	0.05	ug/g	ND	94.2	60-130			
Toluene	3.73	0.05	ug/g	ND	93.3	60-130			
m,p-Xylenes	7.55	0.05	ug/g	ND	94.4	60-130			
o-Xylene	3.95	0.05	ug/g	ND	98.8	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*2.89*		*ug/g*		*90.2*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match - BH6-SS7

Applies to samples: BH6-20-SS7

Container(s) - Bottle and COC sample ID don't match - ID on container reads BH1-SS5

Applies to samples: BH1-20-SS5

Container(s) - Bottle and COC sample ID don't match - ID on containers reads BH2-SS2

Applies to samples: BH2-20-SS2

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-05 : Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACEL LABORATORIES

Paracel ID: 2025116

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2025116	№ 55470

Client Name: LOPERS & ASSOCIATES	Project Ref: LOP20-001
Contact Name: Luke Lopers	Quote #: #20-456 OCHC - 715 Mikinak Road
Address: 30 Lansfield Way, Ottawa, ON	PO #: 2053548
Telephone: 613-327-9073	E-mail: Luke@Lopers.ca

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular

Date Required: _____

Regulation 153/04: ☒ Table 1 ☐ Res/Park ☐ Med/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☐ Table 3 ☐ Agri/Other; ☐ Table ___; For RSC: ☐ Yes ☒ No

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Metals & Inorganics	PHCs	VOCs	BTEXs	PAHs							
1	BH1-20-SS5	S		2	June 15, 2020			X	X		X							
2	BH2-20-SS2	S		2	↓		X	X		X	X							
3	BH6-20-SS7	S		2	↓			X		X								
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments: Billing direct to OCH

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: Mark Fato	Verified By:
Relinquished By (Print): Luke Lopers	Date/Time:	Date/Time: June 15/20 19:00	Date/Time: 16 Jun 2020 8:01
Date/Time: June 15, 2020 / 6:40 PM	Temperature: °C	Temperature: 23.4 °C	pH Verified: ☐ By: NA

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Certificate of Analysis

Lopers & Associates

30 Lansfield Way
Ottawa, ONT K2G 3V8
Attn: Luke Lopers

Client PO: 2053548
Project: LOP20-001B
Custody: 55471

Report Date: 22-Jun-2020
Order Date: 16-Jun-2020

Order #: 2025227

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

Paracel ID	Client ID
2025227-01	BH9-20-SS3
2025227-02	BH10-20-SS5
2025227-03	BH12-20-SS5
2025227-04	BH13-20-SS2
2025227-05	BH13-20-SS5
2025227-06	BH22-20-SS5

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	22-Jun-20	22-Jun-20
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	18-Jun-20	19-Jun-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	18-Jun-20	18-Jun-20
Conductivity	MOE E3138 - probe @25 °C, water ext	22-Jun-20	22-Jun-20
Cyanide, free	MOE E3015 - Auto Colour, water extraction	17-Jun-20	19-Jun-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	22-Jun-20	22-Jun-20
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	22-Jun-20	22-Jun-20
PHC F1	CWS Tier 1 - P&T GC-FID	18-Jun-20	19-Jun-20
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	22-Jun-20	22-Jun-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	17-Jun-20	21-Jun-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	22-Jun-20	22-Jun-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	17-Jun-20	20-Jun-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	18-Jun-20	19-Jun-20
SAR	Calculated	22-Jun-20	22-Jun-20

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH9-20-SS3	BH10-20-SS5	BH12-20-SS5	BH13-20-SS2
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00
	Sample ID:	2025227-01	2025227-02	2025227-03	2025227-04
	MDL/Units	Soil	Soil	Soil	Soil
General Inorganics					
SAR	0.01 N/A	-	-	2.17	0.09
Conductivity	5 uS/cm	-	-	423	1950
Cyanide, free	0.03 ug/g dry	-	-	<0.03	<0.03
pH	0.05 pH Units	-	-	7.32	7.40
Metals					
Antimony	1.0 ug/g dry	-	-	<1.0	<1.0
Arsenic	1.0 ug/g dry	-	-	3.1	3.1
Barium	1.0 ug/g dry	-	-	197	144
Beryllium	0.5 ug/g dry	-	-	0.5	0.5
Boron	5.0 ug/g dry	-	-	<5.0	17.2
Boron, available	0.5 ug/g dry	-	-	0.6	0.5
Cadmium	0.5 ug/g dry	-	-	<0.5	<0.5
Chromium	5.0 ug/g dry	-	-	51.3	22.6
Chromium (VI)	0.2 ug/g dry	-	-	<0.2	<0.2
Cobalt	1.0 ug/g dry	-	-	12.0	9.0
Copper	5.0 ug/g dry	-	-	26.6	15.5
Lead	1.0 ug/g dry	-	-	7.3	12.9
Mercury	0.1 ug/g dry	-	-	<0.1	<0.1
Molybdenum	1.0 ug/g dry	-	-	<1.0	1.1
Nickel	5.0 ug/g dry	-	-	29.3	19.0
Selenium	1.0 ug/g dry	-	-	<1.0	<1.0
Silver	0.3 ug/g dry	-	-	<0.3	<0.3
Thallium	1.0 ug/g dry	-	-	<1.0	<1.0
Uranium	1.0 ug/g dry	-	-	<1.0	<1.0
Vanadium	10.0 ug/g dry	-	-	56.1	22.4
Zinc	20.0 ug/g dry	-	-	60.1	28.5
Volatiles					
Acetone	0.50 ug/g dry	-	<0.50	<0.50	-
Benzene	0.02 ug/g dry	-	<0.02	<0.02	-
Bromodichloromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Bromoform	0.05 ug/g dry	-	<0.05	<0.05	-
Bromomethane	0.05 ug/g dry	-	<0.05	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	<0.05	-
Chlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	-	<0.05	<0.05	-

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH9-20-SS3	BH10-20-SS5	BH12-20-SS5	BH13-20-SS2
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00
	Sample ID:	2025227-01	2025227-02	2025227-03	2025227-04
	MDL/Units	Soil	Soil	Soil	Soil
Dibromochloromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	<0.05	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	-	<0.05	<0.05	-
Hexane	0.05 ug/g dry	-	<0.05	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	<0.05	-
Methylene Chloride	0.05 ug/g dry	-	<0.05	<0.05	-
Styrene	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
Toluene	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
Trichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Vinyl chloride	0.02 ug/g dry	-	<0.02	<0.02	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	-	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	-	<0.05	<0.05	-
4-Bromofluorobenzene	Surrogate	-	100%	100%	-
Dibromofluoromethane	Surrogate	-	112%	111%	-

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH9-20-SS3	BH10-20-SS5	BH12-20-SS5	BH13-20-SS2
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00
	Sample ID:	2025227-01	2025227-02	2025227-03	2025227-04
	MDL/Units	Soil	Soil	Soil	Soil
Toluene-d8	Surrogate	-	98.3%	99.1%	-
Benzene	0.02 ug/g dry	<0.02	-	-	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	<0.05
Toluene	0.05 ug/g dry	<0.05	-	-	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	<0.05
o-Xylene	0.05 ug/g dry	<0.05	-	-	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	-	-	<0.05
Toluene-d8	Surrogate	99.2%	-	-	99.0%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	46	50	31
F4 PHCs (C34-C50)	6 ug/g dry	<6	45	263 [3]	88
F4G PHCs (gravimetric)	50 ug/g dry	-	-	630	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	0.02	0.04	<0.02
Acenaphthylene	0.02 ug/g dry	-	<0.02	<0.02	<0.02
Anthracene	0.02 ug/g dry	-	0.08	0.11	<0.02
Benzo [a] anthracene	0.02 ug/g dry	-	0.15	0.15	<0.02
Benzo [a] pyrene	0.02 ug/g dry	-	0.14	0.13	<0.02
Benzo [b] fluoranthene	0.02 ug/g dry	-	0.16	0.14	<0.02
Benzo [g,h,i] perylene	0.02 ug/g dry	-	0.07	0.08	<0.02
Benzo [k] fluoranthene	0.02 ug/g dry	-	0.08	0.07	<0.02
Chrysene	0.02 ug/g dry	-	0.16	0.16	<0.02
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	0.02	0.02	<0.02
Fluoranthene	0.02 ug/g dry	-	0.38	0.38	<0.02
Fluorene	0.02 ug/g dry	-	0.02	0.05	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	0.07	0.07	<0.02
1-Methylnaphthalene	0.02 ug/g dry	-	<0.02	<0.02	<0.02
2-Methylnaphthalene	0.02 ug/g dry	-	<0.02	<0.02	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<0.04	<0.04	<0.04
Naphthalene	0.01 ug/g dry	-	<0.01	0.04	<0.01
Phenanthrene	0.02 ug/g dry	-	0.26	0.37	<0.02
Pyrene	0.02 ug/g dry	-	0.31	0.31	<0.02
2-Fluorobiphenyl	Surrogate	-	99.7%	64.2%	113%
Terphenyl-d14	Surrogate	-	80.1%	60.6%	100%

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH13-20-SS5	BH22-20-SS5	-	-
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	-	-
	Sample ID:	2025227-05	2025227-06	-	-
	MDL/Units	Soil	Soil	-	-
General Inorganics					
SAR	0.01 N/A	-	2.24	-	-
Conductivity	5 uS/cm	-	442	-	-
Cyanide, free	0.03 ug/g dry	-	<0.03	-	-
pH	0.05 pH Units	-	7.51	-	-
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	-
Arsenic	1.0 ug/g dry	-	3.2	-	-
Barium	1.0 ug/g dry	-	195	-	-
Beryllium	0.5 ug/g dry	-	0.6	-	-
Boron	5.0 ug/g dry	-	<5.0	-	-
Boron, available	0.5 ug/g dry	-	0.6	-	-
Cadmium	0.5 ug/g dry	-	<0.5	-	-
Chromium	5.0 ug/g dry	-	52.9	-	-
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	-
Cobalt	1.0 ug/g dry	-	12.0	-	-
Copper	5.0 ug/g dry	-	26.0	-	-
Lead	1.0 ug/g dry	-	7.9	-	-
Mercury	0.1 ug/g dry	-	<0.1	-	-
Molybdenum	1.0 ug/g dry	-	<1.0	-	-
Nickel	5.0 ug/g dry	-	29.9	-	-
Selenium	1.0 ug/g dry	-	<1.0	-	-
Silver	0.3 ug/g dry	-	<0.3	-	-
Thallium	1.0 ug/g dry	-	<1.0	-	-
Uranium	1.0 ug/g dry	-	<1.0	-	-
Vanadium	10.0 ug/g dry	-	56.0	-	-
Zinc	20.0 ug/g dry	-	60.1	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	<0.50	-	-
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	-	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	-	-

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH13-20-SS5	BH22-20-SS5	-	-
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	-	-
	Sample ID:	2025227-05	2025227-06	-	-
	MDL/Units	Soil	Soil	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	<0.05	<0.05	-	-
Hexane	0.05 ug/g dry	<0.05	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	-	-
Styrene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
4-Bromofluorobenzene	Surrogate	99.7%	100%	-	-

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 22-Jun-2020
Order Date: 16-Jun-2020
Project Description: LOP20-001B

	Client ID:	BH13-20-SS5	BH22-20-SS5	-	-
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	-	-
	Sample ID:	2025227-05	2025227-06	-	-
	MDL/Units	Soil	Soil	-	-
Dibromofluoromethane	Surrogate	111%	112%	-	-
Toluene-d8	Surrogate	99.4%	99.3%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	53	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	315 [3]	-	-
F4G PHCs (gravimetric)	50 ug/g dry	-	630	-	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	-	<0.02	-	-
Anthracene	0.02 ug/g dry	-	0.04	-	-
Benzo [a] anthracene	0.02 ug/g dry	-	0.08	-	-
Benzo [a] pyrene	0.02 ug/g dry	-	0.07	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	0.08	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	0.05	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	0.04	-	-
Chrysene	0.02 ug/g dry	-	0.09	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.02	-	-
Fluoranthene	0.02 ug/g dry	-	0.18	-	-
Fluorene	0.02 ug/g dry	-	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	0.04	-	-
1-Methylnaphthalene	0.02 ug/g dry	-	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	-	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<0.04	-	-
Naphthalene	0.01 ug/g dry	-	<0.01	-	-
Phenanthrene	0.02 ug/g dry	-	0.11	-	-
Pyrene	0.02 ug/g dry	-	0.15	-	-
2-Fluorobiphenyl	Surrogate	-	64.9%	-	-
Terphenyl-d14	Surrogate	-	64.2%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Cyanide, free	ND	0.03	ug/g						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
F4G PHCs (gravimetric)	ND	50	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.51*		*ug/g*		*113*	*50-140*			
Surrogate: Terphenyl-d14	*1.17*		*ug/g*		*88.0*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*8.27*		*ug/g*		*103*	*50-140*			
Surrogate: Dibromofluoromethane	*9.03*		*ug/g*		*113*	*50-140*			
Surrogate: Toluene-d8	*7.01*		*ug/g*		*87.6*	*50-140*			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*7.01*		*ug/g*		*87.6*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	5.61	0.01	N/A	5.40			3.8	30	
Conductivity	1840	5	uS/cm	1860			1.0	5	
Cyanide, free	ND	0.03	ug/g dry	ND			NC	35	
pH	5.10	0.05	pH Units	5.11			0.2	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	1.3	1.0	ug/g dry	ND			NC	30	
Arsenic	4.3	1.0	ug/g dry	4.0			7.4	30	
Barium	84.5	1.0	ug/g dry	115			30.8	30	QR-05
Beryllium	0.7	0.5	ug/g dry	1.4			NC	30	
Boron, available	0.51	0.5	ug/g dry	0.63			20.2	35	
Boron	7.4	5.0	ug/g dry	5.5			29.7	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	31.4	5.0	ug/g dry	35.7			12.9	30	
Cobalt	6.4	1.0	ug/g dry	8.0			21.6	30	
Copper	13.2	5.0	ug/g dry	31.6			NC	30	
Lead	11.1	1.0	ug/g dry	84.7			154.0	30	QR-05
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	17.8	5.0	ug/g dry	21.7			20.2	30	
Selenium	ND	1.0	ug/g dry	1.3			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	30.8	10.0	ug/g dry	44.3			NC	30	
Zinc	52.9	20.0	ug/g dry	81.3			NC	30	
Physical Characteristics									
% Solids	100	0.1	% by Wt.	100			0.0	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	0.349			NC	40	
Acenaphthylene	0.023	0.02	ug/g dry	0.049			NC	40	
Anthracene	0.042	0.02	ug/g dry	1.04			NC	40	
Benzo [a] anthracene	0.080	0.02	ug/g dry	1.20			NC	40	
Benzo [a] pyrene	0.086	0.02	ug/g dry	0.910			NC	40	
Benzo [b] fluoranthene	0.106	0.02	ug/g dry	1.03			NC	40	
Benzo [g,h,i] perylene	0.052	0.02	ug/g dry	0.439			NC	40	
Benzo [k] fluoranthene	0.051	0.02	ug/g dry	0.530			NC	40	
Chrysene	0.096	0.02	ug/g dry	1.16			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	0.134			NC	40	
Fluoranthene	0.168	0.02	ug/g dry	2.85			NC	40	
Fluorene	ND	0.02	ug/g dry	0.453			NC	40	
Indeno [1,2,3-cd] pyrene	0.048	0.02	ug/g dry	0.443			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	0.144			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	0.222			NC	40	
Naphthalene	ND	0.01	ug/g dry	0.599			NC	40	
Phenanthrene	0.091	0.02	ug/g dry	3.24			NC	40	
Pyrene	0.143	0.02	ug/g dry	2.18			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.11*		*ug/g dry*		*83.2*	*50-140*			
Surrogate: Terphenyl-d14	*1.03*		*ug/g dry*		*77.1*	*50-140*			
Volatiles									

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*8.06*		*ug/g dry*		*101*	*50-140*			
Surrogate: Dibromofluoromethane	*8.72*		*ug/g dry*		*109*	*50-140*			
Surrogate: Toluene-d8	*8.07*		*ug/g dry*		*101*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*8.07*		*ug/g dry*		*101*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Cyanide, free	0.215	0.03	ug/g	ND	71.6	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	173	7	ug/g	ND	86.6	80-120			
F2 PHCs (C10-C16)	92	4	ug/g	ND	115	60-140			
F3 PHCs (C16-C34)	219	8	ug/g	ND	112	60-140			
F4 PHCs (C34-C50)	109	6	ug/g	ND	87.7	60-140			
F4G PHCs (gravimetric)	900	50	ug/g	ND	90.0	80-120			
Metals									
Antimony	48.2	1.0	ug/g	ND	96.1	70-130			
Arsenic	50.4	1.0	ug/g	1.6	97.5	70-130			
Barium	82.7	1.0	ug/g	46.1	73.2	70-130			
Beryllium	52.1	0.5	ug/g	0.6	103	70-130			
Boron, available	2.69	0.5	ug/g	0.63	41.3	70-122			QM-07
Boron	48.9	5.0	ug/g	ND	93.5	70-130			
Cadmium	49.2	0.5	ug/g	ND	98.1	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	50.5	70-130			QM-05
Chromium	64.6	5.0	ug/g	14.3	101	70-130			
Cobalt	49.5	1.0	ug/g	3.2	92.7	70-130			
Copper	53.6	5.0	ug/g	12.7	81.8	70-130			
Lead	48.9	1.0	ug/g	4.4	88.9	70-130			
Mercury	1.62	0.1	ug/g	ND	108	70-130			
Molybdenum	48.8	1.0	ug/g	ND	96.9	70-130			
Nickel	56.1	5.0	ug/g	8.7	94.8	70-130			
Selenium	49.0	1.0	ug/g	ND	96.9	70-130			
Silver	42.7	0.3	ug/g	ND	85.1	70-130			
Thallium	47.9	1.0	ug/g	ND	95.6	70-130			
Uranium	47.5	1.0	ug/g	ND	94.5	70-130			
Vanadium	64.0	10.0	ug/g	17.7	92.6	70-130			
Zinc	68.5	20.0	ug/g	32.5	71.9	70-130			
Semi-Volatiles									
Acenaphthene	0.190	0.02	ug/g	ND	114	50-140			
Acenaphthylene	0.160	0.02	ug/g	ND	96.0	50-140			
Anthracene	0.188	0.02	ug/g	ND	113	50-140			
Benzo [a] anthracene	0.171	0.02	ug/g	ND	103	50-140			
Benzo [a] pyrene	0.167	0.02	ug/g	ND	100	50-140			
Benzo [b] fluoranthene	0.210	0.02	ug/g	ND	126	50-140			
Benzo [g,h,i] perylene	0.175	0.02	ug/g	ND	105	50-140			
Benzo [k] fluoranthene	0.174	0.02	ug/g	ND	105	50-140			
Chrysene	0.185	0.02	ug/g	ND	111	50-140			
Dibenzo [a,h] anthracene	0.173	0.02	ug/g	ND	104	50-140			
Fluoranthene	0.180	0.02	ug/g	ND	108	50-140			
Fluorene	0.198	0.02	ug/g	ND	119	50-140			
Indeno [1,2,3-cd] pyrene	0.175	0.02	ug/g	ND	105	50-140			
1-Methylnaphthalene	0.193	0.02	ug/g	ND	116	50-140			
2-Methylnaphthalene	0.193	0.02	ug/g	ND	116	50-140			
Naphthalene	0.154	0.01	ug/g	ND	92.4	50-140			
Phenanthrene	0.196	0.02	ug/g	ND	117	50-140			
Pyrene	0.205	0.02	ug/g	ND	123	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: 2-Fluorobiphenyl	*1.42*		*ug/g*		*106*	*50-140*			
Surrogate: Terphenyl-d14	*1.40*		*ug/g*		*105*	*50-140*			
Volatiles									
Acetone	11.5	0.50	ug/g	ND	115	50-140			
Benzene	4.74	0.02	ug/g	ND	118	60-130			
Bromodichloromethane	4.62	0.05	ug/g	ND	116	60-130			
Bromoform	4.67	0.05	ug/g	ND	117	60-130			
Bromomethane	2.70	0.05	ug/g	ND	67.5	50-140			
Carbon Tetrachloride	4.46	0.05	ug/g	ND	111	60-130			
Chlorobenzene	4.42	0.05	ug/g	ND	111	60-130			
Chloroform	4.66	0.05	ug/g	ND	116	60-130			
Dibromochloromethane	4.43	0.05	ug/g	ND	111	60-130			
Dichlorodifluoromethane	3.67	0.05	ug/g	ND	91.8	50-140			
1,2-Dichlorobenzene	4.96	0.05	ug/g	ND	124	60-130			
1,3-Dichlorobenzene	4.86	0.05	ug/g	ND	121	60-130			
1,4-Dichlorobenzene	4.58	0.05	ug/g	ND	114	60-130			
1,1-Dichloroethane	4.94	0.05	ug/g	ND	124	60-130			
1,2-Dichloroethane	4.90	0.05	ug/g	ND	122	60-130			
1,1-Dichloroethylene	4.71	0.05	ug/g	ND	118	60-130			
cis-1,2-Dichloroethylene	4.77	0.05	ug/g	ND	119	60-130			
trans-1,2-Dichloroethylene	4.69	0.05	ug/g	ND	117	60-130			
1,2-Dichloropropane	4.64	0.05	ug/g	ND	116	60-130			
cis-1,3-Dichloropropylene	4.94	0.05	ug/g	ND	123	60-130			
trans-1,3-Dichloropropylene	4.65	0.05	ug/g	ND	116	60-130			
Ethylbenzene	4.69	0.05	ug/g	ND	117	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.60	0.05	ug/g	ND	115	60-130			
Hexane	4.13	0.05	ug/g	ND	103	60-130			
Methyl Ethyl Ketone (2-Butanone)	11.8	0.50	ug/g	ND	118	50-140			
Methyl Isobutyl Ketone	12.1	0.50	ug/g	ND	121	50-140			
Methyl tert-butyl ether	11.8	0.05	ug/g	ND	118	50-140			
Methylene Chloride	4.53	0.05	ug/g	ND	113	60-130			
Styrene	4.90	0.05	ug/g	ND	122	60-130			
1,1,1,2-Tetrachloroethane	3.94	0.05	ug/g	ND	98.6	60-130			
1,1,2,2-Tetrachloroethane	4.90	0.05	ug/g	ND	122	60-130			
Tetrachloroethylene	4.46	0.05	ug/g	ND	112	60-130			
Toluene	4.51	0.05	ug/g	ND	113	60-130			
1,1,1-Trichloroethane	4.73	0.05	ug/g	ND	118	60-130			
1,1,2-Trichloroethane	4.63	0.05	ug/g	ND	116	60-130			
Trichloroethylene	4.50	0.05	ug/g	ND	112	60-130			
Trichlorofluoromethane	4.59	0.05	ug/g	ND	115	50-140			
Vinyl chloride	3.26	0.02	ug/g	ND	81.4	50-140			
m,p-Xylenes	9.64	0.05	ug/g	ND	121	60-130			
o-Xylene	4.33	0.05	ug/g	ND	108	60-130			
Surrogate: 4-Bromofluorobenzene	*8.03*		*ug/g*		*100*	*50-140*			
Surrogate: Dibromofluoromethane	*8.53*		*ug/g*		*107*	*50-140*			
Surrogate: Toluene-d8	*7.75*		*ug/g*		*96.8*	*50-140*			
Benzene	4.74	0.02	ug/g	ND	118	60-130			
Ethylbenzene	4.69	0.05	ug/g	ND	117	60-130			
Toluene	4.51	0.05	ug/g	ND	113	60-130			
m,p-Xylenes	9.64	0.05	ug/g	ND	121	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	4.33	0.05	ug/g	ND	108	60-130			
Surrogate: Toluene-d8	*7.75*		*ug/g*		*96.8*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Received at temperature > 25C

Applies to samples: BH9-20-SS3, BH10-20-SS5, BH12-20-SS5, BH13-20-SS2, BH13-20-SS5, BH22-20-SS5

Container(s) - Bottle and COC sample ID don't match - Missing -20- from ID on Jar

Applies to samples: BH9-20-SS3, BH10-20-SS5, BH12-20-SS5, BH13-20-SS2, BH13-20-SS5, BH22-20-SS5

Sample Qualifiers :

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

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-05 : Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

PAR LABORA

Paracel ID: 2025227

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2025227-Bulk 2025228-TCLP	№ 55471

Client Name: LOPERS & ASSOCIATES	Project Ref: LOP20-001B	Page 1 of 1
Contact Name: Luke Lopers	Quote #: #20-456-715 Michael Road OCHC	**Turnaround Time**
Address: 30 Lansfield Way, Ottawa, ON	PO #: 2053548	☐ 1 day ☐ 3 day
	E-mail: Luke@Lopers.Ca	☐ 2 day ☒ Regular
Telephone: 613-327-9073		Date Required:

Regulation 153/04: ☐ Table 1 ☒ Res/Park ☐ Med/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☐ Table 3 ☐ Agri/Other; ☐ Table ___; For RSC: ☐ Yes ☐ No

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs	BTEXs	VOCs	Metals & Inorganics	PAHs	Leachate Landfill Unknown Petroleum Package (Reg 558)						
1	BH9-20-SS3	S		2	June 16/20		X	X										✓
2	BH10-20-SS5	S		2	↓		X		X		X							✓
3	BH12-20-SS5	S		2			X		X	X	X							✓
4	BH13-20-SS2	S		2			X	X		X	X							✓
5	BH13-20-SS5	S		2			X		X									✓
6	BH22-20-SS5	S		2			X		X	X	X							✓
7	TCLP	S		4	↓							X						✓
8																		
9																		
10																		

Comments: Direct billing to OCH

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: Jumeeporn Dohmai	Verified By:
Relinquished By (Print): Luke Lopers	Date/Time:	Date/Time: JUN 16, 2020 04:32	Date/Time: 06-16-20 16:45
Date/Time: June 16, 2020 / 4:20 PM	Temperature: °C	Temperature: 29.7 °C	pH Verified: ☐ By:

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Certificate of Analysis

Lopers & Associates

30 Lansfield Way
Ottawa, ONT K2G 3V8
Attn: Luke Lopers

Client PO: 2053548
Project: LOP20-001B
Custody: 55471

Report Date: 22-Jun-2020
Order Date: 16-Jun-2020

Order #: 2025228

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

Paracel ID	Client ID
2025228-01	TCLP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Flashpoint	ASTM D93 - Pensky-Martens Closed Cup	17-Jun-20	17-Jun-20
REG 558 - Cyanide	MOE E3015- Auto Colour	19-Jun-20	19-Jun-20
REG 558 - Fluoride	EPA 340.2 - ISE	19-Jun-20	19-Jun-20
REG 558 - Mercury by CVAA	EPA 7470A - Cold Vapour AA	19-Jun-20	19-Jun-20
REG 558 - Metals, ICP-MS	TCLP EPA 6020 - Digestion - ICP-MS	19-Jun-20	19-Jun-20
REG 558 - NO3/NO2	EPA 300.1 - IC	19-Jun-20	19-Jun-20
REG 558 - PAHs	EPA 625 - GC-MS	19-Jun-20	19-Jun-20
REG 558 - PCBs	EPA 608 - GC-ECD	19-Jun-20	19-Jun-20
REG 558 - VOCs	EPA 624 - P&T GC-MS	19-Jun-20	19-Jun-20

Summary of Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances. Regulatory limts displayed in brackets, (), applies to medium and fine textured soils.

Criteria:

Client ID	Analyte	MDL / Units	Result	Reg 558 Schedule 4

PARACEL LABORATORIES LTD.

Order #: 2025228

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	TCLP	-	-	-	
	Sample Date:	16-Jun-2020	-	-	-	**Criteria:**
	Sample ID:	2025228-01	-	-	-	**Reg 558 Schedule 4**
	Matrix:	Soil	-	-	-	
	MDL/Units					
Physical Characteristics						
Flashpoint	°C	>70	-	-	-	
EPA 1311 - TCLP Leachate Inorganics						
Fluoride	0.05 mg/L	0.13	-	-	-	150 mg/L
Nitrate as N	1 mg/L	<1	-	-	-	1,000 mg/L
Nitrite as N	1 mg/L	<1	-	-	-	1,000 mg/L
Cyanide, free	0.02 mg/L	<0.02	-	-	-	20 mg/L
EPA 1311 - TCLP Leachate Metals						
Arsenic	0.05 mg/L	<0.05	-	-	-	2.5 mg/L
Barium	0.05 mg/L	0.94	-	-	-	100 mg/L
Boron	0.05 mg/L	0.07	-	-	-	500 mg/L
Cadmium	0.01 mg/L	<0.01	-	-	-	0.5 mg/L
Chromium	0.05 mg/L	<0.05	-	-	-	5 mg/L
Lead	0.05 mg/L	<0.05	-	-	-	5 mg/L
Mercury	0.005 mg/L	<0.005	-	-	-	0.1 mg/L
Selenium	0.05 mg/L	<0.05	-	-	-	1 mg/L
Silver	0.05 mg/L	<0.05	-	-	-	5 mg/L
Uranium	0.05 mg/L	<0.05	-	-	-	10 mg/L
EPA 1311 - TCLP Leachate Volatiles						
Benzene	0.005 mg/L	<0.005	-	-	-	0.5 mg/L
Carbon Tetrachloride	0.005 mg/L	<0.005	-	-	-	0.5 mg/L
Chlorobenzene	0.004 mg/L	<0.004	-	-	-	8 mg/L
Chloroform	0.006 mg/L	<0.006	-	-	-	10 mg/L
1,2-Dichlorobenzene	0.004 mg/L	<0.004	-	-	-	20 mg/L

PARACEL LABORATORIES LTD.

Order #: 2025228

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

	Client ID:	TCLP	-	-	-		
	Sample Date:	16-Jun-2020	-	-	-	**Criteria:**	
	Sample ID:	2025228-01	-	-	-	**Reg 558 Schedule 4**	
	Matrix:	Soil	-	-	-		
	MDL/Units						
1,4-Dichlorobenzene	0.004 mg/L	<0.004	-	-	-	0.5	mg/L
1,2-Dichloroethane	0.005 mg/L	<0.005	-	-	-	0.5	mg/L
1,1-Dichloroethylene	0.006 mg/L	<0.006	-	-	-	1.4	mg/L
Methyl Ethyl Ketone (2-Butanone)	0.30 mg/L	<0.30	-	-	-	200	mg/L
Methylene Chloride	0.04 mg/L	<0.04	-	-	-	5	mg/L
Tetrachloroethylene	0.005 mg/L	<0.005	-	-	-	3	mg/L
Trichloroethylene	0.004 mg/L	<0.004	-	-	-	5	mg/L
Vinyl chloride	0.005 mg/L	<0.005	-	-	-	0.2	mg/L
4-Bromofluorobenzene	Surrogate	120%	-	-	-		
Dibromofluoromethane	Surrogate	87.9%	-	-	-		
Toluene-d8	Surrogate	108%	-	-	-		
EPA 1311 - TCLP Leachate Organics							
Benzo [a] pyrene	0.0001 mg/L	<0.0001	-	-	-	0.001	mg/L
Terphenyl-d14	Surrogate	111%	-	-	-		
PCBs, total	0.003 mg/L	<0.003	-	-	-	0.3	mg/L
Decachlorobiphenyl	Surrogate	72.6%	-	-	-		

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Fluoride	ND	0.05	mg/L						
Nitrate as N	ND	1	mg/L						
Nitrite as N	ND	1	mg/L						
Cyanide, free	ND	0.02	mg/L						
EPA 1311 - TCLP Leachate Metals									
Arsenic	ND	0.05	mg/L						
Barium	ND	0.05	mg/L						
Boron	ND	0.05	mg/L						
Cadmium	ND	0.01	mg/L						
Chromium	ND	0.05	mg/L						
Lead	ND	0.05	mg/L						
Mercury	ND	0.005	mg/L						
Selenium	ND	0.05	mg/L						
Silver	ND	0.05	mg/L						
Uranium	ND	0.05	mg/L						
EPA 1311 - TCLP Leachate Organics									
Benzo [a] pyrene	ND	0.0001	mg/L						
Surrogate: Terphenyl-d14	*0.19*		*mg/L*		*95.7*	*37.1-155.6*			
PCBs, total	ND	0.003	mg/L						
Surrogate: Decachlorobiphenyl	*0.0097*		*mg/L*		*96.6*	*62-138*			
EPA 1311 - TCLP Leachate Volatiles									
Benzene	ND	0.005	mg/L						
Carbon Tetrachloride	ND	0.005	mg/L						
Chlorobenzene	ND	0.004	mg/L						
Chloroform	ND	0.006	mg/L						
1,2-Dichlorobenzene	ND	0.004	mg/L						
1,4-Dichlorobenzene	ND	0.004	mg/L						
1,2-Dichloroethane	ND	0.005	mg/L						
1,1-Dichloroethylene	ND	0.006	mg/L						
Methyl Ethyl Ketone (2-Butanone)	ND	0.30	mg/L						
Methylene Chloride	ND	0.04	mg/L						
Tetrachloroethylene	ND	0.005	mg/L						
Trichloroethylene	ND	0.004	mg/L						
Vinyl chloride	ND	0.005	mg/L						
Surrogate: 4-Bromofluorobenzene	*0.826*		*mg/L*		*120*	*83-134*			
Surrogate: Dibromofluoromethane	*0.619*		*mg/L*		*90.0*	*78-124*			
Surrogate: Toluene-d8	*0.741*		*mg/L*		*108*	*76-118*			

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 22-Jun-2020
Order Date: 16-Jun-2020
Project Description: LOP20-001B

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Fluoride	0.23	0.05	mg/L	0.22			3.0	20	
Nitrate as N	ND	1	mg/L	ND			NC	20	
Nitrite as N	ND	1	mg/L	ND			NC	20	
Cyanide, free	ND	0.02	mg/L	ND			NC	20	
EPA 1311 - TCLP Leachate Metals									
Arsenic	ND	0.05	mg/L	ND			NC	29	
Barium	1.11	0.05	mg/L	0.940			16.7	34	
Boron	0.075	0.05	mg/L	0.066			12.6	33	
Cadmium	ND	0.01	mg/L	ND			NC	33	
Chromium	ND	0.05	mg/L	ND			NC	32	
Lead	ND	0.05	mg/L	ND			NC	32	
Mercury	ND	0.005	mg/L	ND			NC	30	
Selenium	ND	0.05	mg/L	ND			NC	28	
Silver	ND	0.05	mg/L	ND			NC	28	
Uranium	ND	0.05	mg/L	ND			NC	27	
EPA 1311 - TCLP Leachate Organics									
PCBs, total	ND	0.003	mg/L	ND			NC	30	
Surrogate: Decachlorobiphenyl	*0.0084*		mg/L		*83.7*	*62-138*			
EPA 1311 - TCLP Leachate Volatiles									
Benzene	ND	0.005	mg/L	ND			NC	25	
Carbon Tetrachloride	ND	0.005	mg/L	ND			NC	25	
Chlorobenzene	ND	0.004	mg/L	ND			NC	25	
Chloroform	ND	0.006	mg/L	ND			NC	25	
1,2-Dichlorobenzene	ND	0.004	mg/L	ND			NC	25	
1,4-Dichlorobenzene	ND	0.004	mg/L	ND			NC	25	
1,2-Dichloroethane	ND	0.005	mg/L	ND			NC	25	
1,1-Dichloroethylene	ND	0.006	mg/L	ND			NC	25	
Methyl Ethyl Ketone (2-Butanone)	ND	0.30	mg/L	ND			NC	25	
Methylene Chloride	ND	0.04	mg/L	ND			NC	25	
Tetrachloroethylene	ND	0.005	mg/L	ND			NC	25	
Trichloroethylene	ND	0.004	mg/L	ND			NC	25	
Vinyl chloride	ND	0.005	mg/L	ND			NC	25	
Surrogate: 4-Bromofluorobenzene	*0.817*		mg/L		*119*	*83-134*			
Surrogate: Dibromofluoromethane	*0.635*		mg/L		*92.3*	*78-124*			
Surrogate: Toluene-d8	*0.721*		mg/L		*105*	*76-118*			
Physical Characteristics									
% Solids	100	0.1	% by Wt.	100			0.0	25	

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 22-Jun-2020
Order Date: 16-Jun-2020
Project Description: LOP20-001B

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Fluoride	0.67	0.05	mg/L	0.22	88.6	70-130			
Nitrate as N	10	1	mg/L	ND	95.1	81-112			
Nitrite as N	10	1	mg/L	ND	100	76-107			
Cyanide, free	0.051	0.02	mg/L	ND	103	60-136			
EPA 1311 - TCLP Leachate Metals									
Arsenic	54.8	0.05	mg/L	0.088	109	83-119			
Barium	159	0.05	mg/L	94.0	130	83-116			QM-07
Boron	54.3	0.05	mg/L	6.63	95.4	71-128			
Cadmium	48.1	0.01	mg/L	0.018	96.2	78-119			
Chromium	59.9	0.05	mg/L	0.276	119	80-124			
Lead	44.1	0.05	mg/L	0.334	87.6	77-126			
Mercury	0.0335	0.005	mg/L	ND	112	70-130			
Selenium	44.2	0.05	mg/L	0.075	88.3	81-125			
Silver	46.6	0.05	mg/L	ND	93.2	70-128			
Uranium	47.5	0.05	mg/L	0.242	94.5	70-131			
EPA 1311 - TCLP Leachate Organics									
Benzo [a] pyrene	0.0424	0.0001	mg/L	ND	84.7	39-123			
Surrogate: Terphenyl-d14	*0.19*		*mg/L*		*96.6*	*37.1-155.6*			
PCBs, total	0.034	0.003	mg/L	ND	86.2	86-145			
Surrogate: Decachlorobiphenyl	*0.0083*		*mg/L*		*82.6*	*62-138*			
EPA 1311 - TCLP Leachate Volatiles									
Benzene	0.322	0.005	mg/L	ND	93.6	55-141			
Carbon Tetrachloride	0.393	0.005	mg/L	ND	114	49-149			
Chlorobenzene	0.419	0.004	mg/L	ND	122	64-137			
Chloroform	0.418	0.006	mg/L	ND	122	58-138			
1,2-Dichlorobenzene	0.348	0.004	mg/L	ND	101	60-150			
1,4-Dichlorobenzene	0.371	0.004	mg/L	ND	108	63-132			
1,2-Dichloroethane	0.397	0.005	mg/L	ND	115	50-140			
1,1-Dichloroethylene	0.376	0.006	mg/L	ND	109	43-153			
Methyl Ethyl Ketone (2-Butanone)	0.734	0.30	mg/L	ND	85.4	26-153			
Methylene Chloride	0.346	0.04	mg/L	ND	100	58-149			
Tetrachloroethylene	0.368	0.005	mg/L	ND	107	51-145			
Trichloroethylene	0.397	0.004	mg/L	ND	115	52-135			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Vinyl chloride	0.425	0.005	mg/L	ND	124	31-159			
Surrogate: 4-Bromofluorobenzene	*0.585*		*mg/L*		*85.0*	*83-134*			
Surrogate: Dibromofluoromethane	*0.628*		*mg/L*		*91.4*	*78-124*			
Surrogate: Toluene-d8	*0.589*		*mg/L*		*85.7*	*76-118*			

PARACEL LABORATORIES LTD.

Order #: 2025228

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 22-Jun-2020

Order Date: 16-Jun-2020

Project Description: LOP20-001B

Qualifier Notes:

Login Qualifiers :

Received at temperature > 25C

Applies to samples: TCLP

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil/Solid results are reported on a dry weight basis unless otherwise indicated
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARAC LABORATORIES

Paracel ID: 2025228

ent Blvd.
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com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2025227-Bulk 2025228-TCLP	№ 55471

Page 1 of 1

Client Name: Lopers & Associates	Project Ref: LOP20-001B
Contact Name: Luke Lopers	Quote #: #20-456 - 715 Mikinak Road OCHC
Address: 30 Leanfield Way, Ottawa, ON	PO #: 2053548
Telephone: 613-327-9073	E-mail: Luke@lopers.ca

Turnaround Time
- ☐ 1 day
- ☐ 3 day
- ☐ 2 day
- ☒ Regular

Date Required: _____

Regulation 153/04
- ☐ Table 1 ☒ Res/Park ☐ Med/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other
- ☐ Table ___

For RSC: ☐ Yes ☐ No

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

Mun: _____
- ☐ Other:

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs	BTEXs	VOCs	Metals & Inorganics	PAHs	Leachate Landfill Uniform Potential Package (Reg 558)						
1	BH9-20-SS3	S		2	June 11/20		X	X										
2	BH10-20-SS5	S		2	↓		X		X		X							
3	BH12-20-SS5	S		2	↓		X		X	X	X							
4	BH13-20-SS2	S		2	↓		X	X		X	X							
5	BH13-20-SS5	S		2	↓		X		X									
6	BH22-20-SS5	S		2	↓		X		X	X	X							
7	TCLP	S		4	↓							X						
8																		
9																		
10																		

Comments: Direct billing to OCH

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: Jumeeporn Dahmali	Verified By:
Relinquished By (Print): Luke Lopers	Date/Time:	Date/Time: JUN 16, 2020 04:32	Date/Time: 20-16-2 16:15
Date/Time: June 16, 2020 / 4:20 PM	Temperature: °C	Temperature: 29.7 °C	pH Verified: ☐ By:

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Certificate of Analysis

Lopers & Associates

30 Lansfield Way
Ottawa, ONT K2G 3V8
Attn: Luke Lopers

Client PO: 2053548
Project: LOP20-001B
Custody: 125319

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020

Order #: 2026213

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

Paracel ID	Client ID	Paracel ID	Client ID
2026213-01	BH6-20		
2026213-02	BH13-20		
2026213-03	BH8-1		
2026213-04	BH18-2		
2026213-05	BH18-1		
2026213-06	BH D-1		
2026213-07	Trip Blank		

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020
Project Description: LOP20-001B

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	25-Jun-20	25-Jun-20
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	24-Jun-20	24-Jun-20
Chromium, hexavalent - water	MOE E3056 - colourimetric	25-Jun-20	25-Jun-20
Cyanide, free	MOE E3015 - Auto Colour	25-Jun-20	25-Jun-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	24-Jun-20	25-Jun-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	24-Jun-20	24-Jun-20
pH	EPA 150.1 - pH probe @25 °C	24-Jun-20	24-Jun-20
PHC F1	CWS Tier 1 - P&T GC-FID	24-Jun-20	25-Jun-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	26-Jun-20	26-Jun-20
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	26-Jun-20	26-Jun-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	24-Jun-20	25-Jun-20

Summary of Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances. Regulatory limts displayed in brackets, (), applies to medium and fine textured soils.

Criteria:

Client ID	Analyte	MDL / Units	Result	Reg 153/04 (2011)-Table 3 Non-Potable Groundwater

PARACEL LABORATORIES LTD.

Order #: 2026213

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH6-20	BH13-20	BH8-1	BH18-2	**Criteria:**	
	Sample Date:	23-Jun-2020	23-Jun-2020	23-Jun-2020	23-Jun-2020		
	Sample ID:	2026213-01	2026213-02	2026213-03	2026213-04	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	Water		
	MDL/Units						
General Inorganics							
Cyanide, free	2 ug/L	<2	-	<2	<2	(66) 66	ug/L
pH	0.1 pH Units	7.8	-	7.6	7.6	(5 - 9) 5 - 9	pH units
Anions							
Chloride	1 mg/L	55	-	67	125	(2,300,000) 2,300,000	ug/L
Metals							
Mercury	0.1 ug/L	<0.1	-	<0.1	<0.1	(2.8) 0.29	ug/L
Antimony	0.5 ug/L	<0.5	-	<0.5	<0.5	(20,000) 20,000	ug/L
Arsenic	1 ug/L	<1	-	<1	<1	(1,900) 1,900	ug/L
Barium	1 ug/L	230	-	70	95	(29,000) 29,000	ug/L
Beryllium	0.5 ug/L	<0.5	-	<0.5	<0.5	(67) 67	ug/L
Boron	10 ug/L	41	-	143	71	(45,000) 45,000	ug/L
Cadmium	0.1 ug/L	<0.1	-	<0.1	<0.1	(2.7) 2.7	ug/L
Chromium	1 ug/L	<1	-	<1	<1	(810) 810	ug/L
Chromium (VI)	10 ug/L	<10	-	<10	<10	(140) 140	ug/L
Cobalt	0.5 ug/L	0.8	-	<0.5	<0.5	(66) 66	ug/L
Copper	0.5 ug/L	0.6	-	<0.5	3.0	(87) 87	ug/L
Lead	0.1 ug/L	<0.1	-	<0.1	<0.1	(25) 25	ug/L
Molybdenum	0.5 ug/L	2.2	-	1.7	1.1	(9,200) 9,200	ug/L
Nickel	1 ug/L	3	-	1	3	(490) 490	ug/L
Selenium	1 ug/L	1	-	<1	<1	(63) 63	ug/L
Silver	0.1 ug/L	<0.1	-	<0.1	<0.1	(1.5) 1.5	ug/L
Sodium	200 ug/L	26200	-	62900	67800	(2,300,000) 2,300,000	ug/L
Thallium	0.1 ug/L	<0.1	-	<0.1	<0.1	(510) 510	ug/L

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020
Project Description: LOP20-001B

	Client ID:	BH6-20	BH13-20	BH8-1	BH18-2	**Criteria:**	
	Sample Date:	23-Jun-2020	23-Jun-2020	23-Jun-2020	23-Jun-2020		
	Sample ID:	2026213-01	2026213-02	2026213-03	2026213-04	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	Water		
	MDL/Units						
Uranium	0.1 ug/L	2.5	-	1.1	2.5	(420) 420	ug/L
Vanadium	0.5 ug/L	1.4	-	<0.5	<0.5	(250) 250	ug/L
Zinc	5 ug/L	<5	-	8	<5	(1,100) 1,100	ug/L
Volatiles							
Acetone	5.0 ug/L	<5.0	-	<5.0	<5.0	(130,000) 130,000	ug/L
Benzene	0.5 ug/L	<0.5	-	<0.5	<0.5	(430) 44	ug/L
Bromodichloromethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(85,000) 85,000	ug/L
Bromoform	0.5 ug/L	<0.5	-	<0.5	<0.5	(770) 380	ug/L
Bromomethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(56) 5.6	ug/L
Carbon Tetrachloride	0.2 ug/L	<0.2	-	<0.2	<0.2	(8.4) 0.79	ug/L
Chlorobenzene	0.5 ug/L	<0.5	-	<0.5	<0.5	(630) 630	ug/L
Chloroform	0.5 ug/L	<0.5	-	<0.5	<0.5	(22) 2.4	ug/L
Dibromochloromethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(82,000) 82,000	ug/L
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	<1.0	<1.0	(4,400) 4,400	ug/L
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	<0.5	<0.5	(9,600) 4,600	ug/L
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	<0.5	<0.5	(9,600) 9,600	ug/L
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	<0.5	<0.5	(67) 8	ug/L
1,1-Dichloroethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(3,100) 320	ug/L
1,2-Dichloroethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(12) 1.6	ug/L
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	<0.5	<0.5	(17) 1.6	ug/L
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	<0.5	<0.5	(17) 1.6	ug/L
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	<0.5	<0.5	(17) 1.6	ug/L
1,2-Dichloropropane	0.5 ug/L	<0.5	-	<0.5	<0.5	(140) 16	ug/L
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	<0.5	<0.5		

PARACEL LABORATORIES LTD.

Order #: 2026213

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020
Project Description: LOP20-001B

	Client ID:	BH6-20	BH13-20	BH8-1	BH18-2	**Criteria:**
	Sample Date:	23-Jun-2020	23-Jun-2020	23-Jun-2020	23-Jun-2020	
	Sample ID:	2026213-01	2026213-02	2026213-03	2026213-04	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**
	Matrix:	Water	Water	Water	Water	
	MDL/Units					
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	<0.5	<0.5	
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	<0.5	<0.5	(45) 5.2 ug/L
Ethylbenzene	0.5 ug/L	<0.5	-	<0.5	<0.5	(2,300) 2,300 ug/L
Ethylene dibromide (dibromoethane	0.2 ug/L	<0.2	-	<0.2	<0.2	(0.83) 0.25 ug/L
Hexane	1.0 ug/L	<1.0	-	<1.0	<1.0	(520) 51 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	<5.0	<5.0	(1,500,000) 470,000 ug/L
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	<5.0	<5.0	(580,000) 140,000 ug/L
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	<2.0	<2.0	(1,400) 190 ug/L
Methylene Chloride	5.0 ug/L	<5.0	-	<5.0	<5.0	(5,500) 610 ug/L
Styrene	0.5 ug/L	<0.5	-	<0.5	<0.5	(9,100) 1,300 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(28) 3.3 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(15) 3.2 ug/L
Tetrachloroethylene	0.5 ug/L	<0.5	-	<0.5	<0.5	(17) 1.6 ug/L
Toluene	0.5 ug/L	<0.5	-	<0.5	<0.5	(18,000) 18,000 ug/L
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(6,700) 640 ug/L
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	<0.5	<0.5	(30) 4.7 ug/L
Trichloroethylene	0.5 ug/L	<0.5	-	<0.5	<0.5	(17) 1.6 ug/L
Trichlorofluoromethane	1.0 ug/L	<1.0	-	<1.0	<1.0	(2,500) 2,500 ug/L
Vinyl chloride	0.5 ug/L	<0.5	-	<0.5	<0.5	(1.7) 0.5 ug/L
m,p-Xylenes	0.5 ug/L	<0.5	-	<0.5	<0.5	
o-Xylene	0.5 ug/L	<0.5	-	<0.5	<0.5	
Xylenes, total	0.5 ug/L	<0.5	-	<0.5	<0.5	(4,200) 4,200 ug/L
4-Bromofluorobenzene	Surrogate	115%	-	115%	119%	
Dibromofluoromethane	Surrogate	100%	-	91.9%	105%	

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH6-20	BH13-20	BH8-1	BH18-2	**Criteria:**	
	Sample Date:	23-Jun-2020	23-Jun-2020	23-Jun-2020	23-Jun-2020		
	Sample ID:	2026213-01	2026213-02	2026213-03	2026213-04	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	Water		
	MDL/Units						
Toluene-d8	Surrogate	106%	-	106%	107%		
Benzene	0.5 ug/L	-	<0.5	-	-	(430) 44	ug/L
Ethylbenzene	0.5 ug/L	-	<0.5	-	-	(2,300) 2,300	ug/L
Toluene	0.5 ug/L	-	<0.5	-	-	(18,000) 18,000	ug/L
m,p-Xylenes	0.5 ug/L	-	<0.5	-	-		
o-Xylene	0.5 ug/L	-	<0.5	-	-		
Xylenes, total	0.5 ug/L	-	<0.5	-	-	(4,200) 4,200	ug/L
Toluene-d8	Surrogate	-	119%	-	-		
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25	(750) 750	ug/L
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100	(150) 150	ug/L
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100	(500) 500	ug/L
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100	(500) 500	ug/L
Semi-Volatiles							
Acenaphthene	0.05 ug/L	<0.05	-	<0.05	<0.05	(1,700) 600	ug/L
Acenaphthylene	0.05 ug/L	<0.05	-	<0.05	<0.05	(1.8) 1.8	ug/L
Anthracene	0.01 ug/L	<0.01	-	<0.01	<0.01	(2.4) 2.4	ug/L
Benzo [a] anthracene	0.01 ug/L	<0.01	-	<0.01	<0.01	(4.7) 4.7	ug/L
Benzo [a] pyrene	0.01 ug/L	<0.01	-	<0.01	<0.01	(0.81) 0.81	ug/L
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	<0.05	<0.05	(0.75) 0.75	ug/L
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	<0.05	<0.05	(0.2) 0.2	ug/L
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	<0.05	<0.05	(0.4) 0.4	ug/L
Chrysene	0.05 ug/L	<0.05	-	<0.05	<0.05	(1) 1	ug/L
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	<0.05	<0.05	(0.52) 0.52	ug/L

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

Client ID:		BH6-20	BH13-20	BH8-1	BH18-2	**Criteria:**	
Sample Date:		23-Jun-2020	23-Jun-2020	23-Jun-2020	23-Jun-2020	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
Sample ID:		2026213-01	2026213-02	2026213-03	2026213-04		
Matrix:		Water	Water	Water	Water		
	MDL/Units						
Fluoranthene	0.01 ug/L	<0.01	-	<0.01	<0.01	(130) 130	ug/L
Fluorene	0.05 ug/L	<0.05	-	<0.05	<0.05	(400) 400	ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	<0.05	<0.05		
1-Methylnaphthalene	0.05 ug/L	<0.05	-	<0.05	<0.05	(1,800) 1,800	ug/L
2-Methylnaphthalene	0.05 ug/L	<0.05	-	<0.05	<0.05	(1,800) 1,800	ug/L
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	<0.10	<0.10	(1,800) 1,800	ug/L
Naphthalene	0.05 ug/L	<0.05	-	<0.05	<0.05	(6,400) 1,400	ug/L
Phenanthrene	0.05 ug/L	<0.05	-	<0.05	<0.05	(580) 580	ug/L
Pyrene	0.01 ug/L	<0.01	-	<0.01	<0.01	(68) 68	ug/L
2-Fluorobiphenyl	Surrogate	67.4%	-	73.7%	62.8%		
Terphenyl-d14	Surrogate	96.0%	-	84.8%	71.7%		

PARACEL LABORATORIES LTD.

Order #: 2026213

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH18-1	BH D-1	Trip Blank	-		
	Sample Date:	23-Jun-2020	23-Jun-2020	22-Jun-2020	-	**Criteria:**	
	Sample ID:	2026213-05	2026213-06	2026213-07	-	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	-		
	MDL/Units						
General Inorganics							
Cyanide, free	2 ug/L	<2	<2	-	-	(66) 66	ug/L
pH	0.1 pH Units	7.5	7.6	-	-	(5 - 9) 5 - 9	pH units
Anions							
Chloride	1 mg/L	25	66	-	-	(2,300,000) 2,300,000	ug/L
Metals							
Mercury	0.1 ug/L	<0.1	<0.1	-	-	(2.8) 0.29	ug/L
Antimony	0.5 ug/L	<0.5	<0.5	-	-	(20,000) 20,000	ug/L
Arsenic	1 ug/L	<1	<1	-	-	(1,900) 1,900	ug/L
Barium	1 ug/L	75	66	-	-	(29,000) 29,000	ug/L
Beryllium	0.5 ug/L	<0.5	<0.5	-	-	(67) 67	ug/L
Boron	10 ug/L	42	148	-	-	(45,000) 45,000	ug/L
Cadmium	0.1 ug/L	<0.1	<0.1	-	-	(2.7) 2.7	ug/L
Chromium	1 ug/L	<1	<1	-	-	(810) 810	ug/L
Chromium (VI)	10 ug/L	<10	<10	-	-	(140) 140	ug/L
Cobalt	0.5 ug/L	<0.5	<0.5	-	-	(66) 66	ug/L
Copper	0.5 ug/L	<0.5	<0.5	-	-	(87) 87	ug/L
Lead	0.1 ug/L	<0.1	<0.1	-	-	(25) 25	ug/L
Molybdenum	0.5 ug/L	2.1	1.8	-	-	(9,200) 9,200	ug/L
Nickel	1 ug/L	1	<1	-	-	(490) 490	ug/L
Selenium	1 ug/L	<1	<1	-	-	(63) 63	ug/L
Silver	0.1 ug/L	<0.1	<0.1	-	-	(1.5) 1.5	ug/L
Sodium	200 ug/L	42000	65200	-	-	(2,300,000) 2,300,000	ug/L
Thallium	0.1 ug/L	<0.1	<0.1	-	-	(510) 510	ug/L

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020
Project Description: LOP20-001B

	Client ID:	BH18-1	BH D-1	Trip Blank	-		
	Sample Date:	23-Jun-2020	23-Jun-2020	22-Jun-2020	-	**Criteria:**	
	Sample ID:	2026213-05	2026213-06	2026213-07	-	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	-		
	MDL/Units						
Uranium	0.1 ug/L	2.1	1.1	-	-	(420) 420	ug/L
Vanadium	0.5 ug/L	<0.5	<0.5	-	-	(250) 250	ug/L
Zinc	5 ug/L	<5	7	-	-	(1,100) 1,100	ug/L
Volatiles							
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-	(130,000) 130,000	ug/L
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-	(430) 44	ug/L
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(85,000) 85,000	ug/L
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-	(770) 380	ug/L
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(56) 5.6	ug/L
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-	(8.4) 0.79	ug/L
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	(630) 630	ug/L
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-	(22) 2.4	ug/L
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(82,000) 82,000	ug/L
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-	(4,400) 4,400	ug/L
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	(9,600) 4,600	ug/L
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	(9,600) 9,600	ug/L
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	(67) 8	ug/L
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(3,100) 320	ug/L
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(12) 1.6	ug/L
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	(17) 1.6	ug/L
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	(17) 1.6	ug/L
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	(17) 1.6	ug/L
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-	(140) 16	ug/L
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-		

PARACEL LABORATORIES LTD.

Order #: 2026213

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH18-1	BH D-1	Trip Blank	-		
	Sample Date:	23-Jun-2020	23-Jun-2020	22-Jun-2020	-	**Criteria:**	
	Sample ID:	2026213-05	2026213-06	2026213-07	-	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	-		
	MDL/Units						
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-		
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-	(45) 5.2	ug/L
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	(2,300) 2,300	ug/L
Ethylene dibromide (dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	-	(0.83) 0.25	ug/L
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-	(520) 51	ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-	(1,500,000) 470,000	ug/L
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-	(580,000) 140,000	ug/L
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-	(1,400) 190	ug/L
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-	(5,500) 610	ug/L
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-	(9,100) 1,300	ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(28) 3.3	ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(15) 3.2	ug/L
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	(17) 1.6	ug/L
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-	(18,000) 18,000	ug/L
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(6,700) 640	ug/L
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	(30) 4.7	ug/L
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	(17) 1.6	ug/L
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-	(2,500) 2,500	ug/L
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-	(1.7) 0.5	ug/L
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-		
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-		
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-	(4,200) 4,200	ug/L
4-Bromofluorobenzene	Surrogate	120%	124%	115%	-		
Dibromofluoromethane	Surrogate	106%	107%	103%	-		

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH18-1	BH D-1	Trip Blank	-		
	Sample Date:	23-Jun-2020	23-Jun-2020	22-Jun-2020	-	**Criteria:**	
	Sample ID:	2026213-05	2026213-06	2026213-07	-	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	-		
	MDL/Units						
Toluene-d8	Surrogate	110%	106%	106%	-		
Hydrocarbons							
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-	(750) 750	ug/L
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-	(150) 150	ug/L
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-	(500) 500	ug/L
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-	(500) 500	ug/L
Semi-Volatiles							
Acenaphthene	0.05 ug/L	<0.05	<0.05	-	-	(1,700) 600	ug/L
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	-	(1.8) 1.8	ug/L
Anthracene	0.01 ug/L	<0.01	<0.01	-	-	(2.4) 2.4	ug/L
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	-	-	(4.7) 4.7	ug/L
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	-	-	(0.81) 0.81	ug/L
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-	(0.75) 0.75	ug/L
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	-	(0.2) 0.2	ug/L
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-	(0.4) 0.4	ug/L
Chrysene	0.05 ug/L	<0.05	<0.05	-	-	(1) 1	ug/L
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	-	(0.52) 0.52	ug/L
Fluoranthene	0.01 ug/L	<0.01	<0.01	-	-	(130) 130	ug/L
Fluorene	0.05 ug/L	<0.05	<0.05	-	-	(400) 400	ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	-		
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-	(1,800) 1,800	ug/L
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-	(1,800) 1,800	ug/L
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	-	(1,800) 1,800	ug/L
Naphthalene	0.05 ug/L	<0.05	<0.05	-	-	(6,400) 1,400	ug/L

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

	Client ID:	BH18-1	BH D-1	Trip Blank	-		
	Sample Date:	23-Jun-2020	23-Jun-2020	22-Jun-2020	-	**Criteria:**	
	Sample ID:	2026213-05	2026213-06	2026213-07	-	**Reg 153/04 (2011)-Table 3 Non-Potable Groundwater**	
	Matrix:	Water	Water	Water	-		
	MDL/Units						
Phenanthrene	0.05 ug/L	<0.05	<0.05	-	-	(580) 580	ug/L
Pyrene	0.01 ug/L	<0.01	<0.01	-	-	(68) 68	ug/L
2-Fluorobiphenyl	Surrogate	63.4%	59.6%	-	-		
Terphenyl-d14	Surrogate	78.6%	115%	-	-		

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
General Inorganics									
Cyanide, free	ND	2	ug/L						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*14.5*		*ug/L*		*72.5*	*50-140*			
Surrogate: Terphenyl-d14	*20.6*		*ug/L*		*103*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2·	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*92.1*		*ug/L*		*115*	*50-140*			
Surrogate: Dibromofluoromethane	*77.1*		*ug/L*		*96.3*	*50-140*			
Surrogate: Toluene-d8	*92.9*		*ug/L*		*116*	*50-140*			
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*92.9*		*ug/L*		*116*	*50-140*			

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020
Project Description: LOP20-001B

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	141	1	mg/L	141			0.0	10	
General Inorganics									
Cyanide, free	ND	2	ug/L	ND			NC	20	
pH	7.9	0.1	pH Units	7.9			0.0	3.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	133	1	ug/L	133			0.2	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	43	10	ug/L	45			3.2	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	4.5	1	ug/L	4.8			8.1	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	8.81	0.5	ug/L	9.03			2.5	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	5.93	0.5	ug/L	5.89			0.8	20	
Nickel	2.1	1	ug/L	2.2			5.9	20	
Selenium	1.4	1	ug/L	1.5			3.1	20	
Silver	0.91	0.1	ug/L	0.89			3.1	20	
Sodium	2940000	200	ug/L	3380000			13.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	2.7	0.1	ug/L	2.7			0.4	20	
Vanadium	0.96	0.5	ug/L	0.95			0.9	20	
Zinc	ND	5	ug/L	ND			NC	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	2.55	0.5	ug/L	3.38			28.0	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	6.80	0.5	ug/L	9.35			31.6	30	QR-07
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Dichlorodifluoromethane	7.70	1.0	ug/L	9.95			25.5	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*94.5*		ug/L		*118*	*50-140*			
Surrogate: Dibromofluoromethane	*84.3*		ug/L		*105*	*50-140*			
Surrogate: Toluene-d8	*79.7*		ug/L		*99.7*	*50-140*			
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*79.7*		ug/L		*99.7*	*50-140*			

Certificate of Analysis
Client: Lopers & Associates
Client PO: 2053548

Report Date: 29-Jun-2020
Order Date: 23-Jun-2020
Project Description: LOP20-001B

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	10.0	1	mg/L	ND	100	85-115			
General Inorganics									
Cyanide, free	28.5	2	ug/L	ND	94.9	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	1840	25	ug/L	ND	92.1	68-117			
F2 PHCs (C10-C16)	1810	100	ug/L	ND	113	60-140			
F3 PHCs (C16-C34)	4120	100	ug/L	ND	105	60-140			
F4 PHCs (C34-C50)	2640	100	ug/L	ND	106	60-140			
Metals									
Mercury	3.40	0.1	ug/L	ND	113	70-130			
Antimony	41.0	0.5	ug/L	ND	81.9	80-120			
Arsenic	43.0	1	ug/L	ND	85.5	80-120			
Barium	45.7	1	ug/L	ND	91.3	80-120			
Beryllium	41.2	0.5	ug/L	ND	82.3	80-120			
Boron	38	10	ug/L	ND	76.7	80-120			QS-02
Cadmium	41.3	0.1	ug/L	ND	82.6	80-120			
Chromium (VI)	175	10	ug/L	ND	87.5	70-130			
Chromium	52.1	1	ug/L	ND	104	80-120			
Cobalt	49.5	0.5	ug/L	ND	99.1	80-120			
Copper	49.5	0.5	ug/L	ND	98.9	80-120			
Lead	40.6	0.1	ug/L	ND	81.0	80-120			
Molybdenum	51.9	0.5	ug/L	ND	104	80-120			
Nickel	50.3	1	ug/L	ND	101	80-120			
Selenium	35.8	1	ug/L	ND	71.6	80-120			QS-02
Silver	41.8	0.1	ug/L	0.89	81.9	80-120			
Sodium	9960	200	ug/L	ND	99.6	80-120			
Thallium	45.4	0.1	ug/L	ND	90.7	80-120			
Uranium	57.8	0.1	ug/L	2.7	110	80-120			
Vanadium	51.3	0.5	ug/L	ND	103	80-120			
Zinc	48	5	ug/L	ND	86.8	80-120			
Semi-Volatiles									
Acenaphthene	3.56	0.05	ug/L	ND	71.1	50-140			
Acenaphthylene	3.49	0.05	ug/L	ND	69.8	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anthracene	3.43	0.01	ug/L	ND	68.6	50-140			
Benzo [a] anthracene	3.32	0.01	ug/L	ND	66.4	50-140			
Benzo [a] pyrene	3.45	0.01	ug/L	ND	69.1	50-140			
Benzo [b] fluoranthene	4.59	0.05	ug/L	ND	91.7	50-140			
Benzo [g,h,i] perylene	3.60	0.05	ug/L	ND	72.0	50-140			
Benzo [k] fluoranthene	3.88	0.05	ug/L	ND	77.7	50-140			
Chrysene	3.74	0.05	ug/L	ND	74.8	50-140			
Dibenzo [a,h] anthracene	3.74	0.05	ug/L	ND	74.8	50-140			
Fluoranthene	3.50	0.01	ug/L	ND	70.0	50-140			
Fluorene	3.83	0.05	ug/L	ND	76.6	50-140			
Indeno [1,2,3-cd] pyrene	3.81	0.05	ug/L	ND	76.2	50-140			
1-Methylnaphthalene	3.83	0.05	ug/L	ND	76.6	50-140			
2-Methylnaphthalene	4.25	0.05	ug/L	ND	85.1	50-140			
Naphthalene	3.42	0.05	ug/L	ND	68.4	50-140			
Phenanthrene	3.20	0.05	ug/L	ND	64.0	50-140			
Pyrene	3.55	0.01	ug/L	ND	71.0	50-140			
Surrogate: 2-Fluorobiphenyl	*15.4*		*ug/L*		*77.2*	*50-140*			
Surrogate: Terphenyl-d14	*18.8*		*ug/L*		*94.2*	*50-140*			
Volatiles									
Acetone	117	5.0	ug/L	ND	117	50-140			
Benzene	44.2	0.5	ug/L	ND	110	60-130			
Bromodichloromethane	42.9	0.5	ug/L	ND	107	60-130			
Bromoform	36.8	0.5	ug/L	ND	91.9	60-130			
Bromomethane	48.2	0.5	ug/L	ND	120	50-140			
Carbon Tetrachloride	48.2	0.2	ug/L	ND	121	60-130			
Chlorobenzene	45.7	0.5	ug/L	ND	114	60-130			
Chloroform	48.7	0.5	ug/L	ND	122	60-130			
Dibromochloromethane	46.6	0.5	ug/L	ND	117	60-130			
Dichlorodifluoromethane	44.5	1.0	ug/L	ND	111	50-140			
1,2-Dichlorobenzene	44.0	0.5	ug/L	ND	110	60-130			
1,3-Dichlorobenzene	45.7	0.5	ug/L	ND	114	60-130			
1,4-Dichlorobenzene	37.8	0.5	ug/L	ND	94.6	60-130			
1,1-Dichloroethane	39.8	0.5	ug/L	ND	99.4	60-130			
1,2-Dichloroethane	43.3	0.5	ug/L	ND	108	60-130			
1,1-Dichloroethylene	36.1	0.5	ug/L	ND	90.3	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
cis-1,2-Dichloroethylene	49.9	0.5	ug/L	ND	125	60-130			
trans-1,2-Dichloroethylene	44.0	0.5	ug/L	ND	110	60-130			
1,2-Dichloropropane	36.8	0.5	ug/L	ND	92.0	60-130			
cis-1,3-Dichloropropylene	36.4	0.5	ug/L	ND	91.1	60-130			
trans-1,3-Dichloropropylene	34.1	0.5	ug/L	ND	85.3	60-130			
Ethylbenzene	42.2	0.5	ug/L	ND	106	60-130			
Ethylene dibromide (dibromoethane, 1,2-	38.0	0.2	ug/L	ND	95.0	60-130			
Hexane	33.9	1.0	ug/L	ND	84.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	93.6	5.0	ug/L	ND	93.6	50-140			
Methyl Isobutyl Ketone	88.7	5.0	ug/L	ND	88.7	50-140			
Methyl tert-butyl ether	114	2.0	ug/L	ND	114	50-140			
Methylene Chloride	39.3	5.0	ug/L	ND	98.2	60-130			
Styrene	47.1	0.5	ug/L	ND	118	60-130			
1,1,1,2-Tetrachloroethane	42.7	0.5	ug/L	ND	107	60-130			
1,1,2,2-Tetrachloroethane	44.9	0.5	ug/L	ND	112	60-130			
Tetrachloroethylene	45.5	0.5	ug/L	ND	114	60-130			
Toluene	46.1	0.5	ug/L	ND	115	60-130			
1,1,1-Trichloroethane	49.0	0.5	ug/L	ND	123	60-130			
1,1,2-Trichloroethane	43.3	0.5	ug/L	ND	108	60-130			
Trichloroethylene	41.0	0.5	ug/L	ND	102	60-130			
Trichlorofluoromethane	45.7	1.0	ug/L	ND	114	60-130			
Vinyl chloride	46.4	0.5	ug/L	ND	116	50-140			
m,p-Xylenes	87.0	0.5	ug/L	ND	109	60-130			
o-Xylene	48.4	0.5	ug/L	ND	121	60-130			
Surrogate: 4-Bromofluorobenzene	*66.9*		*ug/L*		*83.6*	*50-140*			
Surrogate: Dibromofluoromethane	*73.5*		*ug/L*		*91.8*	*50-140*			
Surrogate: Toluene-d8	*68.1*		*ug/L*		*85.1*	*50-140*			
Benzene	44.2	0.5	ug/L	ND	110	60-130			
Ethylbenzene	42.2	0.5	ug/L	ND	106	60-130			
Toluene	46.1	0.5	ug/L	ND	115	60-130			
m,p-Xylenes	87.0	0.5	ug/L	ND	109	60-130			
o-Xylene	48.4	0.5	ug/L	ND	121	60-130			
Surrogate: Toluene-d8	*68.1*		*ug/L*		*85.1*	*50-140*			

PARACEL LABORATORIES LTD.

Order #: 2026213

Certificate of Analysis

Client: Lopers & Associates

Client PO: 2053548

Report Date: 29-Jun-2020

Order Date: 23-Jun-2020

Project Description: LOP20-001B

Qualifier Notes:

QC Qualifiers :

QR-07 : Duplicate result exceeds RPD limits due to non-homogeneity between multiple sample vials. Remainder of QA/QC is acceptable.

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACEL LABORATORIES I

Paracel ID: 2026213

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2026213	№ 125319

Client Name: LOPERS & ASSOCIATES	Project Ref: LOP20-001B
Contact Name: Luke Lopers	Quote #: #20-456 OCHC - 715 McKenah Road
Address: 30 Leatfield Way, Ottawa, ON	PO #: 2053548
Telephone: 613-327-9073	E-mail: Luke@Lopers.ca

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular

Date Required:

Regulation 153/04: ☐ Table 1 ☒ Res/Park ☒ Med/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☒ Table 3 ☐ Agri/Other; ☐ Table ___; For RSC: ☐ Yes ☒ No

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Metals & Hydrides					
1	BH6-20	GW		10	June 23, 2020		X	X	X					X					
2	BH13-20	GW		3			X												
3	BH8-1	GW		10			X	X	X					X					
4	BH18-2	GW		10			X	X	X					X					
5	BH18-[illegible]	GW		10			X	X	X					X					
6	BHD-1	GW		10			X	X	X					X					
7																			
8																			
9																			
10																			

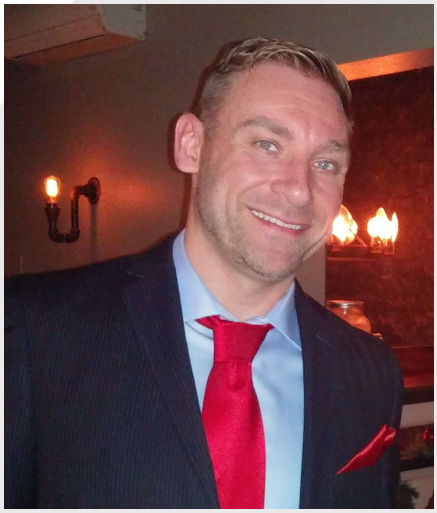
Comments: Metals are field filtered

Method of Delivery: D/B ~~Courier~~

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Luke Lopers	Date/Time:	Date/Time: 06-26-20 17:10	Date/Time: 24 Jun 2020 855
Date/Time: June 23, 2020 / 4:55 PM	Temperature: °C	Temperature: 25.6 °C	pH Verified: ☐ By:

Appendix F

Qualifications of Assessors



LUKE LOPERS

Principal

LOPERS & ASSOCIATES

PROFILE

Mr. Lopers is an environmental engineer with over 12 years of experience in environmental engineering specializing in due diligence investigations. Mr. Lopers has extensive experience in Phase I and II Environmental Site Assessments; environmental remediation, and investigations; record of site condition submissions; asset inventory, designated substance surveys and abatement projects; environmental expertise on legal issues; and coordination of various monitoring programs (groundwater, surface water, air).

Mr. Lopers has participated in various Property Condition and Building Envelope mandates at various residential and commercial properties throughout Ontario.

Mr. Lopers has a strong commitment to health and safety, having experience leading a regional health and safety committee as a certified employee representative. Mr. Lopers has extensive training including OSHA 40-hour HAZWOPER, ASP Health and Safety on Construction Sites in Quebec, Ontario Working at Heights, Emergency First Aid/CPR and WHMIS.

CONTACT

EMAIL:
Luke@Lopers.ca

EDUCATION

University of Waterloo,
B.A.Sc., Honours Environmental Engineering
Management Science Option Designation - 2002 - 2008

PROFESSIONAL EXPERIENCE

Lopers & Associates, Principal, Project Manager, Senior Environmental Engineer
Ottawa, Ontario - 2020–Present
Responsible for the management, coordination, supervision, completion and delivery of Phase I/1 and II/2 Environmental Site Assessments, Environmental Remediation Programs, Environmental litigation support, Designated Substance Surveys, scope of work development, cost estimates and proposals

GHD Limited, Project Manager, Senior Environmental Engineer
Ottawa, Ontario - 2013–2020
Responsible for the management, senior technical review, coordination, supervision, completion and delivery of Phase I/1 and II/2 Environmental Site Assessments, Environmental Remediation Programs, Environmental litigation support, Designated Substance Surveys, scope of work development, cost estimates and proposals
Office Safety Captain and Joint Health and Safety Committee team leader

Paterson Group Inc., Project Manager, Environmental Engineer
Ottawa, Ontario - 2009–2013
Responsible for supervision, completion and review for Phase I/1 and II/2 Environmental Site Assessments, Environmental Remediation Programs, Designated Substance Surveys

NEXT Environmental Inc., Site Investigation Staff
Burnaby, British Columbia - 2008–2009
Responsible for fieldwork and reporting for Stage/Phase I and II Environmental Site Assessments, Environmental Remediation Programs

PROFESSIONAL DESIGNATIONS

Licensed Professional Engineer (P.Eng.) with Professional Engineers Ontario (PEO) since 2012

Qualified Person (QP), Environmental Site Assessments with Ontario Ministry of the Environment, Conservation and Parks

PROJECT EXPERIENCE

Environmental Site Assessments

Project Engineer/Manager
Phase 1 Environmental Site Assessment | Various Clients | Ontario, Quebec and British Columbia | 2006-2020

Project Engineer/Manager for Phase I Environmental Site Assessments in support of acquisition/divestiture/regulatory requirements for various properties in Ontario, Quebec and British Columbia, including the following:

- Canadian Tire Retail Store and Gas Bar, CTR 417 - 2560 Princess Street, Kingston, Ontario
- Former Automotive Dealership and Service Garage, North Vancouver, British Columbia
- Former Philips Cable Plant, Brockville, Ontario
- Former Cornwall Cotton Mill, Cornwall, Ontario
- Retail Fuel Outlet and Automotive Service Garage, Ottawa, Ontario
- Jack Garland Airport Land, North Bay, Ontario
- Various Commercial/Residential Properties, Ontario and British Columbia
- Various Residential Properties, Ontario, Quebec and British Columbia
- Rochester Heights (811, 818 Gladstone Avenue), Ottawa, Ontario

Project Engineer/Manager
Phase Two Environmental Site Assessments | Various Clients | Various Locations | 2008-2020

Project Engineer/Manager for the following field investigation and/or regulatory reporting requirements for Phase II ESAs and other Site Investigations:

- Proposed Canadian Tire Development, CTR 693P - Terry Fox Drive at Eagleson Road, Stittsville, Ontario
- Former Retail/Private Fuel Outlets, Ottawa/North Bay/Vancouver, Canada
- Operational/Former Industrial Facilities, Ottawa/Cornwall/Sarnia/Brockville/Gananoque, Ontario
- Existing Dry Cleaning Facilities, Ottawa/Arnprior, Ontario
- Automotive Service Garages, Ottawa/Vancouver, Canada
- Various Commercial/Residential Properties, Eastern Ontario
- Tetrachloroethylene Groundwater Plume, Commercial Property, Ottawa, Ontario
- Rochester Heights (811, 818 Gladstone Avenue), Ottawa, Ontario

Project Manager
Phase One, Phase Two Environmental Site Assessments, Environmental Delineation Quality Assurance Program | Costco Wholesale | Ottawa, ON | 2014-2019

Project Manager for the completion of a Phase One ESA for the potential acquisition of a commercial property. Upon discovery of APECs at the Site and significant data gaps in previous investigations, completed a Phase Two ESA to evaluate soil and groundwater quality at the Site. Further oversight of original owner's environmental consultants was completed to ensure adequate delineation and characterization of a dNAPL groundwater plume at the Site, present at significant depths in shale bedrock, which originated as a result of a former on-Site dry-cleaning operation.

Environmental Remediation Programs

Project Engineer
Underground Fuel Storage Tank Removals and Environmental Remediation Programs in Vicinity of Active Underground Services | Ottawa, ON | 2010, 2012

Project Engineer for removal of underground heating oil storage tanks adjacent to residential buildings. Completed excavation supervision of contaminated soil around and below active underground services, including hydro, water and natural gas infrastructure at residential properties. Activities included oversight of removal of petroleum, impacted soil, and field screening and collection of confirmatory soil and groundwater samples for petroleum hydrocarbon analysis. Prepared Phase I, II and III Environmental Site Assessment reports.

Project Engineer
Retail Fuel Outlet Decommissioning and Remediation | Ottawa, ON | 2012

Project Engineer for UST removal and confirmatory soil sampling at former ESSO gas station in Ottawa, Ontario. Activities included oversight of removal of USTs and product lines, oversight of removal of petroleum-impacted soil and groundwater encountered and backfilling operations, and field screening and collection of confirmatory soil and groundwater samples for petroleum hydrocarbon analysis.

Project Engineer/Manager
Former Fuel Outlet Investigation and Remediation | Merrickville, ON | 2016-2017

Project Engineer for confirmatory soil and groundwater sampling following UST removal at former Shell gas station. Activities included oversight of removal of petroleum-impacted soil, pumping of groundwater encountered and backfilling operations, and field screening and collection of confirmatory soil and groundwater samples for petroleum hydrocarbon analysis. Additional borehole/monitoring well drilling also completed.

Record of Site Conditions

Project Manager/Engineer
Residential Redevelopment | Environmental Remediation Program and Record of Site Condition Submission | Ottawa | 2015

Project Manager for delineation of soil contamination and groundwater sampling for a former automotive garage and gas station property in Ottawa, Ontario. Presented and implemented remedial action plan to remediate on-Site contamination. Directed staff in collection of post remediation confirmatory soil and groundwater samples for contaminants of concern. Prepared remediation closure report and record of site condition supporting documentation for submission to the Ministry of the Environment and Climate Change.

Project Manager/Engineer
Industrial Development | Environmental Assessment and Record of Site Condition Submission | Township of Edwardsburgh/Cardinal | 2015

Project Manager for environmental assessments for a proposed industrial business park, in an existing industrial area within the Township of Edwardsburgh/Cardinal, Ontario. Prepared environmental assessment reports and record of site condition supporting documentation for submission to the Ministry of the Environment and Climate Change.

Excess Soil Management

Project Engineer/Manager
Management of Excess Soil | CTREL, Brigil, Ottawa Community Housing Corporation | Ottawa and Pembroke, Ontario | 2016, 2018

Project Engineer/Manager for sampling, analytical testing, development of soil management plans and monitoring during removal of excess soil generated as part of construction activities, including the following properties/facilities:

- Rochester Heights (811, 818 Gladstone Avenue), Ottawa, Ontario
- Residential redevelopment, 121 Parkdale Avenue, Ottawa, Ontario
- CTR 079, 1104 Pembroke Street East, Pembroke, Ontario
- CTR 297, 2010 Ogilvie Road, Ottawa, Ontario

Designated Substance Surveys

Project Manager
Designated Substance Surveys and Hazardous Building Materials Assessment | Ottawa, Pembroke, Southeastern Ontario | 2010-2020

Project Manager for asbestos containing material (ACM) surveys, designated substance surveys (DSSs), Hazardous Building Materials Assessments (HBMAs) or mould assessments at the following sites:

- DSSs at various municipal facilities for the City of Pembroke, Pembroke, Ontario. Preparation of Asbestos Management Plan.
- HBMAs at various institutional buildings for the Catholic District School Board of Eastern Ontario, Southeastern Ontario.
- DSSs and ACM surveys at various residential, buildings (dwellings and apartment buildings) for private residential clients, Ottawa, Ontario.
- DSS and abatement oversight during demolition, residential buildings (townhouses) for Ottawa Community Housing Corporation, 818 Gladstone Avenue, Ottawa, Ontario.

Environmental Litigation Support

Project Manager, Field Engineer, Expert Witness
Ottawa, Ontario | 2014-2020

Project Manager, Field Engineer and Expert Witness for a fuel spill, remediation program, groundwater monitoring program and litigation review for redevelopment of a residential property adjacent to a central heating plant at an institutional facility.

DON PLENDERLEITH

Senior Environmental Engineer and Project Manager

Education

BEng Geological Engineering, École Polytechnique de Montreal, Montreal, Quebec, 1990

MSc Geophysics, University of British Columbia, Vancouver, British Columbia, 1983

BSc Geophysics, Honours, University of British Columbia, Vancouver, British Columbia, 1980

Certifications

Registered as PMP with Project Management Institute since 2012, requalified in 2018

Qualified Person (QP) for Environmental Site Assessments
with Ontario Ministry of Environment and Conservation and Parks

Professional Affiliations

Licensed as P.Eng. with the Professional Engineers of Ontario (PEO) since 1994

Licensed as Ing. with l'Ordre des ingénieurs du Québec (OIQ), 1992

Licensed as P.Eng. with NAPEG (NWT and Nunavut), since 2009.

Licensed as P.Eng with Engineers Yukon since 2018

Federal Clearance Level

Secret ID # 95251065

PROFESSIONAL SUMMARY

Mr. Plenderleith has been an environmental engineer for 30 years. From 1990 to 2000 he worked at specialty firms in Montreal and Ottawa where he gained field and reporting experience in site assessment and remediation of retail fuel outlets and railway yards. In 1991 and 1992 he worked on a CIDA sponsored project to assess additional water resource potential in two provinces in Indonesia. He worked for Golder for 19 years on projects in Ottawa, the North and overseas.

His expertise covers all steps in contaminated site management: Phase I, II and III environmental site assessments (ESAs), risk assessments, remedial options evaluations, remedial action plans, tender plans and specifications, remediation project oversight, long-term monitoring and project closure. He has largely concentrated on federal sites since 2002 and was Golder's initial point of contact on the Environmental Standing Offer Agreement with PSPC in the National Capital over that time.

Don led Golder's national client service team for Federal government and was responsible to Golder's management for maintaining strong relations with the federal government. Locally, he provided project management and technical direction of a variety of environmental projects from the Ottawa office. Don mentored several junior professionals. His site portfolio included: military bases, Northern sites, navigational sites, correctional facilities, research labs, commercial buildings and Canadian embassies abroad. On several multi-year projects (Kingston Penitentiary and Connaught Ranges landfill) he directed all steps of site management from initial investigations, through to site closure.

Don is equally experienced at providing strategic and portfolio-level assistance to clients as well as site-specific level work. He has written contaminated sites management plans for several federal Departments. He helped to develop components of the FCSAP project manager's tool kit and has trained federal project managers in its use. He has provided program-level assistance to the FCSAP Secretariat for funding demand forecasting and long-term strategy and risk management. For nine years he led a multi-disciplinary team that performed contaminated site liability peer reviews for the Office of the Auditor General of Canada.

Don completed his engineering degree in French and is licensed to practice in Quebec. He frequently coordinates the French language component at bilingual meetings and workshops.

PROJECT EXPERIENCE – STANDING OFFER MANAGER

Public Services and Procurement Canada, National Capital Region, Environmental Engineering Standing Offer (2002-2019).

Don managed Golder's Environmental Standing Offer Agreement (SOA) with PSPC in the National Capital Region from 2002 to 2019. He was the first point of contact with PSPC for new call-ups. He formed project teams from the approved resources and reviewed the work plans under each call-up. He was responsible and accountable for Golder's overall project performance to PSPC.

PROJECT EXPERIENCE – SENIOR PROJECT MANAGER

Phase I, II, and III and Remediation at Pittsburgh Institution and Kingston Penitentiary for PSPC/CSC near Kingston, Ontario

Environmental Site Assessment, Remediation Planning and Implementation for the Pittsburgh Institution and Kingston Penitentiary, Kingston, Ontario from 2007 to 2015 - Don was the Senior Project Manager and project reviewer for the Phase I, II and III of contaminated sites on two similar projects at these federal penitentiaries. Don performed project management and provided technical direction during the full suite of services from site assessment through to remediation. Federal project management tools, and FCSAP technical tools (GOST) were used to assist with procedural compliance. Don assisted PSPC with the tender specification for both remediation projects and performed on-site supervision during the fast-track remediation work at Pittsburgh. Don also performed senior review of the draft and final reports.

Peer Review and Liability Review of US Steel Site in Hamilton Harbour for PSPC and Transport Canada (July-August 2016)

Don was the Senior Project Manager for a Peer Review of reports pertaining to the US Steel site on Hamilton Harbour that the Hamilton Port Authority (HPA) was considering purchasing. TC requested the peer review and liability review in its oversight role over the HPA. Don brought a senior expert in at steel industry at Golder onto the project team. With his input some important gaps in the previous site assessments, management plans and liability estimates were identified to TC.

Contaminated Site Reporting and Review for Department of National Defence Ottawa, Ontario, Canada

Don has managed several projects for DND's Director General Environment, related to the financial reporting of DND's contaminated sites. He managed the EcoNet validation project in 2006, in which the systems and procedures by which site cost and liability information are input to DND's Contaminated Site database, Econet. Several of DND's major projects being run out of headquarters were reviewed in that exercise. In 2008 he assisted DND by producing the 2008 update of their Contaminated Sites Management Plan (CSMP) for Treasury Board submission. Nine divisional CSMPs were reviewed, summarized and incorporated into the departmental CSMP.

PROGRAM LEVEL WORK – FEDERAL CONTAMINATED SITES

Project Management Tools for Contaminated Sites, Ottawa, Ontario, Canada

Mr. Plenderleith developed two of the FCSAP Project Management Tools: Status Reporting and Project Risk Management. He has provided training in the tools to federal project managers country-wide. He has delivered training sessions at RPIC National Contaminated Sites workshops on several occasions on the PM Tools, the Sustainable Development Tool (SDAT), and Guidance Tool for Selection of Technologies Tools (GOST).

Assistance to FCSAP for program-level Risk Management, PWGSC/ECCC Ottawa, Ontario

Don has led a team at Golder that provided assistance to the FCSAP Secretariat from 2013 to 2019 in the areas of cost projections for funding demand estimates. He devised a method of projecting the costs of unassessed sites based on closure costs of similar sites. This tool was used to estimate the funding demand for FCSAP Phase III and past Phase III. Don assisted the Secretariat with Long-Term Strategic planning for FSCAP post 2020 when the 15-year program is due to sunset.

Secondments to Federal Departments

Mr. Plenderleith has been seconded from Golder to the Department of Foreign Affairs and International Trade (now Global Affairs Canada "GAC") on three occasions to develop their Contaminated Sites Management Plans and to fill in while GAC was staffing their full-time environmental engineer position. Through these secondments he has developed a greater understanding of the role of federal custodians in managing their programs.

PROJECT EXPERIENCE – NORTHERN SITES

DEW Line Site Monitoring, Baffin Region, DND (2015-19)

Mr. Plenderleith was the project director of Golder's DEW Line Monitoring contract with DND from four years 2015 to 2019. He was responsible for overall program quality and liaison with the client and management of Inuit subcontractors. The project was multi-disciplinary, involving geotechnical and environmental components. Mr. Plenderleith has developed a very positive working relationship with the hamlet of Qikiqtarjuaq and the Inuit staff from that community, many of whom have returned to work with Golder every year. All Inuit Participation Targets were exceeded.

Tundra Mine Remediation Monitoring PSPC/INAC (2016-2018)

Don was the Senior project director for Golder's Remediation Monitoring of Tundra Mine (NWT) for PSPC and INAC. This project is multi-disciplinary involving surface water and groundwater environmental monitoring and aquatic monitoring for the final stages of the remediation of Tundra Mine. Don has reviewed the monthly and annual monitoring reports produced for the Water Licence. His earlier experience with the RAP for Tundra has been valuable on this project.

Remedial Options Review and Remedial Action Planning Former Water Tanker Base, Inuvik Airport, NWT 2010-12

From 2010 to 2012, Mr. Plenderleith was the technical director for the Phase III ESA detailed site assessment and remediation planning of the former Water Tanker Base at the Inuvik Airport in NWT. The work included determining the contaminants of concern, delineation of contaminated soil and seasonal groundwater areas, and assessing remedial options. The remedial action plan reviewed chemical oxidation and removal & disposal options within the constraints of northern work season, and the distance to a disposal facility. Descriptions, costs, advantages and limitations were provided for several options. GNWT performed the remediation with own forces.