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REPORT ON

PHASE II
ENVIRONMENTAL SITE ASSESSMENT
3200 REIDS LANE
CITY OF OTTAWA, ONTARIO

Submitted to:

Crestview Innovations Inc.
12 Escade Drive
Nepean, ON
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DATE: January 24, 2023

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1.0 EXECUTIVE SUMMARY

Kollaard Associates Inc. was retained by Crestview Innovations Inc. to carry out a Phase II Environmental Site Assessment (ESA) of the property located at 3200 Reids Lane, Ottawa, Ontario to meet the requirements of a Phase II ESA as stipulated in the Ontario Regulation 153/04 (O.Reg. 153/04) as amended.

The site consists of a 3.5 hectares (8.7 acres) parcel located on the north side of Osgoode Main Street about 200 metres west of the intersection of Osgoode Main Street and Elizabeth Street in Osgoode Village, City of Ottawa, Ontario. At the time of the preparation of the report, the site was a vacant undeveloped property. Based on historical information for the site, the property was previously occupied developed as a farm property that was subsequently demolished.

The purpose of the Phase II ESA was to address the Areas of Potential Environmental Concern (APEC) identified during the Phase I ESA conducted in October 2022 and to update information from previous Phase 2 ESA investigations (carried out by others in 2017). A previous Phase II investigation (carried out by Dillon Consulting, 2017) included three groundwater monitoring wells within the fill areas and two groundwater monitoring wells within the area closest to the former fuel storage. No groundwater impacts were measured in any of the wells after two rounds of testing for any of the COPCs including metals, VOCs, PHC F1-F4, PAHs. As such, the groundwater at the site does not require further investigation. The Phase I ESA was completed in accordance with O.Reg. 153/04, as amended. The results of the Phase I ESA identified two APECs as follows:

- APEC 1: Fill and/or Debris impacting soil. There were soil impacts noted at three locations of the subject property related to debris from illegal dumping which occurred between 1987 and 2000. Of a total of four soil samples, two samples had exceedances for PAHS, one had an exceedance for arsenic and one had an exceedance for lead. These soil samples were collected by Dillon Consulting in 2017.
- APEC 2: The former fuel depot impacted soil at the southwest corner of the site from Total Petroleum Hydrocarbons, as noted in 2003. Updated soil testing is necessary for PHCs F1-F4 to determine if soil impacts remain at the site. Previous soil impacts were measured in one soil sample collected in 2003 by AMEC. At that time, the impacts were found to be shallow and the deeper soils were not impacted.

It is understood that the site is to be redeveloped for the residential development. The historical use of the site was also for residential and agricultural (farm) purposes. Based on the historical use of the site and no proposed change of use, it is understood that a Record of Site Condition is not required for this property. The Phase II ESA investigation is being carried out for Plan of Subdivision approval with the City of Ottawa.

This report should be read in conjunction with the following:

- Phase I ESA report completed by Kollaard Associates Inc., Project 210064, dated October 19, 2022.

The field program for the Phase II ESA was carried out by putting down a total of eight (8) test pits to address two APECs. APEC 1 is identified in three areas where fill materials were previously identified to contain the following one or more of the following contaminants above allowable limits arsenic, lead (metals) and PAHs. APEC 2 is located in the southwest corner of the property adjacent to a former bulk fuel storage facility where previous soil contamination at that location consisted of Petroleum Hydrocarbon fractions F1 to F4 (PHCs). The soil and groundwater analytical results were compared against Ontario Ministry of the Environment (MECP) “Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, dated April 15, 2011, Table 2: Full Depth

Generic Site Condition Standards in a Potable Ground Water Condition for Residential/Parkland/Institutional Use for coarse textured soils.

Based on the results of the Phase II ESA the following summary and conclusions are provided:

- APEC 1: The fill materials present at the site are within allowable limits for PAHs and metals, with the exception of one sample.
- APEC 2: The soils adjacent to the former fuel storage property have a presence of PHCs F1-F4 and BTEX (gasoline compounds) within allowable limits

A total of twelve (12) samples of the fill materials within APEC 1 were obtained from a total of six test pits on November 7, 2022. These were tested for metals and PAHs. No presence of PAHs above method reporting limits was reported for a total of ten (10) samples. Two samples obtained from TP3 had the presence of PAHs, including one sample which had an exceedance of two PAHs identified as benzo(a)pyrene and dibenz(a,h)anthracene. That test pit (TP3) encountered some asphalt pieces mixed in with fill materials. A second visit was carried out and one additional soil sample was obtained from below the fill materials and in the native soils. There was no presence of PAHs or metals above method reporting limits in the deeper sample obtained within the same test pit. The exceedance encountered in one sample (TP3-2) is due to the presence of asphalt in the soil sample rather than representative of the fill materials/soils present at the site. It is considered that once the asphalt is removed from the site, the remaining soils can remain on site.

At APEC 2, two test pits were put down with a total of four soil samples obtained and tested for both PHC F1-F4 and select VOCs (benzene, toluene, ethylbenzene and xylene). There was a presence of PHC F3 and F4 within one sample (TP8-1). However, the levels encountered were within the allowable limits. A deeper sample obtained from the same test pit encountered no presence of any PHCs or BTEX compounds. A second test pit (TP7) encountered no presence of any PHCs or BTEX. As such, the soil impacts from the former fuel storage facility are within allowable limits. No further assessment or soil characterization is considered necessary.

The asphalt materials encountered within the fill materials at the site are not considered to be soil. Under the Excess Soil Regulations (O. Reg. 406/19), excess soil does not include processed material (such as wood, metal, bricks, asphalt or other construction debris). Soil containing these items is deemed waste and cannot be reused. However, the regulation also allows for the soil to be managed on site by various methods, that once processed, the excavated soil is not designated as waste. It is recommended that the asphalt be removed from the site by separating it from the soils and disposing or recycling the asphalt accordingly. The fill materials that are considered to be soil have been characterized and are acceptable for reuse on the site, once sorting has occurred to separate the asphalt pieces. As such, it is considered that the appropriate reuse of fill materials can be addressed and managed through the Excess Soil Regulations and no further soil characterization is necessary.

There is solid waste present at the site on the ground surface in various locations, which was not fully assessed due to the limitations of vegetation that has since obscured visual and physical access to the debris. Debris that was observed includes metals, concrete, wood, plastic bottles, tin, roofing shingles and other solid waste. The underlying soils and groundwater have been assessed and are not impacted by the solid waste present on the ground surface at the site. Any solid waste should be disposed of at an appropriately licensed landfill at the time of development.

This executive summary is a brief synopsis of the report and should not be read in lieu of reading the report in its entirety.

2.0 INTRODUCTION

2.1 BACKGROUND

This Phase II Environmental Site Assessment (ESA) was carried out by Kollaard Associates Inc. for Crestview Innovations Inc. of Ottawa, Ontario for the property at civic address 3200 Reids Lane in the City of Ottawa, Ontario (see Key Plan, Figure 1). The subject site for this assessment consists of a vacant residential property, occupying a total area of about 3.5 hectares (8.7 acres). The purpose of the Phase II ESA was to address the Area of Potential Environmental Concern (APEC) identified during the Phase I ESA conducted in November 2022.

A Phase I ESA in accordance with Ontario Regulation 153/04 (O.Reg. 153/04) (as amended) was completed for the site by Kollaard Associates as described in the report entitled "Phase I Environmental Site Assessment, 3200 Reids Lane, City of Ottawa, Ontario", Project 210064, dated October 19, 2022. The Phase I ESA identified two APECs. The first APEC related to fill materials at the site underlying debris (solid waste) that was disposed of onsite which may contain metals and PAHs and the second APEC is related to potential contamination from an offsite source of petroleum hydrocarbons. Previous environmental investigation carried out by Dillon Consulting included groundwater sampling of a total of five monitoring wells that included two wells near the former fuel depot in the southwest corner of the site and three monitoring wells installed by Dillon Consulting near the former debris piles. In December 2017 and subsequently in July 2018, all the wells were tested for the following parameters; metals, Volatile Organic Compounds (VOCs), PHC F1-F4, semi-volatiles (PAHs). The results of the groundwater investigation indicate that there were no groundwater impacts. After careful review, Kollaard Associates Inc. agrees that the previous groundwater testing was sufficient and no further groundwater investigation is needed. Shallow soil impacts were found within fill materials due to PAHs, including lead and arsenic each in one sample in the imported fill materials onsite. Dillon recommended additional testing as no deeper samples were obtained and the lateral extent was not evaluated. Some shallow soil impacts were measured by AMEC in 2003 in the southwest corner of the site. At that time, the soil impacts were limited to Total Petroleum Hydrocarbons in one shallow soil sample and the underlying soils and adjacent areas were found to be un-impacted. AMEC indicated at that time that as the impacts were shallow and limited in extent, they were expected to naturally attenuate.

This Phase II ESA is required to address the above noted environmental concern identified in a Phase I ESA report and from previous environmental investigations and to assist in site development approvals. It is understood that the property is to be redeveloped into a residential subdivision, consisting of seven lots. The historical use of the site was also for residential purposes. Based on the historical use of the site and no proposed change of use to a more sensitive use, it is understood that a Record of Site Condition is not required for this property.

2.2 SITE DESCRIPTION

Address:	3200 Reids Lane, Ottawa, Ontario.
Legal Description:	Part Lots 27 & 28, Concession 1, Osgoode, Part Lots 50 & 51, Plan 393, Part 1 Plan 5R-9330 and Part 1 Plan 5R-13990 except Part 3, 6, & 9, Plan 4R-17009 and Parts 4 & 5, Plan 4R-20040 (PIN 04290-0555) AND Part Lot 28, Concession 1, Osgoode, Parts 3 & 4, Plan 5R-1527 (PIN 04290-0213)
Location:	The site is located on the north side of Osgoode Main Street about 200 metres west of the intersection of Osgoode Main Street and Elizabeth Street in Osgoode Village, City of Ottawa, Ontario. The location is shown on Figure 1 – Key Plan, appended to this report.
Latitude and Longitude:	45° 08’ 45.4” N, 75° 36’ 38.0” W
Configuration:	rectangular
Site Area:	3.5 hectares (8.7 acres)

2.3 PROPERTY OWNERSHIP

The property is currently owned by Crestview Innovations Inc. Authorization to proceed with this work was granted by Mr. Miles Yang.

2.4 CURRENT AND PROPOSED FUTURE USES

The property was vacant at the time of the investigation.

The first developed use of the property was determined based on a review of aerial photographs of the site (Sections 4.3.1) and other information sources. The earliest air photograph that was reviewed was 1976. However, a previous phase I ESA was provided that contained aerial photographs dating back to 1936. The first developed use is considered to be a farm property with a structure/barn dating back to prior to 1936. The site and the surrounding lands appear to be agricultural land. Development surrounding the site has steadily occurred over time.

The proposed future use of the site is for a residential subdivision. There is no proposed change of land use that would trigger an RSC.

2.5 APPLICABLE SITE CONDITION STANDARDS

The results were compared to the Ministry of the Environment, Conservation and Parks (MECP) *Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act*: *Table 2,* dated April 15, 2011, full depth generic site condition standards for residential/parkland/institutional property use, for coarse grained textured soils in a potable groundwater condition.

The surficial soils at the site consist of sand overlying silty clay. Grain size distribution analyses on three surficial soil samples indicate that samples are coarse grained soils (i.e. less than 3 to 6% passing the 75 um sieve). As such, it is considered that greater than 1/3 of the property consists of coarse grained soil.

The site meets the following criteria for applying the selected soil standards, as per O. Reg. 153/04:

- There are groundwater wells in use on adjacent properties and the proposed use of the property is based on potable water wells;
- Based on the information obtained from previous geotechnical investigation and wells installed on site there is a minimum of 12 metres of overburden before bedrock is encountered;

- The site is not adjacent to a water body and does not contain land that is within 30 metres of a water body;
- The site is not located within or adjacent to an area of natural significance.
- The site is not located in a municipal wellhead protection area or other groundwater protected area;
- The site is not an agricultural use.

2.6 GENERAL OBJECTIVES

The objectives of the Phase II ESA were to obtain additional information about environmental conditions in the soil at the Site, and to develop the information necessary to complete a Phase II ESA for the property.

3.0 BACKGROUND INFORMATION

3.1 PHYSICAL SETTING

The ground surface across the site and surrounding area is relatively flat lying with a gradual slope from the southeast to the northwest, which is consistent across the area. The shallow groundwater flow direction follows the topography at the site.

The regional topography slopes northwest towards the Rideau River located approximately 2 kilometres northwest from the subject site. Osgoode Village is a transitional area where the Rideau River watershed and the South Nation watershed coincide. As such, there is a groundwater divide that exists to the southeast of the site and groundwater flow is expected to change to the east/southeast in the area. A Hydrogeology and Terrain Study were reviewed for this assessment and the shallow groundwater flow at the site is to the northwest while the deeper bedrock aquifer flows to the east/southeast.

Based on a review of the surficial geology map for the site area and borehole logs from a previous geotechnical and hydrogeological study at the site, the site is underlain by sand followed by silty clay. A thin layer of fill (consisting of topsoil overlying yellow brown sand and gravel) some 0.7 to 1.15 metres in thickness was encountered in two of the boreholes, identified as BH1 and BH4,

which were located in the southeast and centre east portions of the site. The other four boreholes encountered native sand overlying silty clay.

The adjacent properties consist of residential development along the south side of the site. These consist of single family dwellings, most of which have been developed prior to 1936. North of the site is a newer residential development, consisting of single family dwellings constructed sometime between 2011 and 2017. The lands to the east are undeveloped, with no evidence of previous development dating back to 1936. The lands to the west consist of a former Canadian Pacific railway, which was abandoned and purchased by the City. It is now in use as a multi-use recreational trail (Osgoode Link Pathway). Southeast of the site, there are two commercial properties that are noted: 5543 Osgoode Main Street is an operating automobile service garage (Jensen's garage) and 5566 Osgoode Main Street is a retail fuel outlet.

There are no underground services currently present at the subject site.

3.2 PAST INVESTIGATIONS

A Phase I ESA was conducted by Kollaard Associates Inc. for the site. The information provided in that report was used to support the preparation of the Phase II ESA for the site.

A Phase I ESA in accordance with Ontario Regulation 153/04 (O.Reg. 153/04) (as amended) was completed for the site by Kollaard Associates as described in the report entitled "*Phase I Environmental Site Assessment, 3200 Reids Lane, City of Ottawa, Ontario, Project 210064, dated October 19, 2022."*

A review of several previous environmental reports provided by the current property owner was carried out. The documents that were reviewed consist of the following:

- Phase I Environmental Site Assessment (Final), 3200 Reids Lane, Osgoode, ON, prepared by Dillon Consulting for the City of Ottawa, dated November 2016, File# 16-3971
- Letter entitled *3200 Reids Lane - Preliminary Debris Removal,* dated March 28, 2018, prepared by Dillon Consulting for the City of Ottawa

- Letter entitled *3200 Reids Lane – Subsurface Investigation,* dated March 28, 2018, prepared by Dillon Consulting for the City of Ottawa
- Letter entitled *3200 Reids Lane – Groundwater Monitoring,* dated September 12, 2018, prepared by Dillon Consulting for the City of Ottawa
- Memorandum prepared by Ministry of the Environment, Conservation and Parks, dated November 19, 2018 regarding Groundwater Monitoring at 3200 Reids Lane

Phase I Environmental Site Assessment (Final), 3200 Reids Lane, Osgoode, ON, prepared by Dillon Consulting for the City of Ottawa, dated November 2016, File# 16-3971

The following information was obtained from the above noted report:

- Actual source of contamination due to a former offsite Imperial Oil Fuel depot near the southwest corner of the site that was provided in a Phase II ESA conducted by AMEC in 2003 which resulted in minor soil and groundwater impacts. The report identified that while impacts had likely attenuated since the AMEC assessment, current conditions were unknown.
- Potential sources of contamination were identified due to fill material and debris piles across the site. The source and quantity of fill material and debris was unknown and may contain contaminants that exceed applicable standards.
- The following offsite potential sources of contamination of PHCs and/or VOCs were identified:

  - 5566 Osgoode Main St: retail fuel outlet that was currently operating and had been since 1987, located upgradient of site.

  - 5514 Osgoode Main St: former retail fuel outlet, vacant, with former USTs and a former garage, located upgradient of the site

  - 5543 Osgoode Main St: current automotive garage Jensen's Garage, upgradient of site

  - 5491 Osgoode Main St: historical motor vehicle repair shop, currently residential, also upgradient of site.

  - Onsite activities that have potential to impact the site are related to the construction debris on the site with potential for asbestos containing material and lead.

Letter entitled *3200 Reids Lane - Preliminary Debris Removal*, dated March 28, 2018, prepared by Dillon Consulting for the City of Ottawa

- This letter summarized the removal of select portions of debris that was removed in order to discourage additional illegal dumping on the site and improve the site aesthetic. The work was carried out by Tomlinson Environmental Services and supervised by Dillon Associates on November 29, 2017.
- The material removed from the site consisted of abandoned rubber tires, several piles of metal debris, abandoned furniture, a steel above ground fuel storage tank (AST), a fibreglass boat, metal and other items. All of the material was stockpiled and transported to the Springhill Landfill.

Letter entitled *3200 Reids Lane – Subsurface Investigation*, dated March 28, 2018, prepared by Dillon Consulting for the City of Ottawa

- The investigation was carried out to assess the soil and groundwater at select locations across the site. On November 30, 2017, three boreholes were advanced across the site in proximity to fill/debris areas and monitoring wells were installed in each of the boreholes.
- Four soil samples (and one duplicate sample) were laboratory tested for metals, benzene, toluene, ethylbenzene, xylene (BTEX), PHC F1-F4, PAHs and PCBs. The samples were obtained from shallow fill materials or from debris piles as follows: former location of abandoned fuel AST, eastern property boundary, large debris pile at north property boundary and one other fill area located in the south central part of the site.
- The soil results indicated that several PAH concentrations were exceeded at the location of soil sample SS1, lead and several PAH concentrations were exceeded at soil sample SS3, the arsenic concentration measured in the soil sample SS4. Other than these, all other parameter results were within the Table I (background) Standards. The highest contamination was encountered at SS1, which was located where a debris pile containing a fuel AST had been previously removed, and some PAH levels were about double the allowable limits. The report indicates that the soil impacts appear to be limited to shallow soil, though additional testing is recommended for soil characterization purposes.

- The groundwater flow direction in the local overburden aquifer was estimated to be to the north, using groundwater levels in the monitoring wells.
- Three groundwater monitoring wells that were installed by Dillon Consulting were also tested in addition to two monitoring wells previously installed on the subject property in the southwest portion of the site by AMEC (during their investigation of the offsite Imperial Oil fuel depot). All five wells were tested for the following parameters; metals, benzene, toluene, ethylbenzene, xylene (BTEX), PHC F1-F4, PAHs and PCBs. The groundwater samples met all the applicable standards in all wells except for vanadium concentrations in three of the five wells. The vanadium concentrations were slightly above the standard of 6.2 ug/L. Vanadium was not encountered in the shallow soil samples (at elevated levels) but is known to be associated with clays in Eastern Ontario and that had there been groundwater impact from debris and fill materials elevated concentrations of other parameters would be expected. The groundwater was considered to not be impacted from the debris and fill materials. An additional round of groundwater testing was recommended to confirm the results from the investigation.

Letter entitled *3200 Reids Lane – Groundwater Monitoring*, dated September 12, 2018, prepared by Dillon Consulting for the City of Ottawa

- On July 12, 2018, the three groundwater monitoring wells that were installed by Dillon Consulting were tested in addition to two monitoring wells previously installed on the subject property in the southwest portion of the site by AMEC (during their investigation of the offsite Imperial Oil fuel depot). All five wells were tested for the following parameters; metals, Volatile Organic Compounds (VOCs), PHC F1-F4, semi-volatiles (PAHs)
- The concentrations of the above noted parameters were all within the Table 2 Standards (O. Reg. 153/04 Table 2 Standards 2011, for potable groundwater)
- The report concluded that based on the second round of groundwater testing (subsequent to the previous testing that occurred in December 2017) that groundwater was not impacted from the fill and debris that were encountered in the shallow soils at the property.

The following area of potential environmental concern has been identified, based on known past activities at and near the subject site. The corresponding contaminants of potential concern (COPCs) are identified.

Table 1 - Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (on-site/off-site)	Contaminants of Concern (COC)	Media Potentially Impacted (groundwater soil, sediment)
APEC 1 – approximate fill footprint/former debris piles	-Centre, south portion	Item #30: Importation of Fill Material of Unknown Quality -dumping of solid waste onsite from 1987-2000 -former testing by Dillon indicates PAHs, lead and arsenic exceedances in soils underlying former debris piles	-on-site	-Metals, PAHs	-soils only -groundwater testing was carried out and there are no groundwater impacts (Dillon, 2016/2017)
APEC 2 – Property line encroachment by former fuel oil depot at 5491 Osgoode Main St		PCA Item # 28: Gasoline and Associated products Storage in Fixed Tanks	- off-site	- PHCs F1-F4	-soils only -groundwater testing was carried out and there are no groundwater impacts (AMEC, 2003 and Dillon, 2016/2017)

The information obtained from the review of the Phase I ESA report was used to develop the current Phase II ESA work program with respect to:

1) identifying the potentially contaminating activities and contaminants of concern associated with the historical use of the site

2) identifying the areas of potential environmental concern to be investigated

3) obtaining preliminary information regarding the subsurface conditions at the site (soil type, bedrock depth, depth to groundwater)
4) planning the locations and depths of the boreholes based on the APEC, PCA and the subsurface conditions
5) planning the soil sampling parameters and the parameters of concern to be analyzed.

4.0 SCOPE OF THE INVESTIGATION

4.1 OVERVIEW OF SITE INVESTIGATION

To achieve the objectives of the Phase II ESA, eight test pits were put down across the site, soil sampling and laboratory testing of select soil samples was carried out to check whether contaminants of potential concern (COPC) exceeded allowable limits in two areas of potential environmental concern (APEC) identified by the Phase I Environmental Site Assessment (ESA) carried out for the site by Kollaard Associates Inc. (KAI). The APECs include areas of fill placement onsite (APEC 1) and a portion of the site that shares a property boundary with a former bulk fuel depot (APEC 2). The COPCs are:

- Hydrocarbons (PHCs, BTEX), metals, PAHs.

The tasks completed for the Phase II ESA consisted of the following activities:

- Obtaining underground utility clearances and locates;
- The advancement of eight test pits for field investigation completed on November 7, 2022;
- The collection of 12 soil samples from six test pits within the fill area (APEC 1) tested for metals and PAHs;
- The collection of 4 soil samples from two test pits within the potential area impacted by hydrocarbons from offsite hydrocarbon source (APEC 2) tested for petroleum hydrocarbons (PHC F1-F4) and select VOCs (benzene, toluene, ethylbenzene and xylenes);
- Compare analytical results to full depth generic soil standards (Table 2 - Residential - potable);
- Subsequent to receipt of test results, obtain one additional sample from one location where PAH exceeded carried out on December 1, 2022;
- The preparation of a Phase II ESA report summarizing the results and findings of the investigation.

4.2 MEDIA INVESTIGATED

The Phase II ESA investigation was carried out to test soils for impacts from several COPCs.

4.3 PHASE ONE CONCEPTUAL SITE MODEL

The following describes the Phase I ESA Conceptual Site Model (CSM) based on the information obtained and reviewed as part of the Phase I ESA.

In order to determine which potentially contaminating activity within the Phase I study area that may have contributed to an APEC at the subject site, the following were considered.

Site and area topography and surface water drainage: The ground surface across the site is relatively flat lying with a gentle slope downwards from southeast to northwest.

Hydrogeology/Surficial and Bedrock Geology: Based on information from geotechnical and hydrogeological investigations, there is sand overlying silty clay followed by glacial till at the subject property and the water table is within 1-3 metres of the ground surface. Bedrock geology maps indicate that the bedrock underlying the site consists of dolostone and sandstone of the Beekmantown Group. The description of bedrock for three water supply wells at the subject property indicates that bedrock was encountered at about 15.8 metres and consisted of limestone, with some sandstone mix (interbedding at depth).

Contaminant distribution and transport: The hydraulic conductivity of the soils at the site and within the Phase I study area are low due to the presence of a silty clay deposit underlying the sandy surficial soils. The bedrock occurs about ~15 to 16 metres below the ground surface. Lateral groundwater flow is expected through the sandy soils which are saturated below 1-3 metres depth. However, downward (vertical) gradients would be slowed due to the presence of a continuous silty clay deposit throughout the site. Once saturated conditions are encountered and depending on contaminant mobility, solubility, volatility, etc. the contaminants could be expected to dissolve into the groundwater and migrate laterally in the direction of groundwater flow. In this case, the topographical information indicates that the groundwater flow gradient is towards the northwest.

Contaminants of Potential Concern

The Contaminants of Potential Concern (COPCs) identified in the Phase I ESA include PHCs, BTEX, PAHs and metals.

Existing Buildings and Structures

The site is currently a vacant property with no developed use. There are water supply wells and shallow monitoring wells that were installed at the site for studies pertaining to development approval.

Water Bodies

There are no surface water features located on or within the vicinity of the subject site.

Areas of Natural and Scientific Interest

Based on a review of the Land Information Ontario ANSI, there are no areas designated as Areas of Natural and Scientific Interest (ANSI) within at least 500 metres of the subject property.

Well Records

A search of the Ministry of the Environment, Conservation and Parks website for Water Well Record Mapping was completed as part of this assessment. Several wells are indicated to be constructed within 250 metres of the subject site. There are potable water wells at the property and within 250 metres of the subject site.

Neighbouring Land Use

The adjacent properties consist of residential development along the south side of the site. These consist of single family dwellings, most of which have been developed prior to 1936. North of the site is a newer residential development, consisting of single family dwellings constructed sometime between 2011 and 2017. The lands to the east are undeveloped, with no evidence of previous development dating back to 1936. The lands to the west consist of a former Canadian Pacific

railway, which was abandoned and purchased by the City. It is now in use as a multi-use recreational trail (Osgoode Link Pathway). Southeast of the site, there are two commercial properties that are noted: 5543 Osgoode Main Street is an operating automobile service garage (Jensen's garage) and 5566 Osgoode Main Street is a retail fuel outlet.

A previous Phase I and 2 ESA were prepared for the City of Ottawa by AMEC. Those reports were not provided for review for this report. They were reviewed by Dillon Consulting in the Phase I ESA that was prepared in 2016 and are summarized herein from that report. At that time, Dillon Consulting identified that a borehole and monitoring well installed on the southwest portion of the subject site had previously exceeded the applicable criteria for soil that was in place at that time (2003), which was the MOE Guideline for Use at Contaminated Sites in Ontario Table A. The soil sample had a concentration of 109 ug/g TPH and a duplicate sample had a concentration of 120 ug/g, which slightly exceeded the standard of 100 ug/g. An initial water sample from the monitoring well had a level of 600 ug/L TPH, compared to the allowable limit of 1000 ug/L. During a subsequent resampling by AMEC, the groundwater quality was within the allowable limit. The AMEC report concluded that the soil impacts were marginal and relatively immobile given the groundwater results, and that the soil impacts would naturally attenuate.

The Dillon Phase I ESA report suggested that the railway corridor is not expected to represent a potential source of contamination (based on their review of the AMEC reports) however, soil and groundwater impacts were present on the subject property due to a former Imperial Oil fuel depot. Dillon Consulting subsequently resampled the former AMEC monitoring wells on two occasions (December 19, 2017 and July 12, 2018) for metals, gasoline compounds (benzene, toluene, ethylbenzene and xylene), PHCs F1, 2, 3 and 4 and PAHs. There was no detectible presence of any of the above parameters, with the exception for metals that were present within the allowable standards for Table 2 O. Reg. 153/04. Based on this information, it is considered that there may be some soil impacts present from the former Imperial Oil fuel depot. However, there was no impact on groundwater from the former adjacent site. Additional soil testing at the location of the former AMEC well (MW03-1) is recommended to confirm whether any soil impacts remain from petroleum hydrocarbons which could include testing for PHC F1-F4, BTEX and PAHs.

Potentially Contaminating Activities

The following PCAs are identified to be present at the site based on historical activities at the site and on the adjacent properties.

The following PCAs ("Potentially Contaminating Activities", as identified in Table 2 of Schedule D of O. Reg. 153/04) were identified within the 250 metres Phase I ESA study area, along with information as to whether there is a corresponding APEC at the site from the activity.

Address / Occupant	Activity	Onsite/ Offsite	Distance from Subject Site	Potential Area of Concern on Subject Site (Y/N)?	Additional Comments
3200 Reids Lane / former City of Ottawa lands	PCA Item #30 Importation of Fill Materials of Unknown Quality	onsite	0 m	Y	-A previous Phase 2 ESA in 2017 encountered PAHs, arsenic and lead in shallow soil samples with no impacts to groundwater -some debris piles were observed during site visit in 2022
5491 Osgoode Main St / former Imperial Oil fuel depot / Reece Thomas automotive garage	PCA Item #27 and Item #28 Garages and Gasoline and Associated products Storage in Fixed Tanks	offsite	15 m S	Y	-A previous report by AMEC indicated some hydrocarbons in soil exceeded limits -groundwater testing results (Dillon 2016/2017) indicate no groundwater impact in two monitoring wells onsite adjacent to the former PCA -site is currently occupied by a single family dwelling
5543 Osgoode Main St / Jensen Garage	PCA Item #27 Garages	offsite	50 m E	N	-The site operates as an automotive garage -There are no records of any spills on the property, no registered USTs or any waste generation -There is no shared property line with the subject site (two other properties between the subject site and the garage). Any soil or groundwater impacts are expected to be localized and unlikely to extend to the subject site.
5566 Osgoode Main St / Drummond's Gas / A Raymond & Sons gas station	PCA Item # 28 Gasoline and Associated products Storage in Fixed Tanks	offsite	150 m E	N	-The site can be considered up gradient -No spills have been reported and USTs were removed and upgraded in 2019 with double walled fibreglass USTs -Given the distance between the site and the subject property, it is unlikely that contaminants would reach that far.
5514 Osgoode Main St	PCA Item # 28 Gasoline and Associated products Storage in Fixed Tanks	offsite	90 m SE	N	1990-2002-Licensed Retail Fuel Outlet with USTs, active in 2009, closed in 2012 with tanks removed by 2014 Service Stations-Gasoline, Oil & Natural Gas Current use appears to be storage of fuel delivery trucks and office (Francis Fuels)

The following area of potential environmental concern has been identified, based on known past activities at and near the subject site. The corresponding contaminants of potential concern (COPCs) are identified.

Table 1 - Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (on-site/off-site)	Contaminants of Concern (COC)	Media Potentially Impacted (groundwater soil, sediment)
APEC 1 – approximate fill footprint/former debris piles	-Centre, south portion	Item #30: Importation of Fill Material of Unknown Quality -dumping of solid waste onsite from 1987-2000 -former testing by Dillon indicates PAHs, lead and arsenic exceedances in soils underlying former debris piles	-on-site	-Metals, PAHs	-soils only -groundwater testing was carried out and there are no groundwater impacts (Dillon, 2016/2017)
APEC 2 – Property line encroachment by former fuel oil depot at 5491 Osgoode Main St		PCA Item # 28: Gasoline and Associated products Storage in Fixed Tanks	- off-site	- PHCs F1-F4	-soils only -groundwater testing was carried out and there are no groundwater impacts (AMEC, 2003 and Dillon, 2016/2017)

4.4 DEVIATIONS FROM SAMPLING AND ANALYSIS PLAN

There are no deviations from the original scope of work for the subject investigation.

4.5 IMPEDIMENTS

No impediments to the Phase II ESA soil investigation were encountered that prevented the completion of the original defined scope of the investigation.

5.0 INVESTIGATION METHOD

5.1 GENERAL

The following sections describe the field work activities and field methodology employed during the Phase II ESA conducted at the Phase II property by Kollaard Associates Inc.

On November 7, 2022, a test pit investigation was carried out at the site using a rubber tire backhoe supplied by the property owner.

Field methodology described below includes the soil sampling methodology used for test pits.

5.2 EXCAVATING

The field program for the Phase II ESA was carried out by putting down eight (8) test pits at the site on November 7, 2022. One test pit (TP3) was later deepened in order to obtain a native soil sample underlying the fill area.

5.3 SOIL SAMPLING

The soil sampling methodology used when transferring soil samples from test pits to sample jars is described as follows.

Following logging, any soil samples were collected manually using black nitrile gloves and transferred directly into laboratory-supplied and prepared sample jars and vials and immediately placed in coolers. The person handling samples exchanged gloves between each sampling interval and location in order to prevent cross-contamination.

The sample jars were filled completely with soil to reduce the amount of headspace vapour within the jars. All of the samples were placed in unpreserved clear glass jars with Teflon lids, while samples to be submitted to ALS Environmental Testing laboratory in Waterloo, Ontario for analysis of volatile compounds were collected using disposable soil plug sample collectors supplied by the laboratory. The soil plugs were placed in laboratory-supplied vials charged with measured volumes of methanol for sample preservation.

Description of Soils Based on Test Pits

The detailed Test Pit Logs are provided on the attached Record of Test Pit sheets. The following provides a general description of the soils encountered based on the field logs.

Four of the test pits were terminated within fill materials at depths of some 0.60 to 1.5 metres below existing ground surface. The other four test pits were terminated in native sand at depths of some 0.80 to 1.0 metres below existing ground surface. Test Pits 1 and 4, encountered fill consisting of sand, gravel, cobbles, with trace asphalt. Test pit 3 was observed to have some asphalt. A second site visit was carried out to deepen test pit 3 and obtain an additional soil sample for testing. . At that time, large asphalt pieces were encountered and increased with depth (as though asphalt pieces were deposited and then sandy fill was later deposited on top of the asphalt). Test pits 2, 5 and 6 encountered fill consisting of sand. Test pit 2 was terminated within sand fill at a depth of 1.5 metres. Test pits 5 and 6 encountered fill consisting of sand to depths of about 0.4 metres. Underlying the fill in these areas was a native topsoil layer overlying native sand. Test pits 5 and 6 were terminated at depths of 0.8 to 1.0 metres in the native sand.

Test pits 7 and 8 were put down in the southwest portion of the site. These test pits encountered surface debris and fill for the first 0.4 to 0.5 metres. Fill consisted of peaty topsoil wood, metal, plastic, foam, bricks. Underlying the fill native sand was encountered. These test pits were terminated in the native sand deposit at depths of 1.0 metres.

5.4 FIELD SCREENING MEASUREMENTS

The contaminants of concern (COCs) identified at the site were metals, PAHs and PHC F1-F4. All of these COCs are non volatile compounds. As such, no field screening equipment was used in sample selection. The COCs are largely associated with shallow fill on the site or in soil areas underlying solid waste which was easily identified using visual observations at the time of excavating.

5.5 SEDIMENT SAMPLING

No sediment was encountered and no sediment sampling was carried out for this investigation.

5.6 ANALYTICAL TESTING

Soil samples were submitted to ALS Environmental Laboratories Ltd. in Ottawa Depot located at 190 Colonnade Road South, Nepean, Ontario which accepts samples and ensures appropriate shipping when samples are transported to the analytical laboratory located in Waterloo, Ontario, for testing. ALS is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests within their scope of accreditation.

5.7 RESIDUE MANAGEMENT PROCEDURES

No residue management was required. Any test pits were immediately backfilled upon completion.

5.8 ELEVATION SURVEYING

No elevation surveying was carried out for the Phase 2 investigation.

5.9 QUALITY ASSURANCE AND QUALITY CONTROL MEASURES

Quality assurance and quality control measures were taken to ensure the integrity of the samples and the analytical testing, as follows:

- Samples were obtained using appropriately labelled and prepared containers supplied by a laboratory
- Soil samples were collected manually using black nitrile gloves and were placed in laboratory prepared glass jars and immediately placed in coolers.
- Soil samples for possible BTEX and PHC F1 analyses were collected using disposable plastic syringe plungers and soil was immediately place into 40 mL vials containing a known pre-weighed mass of methanol preservative and stored on ice, pending laboratory submission
- Detailed field records documenting the methods and circumstances of collection for each field sample were prepared at the time of sample collection. Each sample was assigned a unique sample identification number recorded in the field notes, along with the date and time of sample collection, the sample matrix, and the requested analyses.
- A chain of custody form was completed for the samples which documented the sample movement from collection and includes the sample conditions upon receipt at the laboratory, including temperature of container, hold times, etc.
- Quality control measures were taken in the laboratory by testing blanks and/or duplicates and/or laboratory control samples and/or spikes of one or more samples to verify all results
- All laboratory analyses was completed within Analysis Holding Times.

6.0 REVIEW AND EVALUATION

6.1 GEOLOGY

Surficial and Bedrock Geology

Based on a review of the surficial geology map for the site area and borehole logs from a previous geotechnical and hydrogeological study at the site, the site is underlain by sand followed by silty clay. Bedrock geology maps indicate that the bedrock underlying the site consists of dolostone and sandstone of the Beekmantown Group.

Based on the test pits put down at the site for the Phase 2 investigation, along with information from previous boreholes put down for a geotechnical investigation, the overburden at the site consists of fill in some areas of thicknesses of up to 1.5 metres, followed by sand. Boreholes at the site encountered silty clay layers underlying the sand at depths of between 1.0 to 3.9 metres overlying

glacial till at 6 to 7 metres, where encountered. One borehole encountered clay to a depth of 9.75 metres and was terminated at that depth. Water table was encountered at depths of about 1.0 to 1.8 metres below existing ground surface in the boreholes.

The geological unit that was investigated at the site consists of the uppermost soil layer, which is comprised of fill (in some cases) and native sand, with some thin layers of sandy to silty clay possible in some areas. The thickness of that geological unit (i.e. sand or fill/sand) was identified to be between 2.9 to 3.9 metres. Some of the boreholes encountered sandy clay or silty clay layers interspersed within the sand unit.

6.2 COARSE SOIL TEXTURE

The soils that were sampled at the site consisted mostly of fill materials containing sand, trace to some gravel, with some samples containing trace to some asphalt. One sample of the native sand underlying the fill was also obtained. Sieve analyses were carried out on several samples of the native soils. The native soil was observed to contain 50 percent or more by mass of particles that are greater than 75 µm in mean diameter. Thus, coarse soil texture as per O. Reg. 153/04 s. 42 is considered applicable for the Site. The fill samples were not tested. However, they were visually confirmed to consist of mostly sand.

6.5 SOIL: FIELD SCREENING

The contaminants of concern (COCs) identified at the site were metals, PAHs and PHC F1-F4. All of these COCs are non volatile compounds. As such, no field screening equipment was used in sample selection. The COCs are largely associated with shallow fill on the site or in soil areas underlying solid waste which was easily identified using visual observations at the time of excavating.

6.6 SOIL QUALITY

Soil Standards

A total of sixteen (16) samples obtained from the test pits were submitted for laboratory analysis. Twelve (12) samples were obtained from area of imported fill on the subject property and were tested for the COPCs associated with that APEC, including metals, PAHs. Four (4) soil samples

were obtained from the southwest portion of the site which is adjacent to a former offsite source of hydrocarbons. Those samples were tested for PHCs F1-F4 and select VOCs (benzene, toluene, ethylbenzene and xylene).

The locations of the samples are provided on the attached Figure 2. The cross sections (Figures 4 and 5) show the fill areas and underlying native soil and bedrock conditions at the site.

The test results are included as Attachment A. The results were compared to the MECP *Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act*: *Table 2,* dated April 15, 2011, generic site condition standards for residential/parkland/institutional property use in a potable groundwater condition, for coarse grained soils.

Results of Analytical Testing for Phase II Investigation

The soil samples that were obtained from the imported fill areas (TP1-TP6) on the site detected metals within the applicable MECP standards, for all samples. The same samples were tested for PAHs. All of the samples with the exception of two soil samples obtained from TP3 had non-detectible levels of PAHs. TP3 had higher levels of asphalt within the fill materials and of the two samples, several PAHs were present within the allowable limits. One sample TP3-2, contained two PAHs at levels that are greater than the allowable limits for benzo[a]pyrene and dibenz[a h]anthracene as shown in the Table below.

The soil samples that were obtained from the southwest portion of the site (TP7-TP8) were tested for Petroleum Hydrocarbons (PHCs F1-F4) and select VOCs (BTEX). The presence of PHC F3 and F4 was noted in one sample (TP8-1) at levels that were within the allowable limits. The other three samples had non-detectible levels of PHCs F1-F4 and BTEX.

Parameter	**153/04 Table 2 Standard (ug/g)**	**Location/Depth**
		TP3-2
		1.0 m -1.5 m
Benzo(a)pyrene	0.3	**0.986**
Dibenz(a,h)anthracene	0.1	**0.141**

A subsequent site visit was carried out to determine whether the soil impacts were present in the native soils underlying the fill area at TP3. The underlying soil sample was obtained from the same test pit location from a depth of about 1.60 metres. That sample had non-detectible levels of all PAHs.

Based on the information from all the samples obtained, it is considered that the soil at the site does is not impacted by PAHs. However, the presence of asphalt (especially at TP3) within the fill materials did cause one soil sample to exceed allowable limits for PAHs, due to the presence of asphalt within the soil matrix. That sample was noted to have contained asphalt pieces. During sample preparation, pieces of asphalt were crushed and formed part of the soil sample tested. It is considered that the asphalt within the soil sample caused the exceedance in this sample. There was non-detectible presence of PAHs in the underlying soil. There were no PAHs detected in any other soil sample. As such, it is considered that the source of the exceedance is from the buried asphalt pieces rather than the soil itself. The soil at TP3 was similar in colour and appearance to the soil in other test pits. The main difference was the presence and amount of asphalt that was observed within that location, compared to other test pits. Trace asphalt was observed at TP1 and TP4. Of the four soil samples obtained from those test pits, there were non-detectible levels of PAHs.

Excess Fill Materials

With regards to the soils investigation, the purpose of the Phase 2 ESA was to investigate the imported fill materials to determine whether there was any soil contamination resulting from the fill placement at the site. Based on the results of the recent soil testing, there is no issue with the fill materials, except for the area where the fill materials consist of asphalt.

The asphalt materials encountered within the fill materials at the site are not considered to be soil. Under the Excess Soil Regulations (O. Reg. 406/19), excess soil does not include processed material (such as wood, metal, bricks, asphalt or other construction debris). Soil containing these items is deemed waste and cannot be reused. However, the regulation also allows for the soil to be managed on site by various methods, that once processed, the excavated soil is not designated as waste. It is recommended that the asphalt be removed from the site by separating it from the soils and disposing or recycling the asphalt accordingly. The fill materials that are considered to be soil have been characterized and are acceptable for reuse on the site, once sorting has occurred to

separate the asphalt pieces. As such, it is considered that the appropriate reuse of fill materials can be addressed and managed through the Excess Soil Regulations.

6.7 GROUNDWATER QUALITY

Groundwater testing was not carried out as part of this investigation. Previous groundwater testing by other consultants (Dillon, 2017) confirms that the groundwater at the site is not impacted by any of the COCs including metals (with one exception, vanadium), gasoline compounds (Benzene, toluene, ethylbenzene and xylene), PHC F1-F4, PAHs and PCBs. The exception was that vanadium concentrations were slightly above the allowable limits of 6.2 ug/L. However, vanadium is naturally present in clay soils in the Ottawa area and there was no exceedance of vanadium in the surface soils (i.e. no contamination from vanadium present on site). There were sufficient wells placed in the APECs such that Kollaard Associates Inc. did not considered additional groundwater testing to be warranted.

6.8 SEDIMENT QUALITY

Sediment was not present at the Phase II property, therefore no sediment samples were collected or tested as part of this investigation.

6.9 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

All of the soil and groundwater samples that were obtained during the investigation were handled in accordance with industry accepted standards.

The Laboratory Certificates of Analyses indicate that holding times and CCME checklist items for petroleum hydrocarbon testing were within response limits and laboratory method blanks were utilized to provide quality assurance. The quality control measures were within acceptable limits.

6.10 PHASE II CONCEPTUAL SITE MODEL

The Phase I Conceptual Site Model (CSM), provided as Section 4.3, provides a description and assessment of areas where potentially contaminating activities (PCAs) have occurred, and areas of

potential environmental concern, as well as any subsurface structures or utilities that may affect contaminant distribution and transport. This Phase II CSM provides updated information based on the information provided in this report.

The following figures comprise the Phase II CSM, including:
Figure 1 – Key Plan
Figure 2 – CSM with Soil Sampling Locations and APECs

Site Description and Physical Setting

The subject site for this assessment consisted of a vacant property, located at civic address 3200 Reids Lane, City of Ottawa, Ontario, and also includes Reids Lane itself (no civic address). The location of the site has been identified on the attached Key Plan, Figure 1. The site has a total area of 3.5 hectares (8.7 acres).

The site is located in an area of residential development with some mixed residential and commercial uses along Osgoode Main Street south of the site. The site is in an undeveloped condition, consisting of a mixture of grassy open areas and some trees and bushes across the site. Former use of the site was for a farm and residential dwelling with all buildings demolished and removed from the site sometime between 1976 and 1991.

Topography and Drainage

The ground surface across the site and surrounding area is relatively flat lying with a gradual slope from the southeast to the northwest, which is consistent across the area. The shallow groundwater flow direction follows the topography at the site, which was determined through three shallow monitoring wells installed at the site as part of other investigations.

Environmentally Sensitive Areas

The site is not located within an area of natural significance and no areas of natural significance were identified within 30 metres of the site. The soils at the property do not have a pH value that is less than 5 or greater than 9 for surface soils or with less than 5 or greater than 11 for sub-surface soils. Based on the soil analytical results, the pH of soil at the site was measured to be 7.38 at a

depth of about 1.5 metres to 2.1 metres.. Thus, the Phase Two Property is not considered to be environmentally sensitive, as defined by O. Reg. 153/04 (as amended).

Shallow Soil Property

Bedrock was encountered at about 16 to 17 metres below ground surface in three drilled wells located on the subject site.. Accordingly, under O. Reg 153/04 as amended, the property is not considered a "shallow soil property".

Summary of Historical Site Use

The property has been used for residential and farming purposes since prior to 1976 and has been in an undeveloped state since prior to 1991. The property was owned by the Township of Osgoode which became the City of Ottawa (name change) since from 1990 untilt he current owner purchased the property in 2019. Based on previous environmental investigations, it is understood that former illegal dumping of waste materials occurred in several locations on the property that resulted in some shallow soil impacts in those locations. Most of the debris was removed while the City of Ottawa had ownership of the property. However, there is still some surficial debris scattered across portions of the site.

Subsurface Structures and Utilities

There are no underground utilities on the subject site.

Site Stratigraphy

Test pits were put down as part of the Phase II ESA investigation at the site. The following environmental related information was obtained as a result of this investigation. On November 7, 2022, eight test pits were put down at the site. Fill materials, some 0.4 to 1.5 metres in thickness were encountered at the test pits.

The following stratigraphic units were investigated during the Phase 2 soil investigation.

Fill (non-native topsoil, sand and gravel)

- Yellow brown sand, trace to some gravel
- Some test pits (TP1, TP3 and TP4) encountered yellow brown sand, trace to some gravel, trace to some asphalt
- Some test pits (TP7, TP8) encountered topsoil containing variably, trace plastic, metals, wood, styrofoam, brick

Native Topsoil

- TP3 and TP8 encountered a native topsoil layer underlying the fill

Sand

- TP3, TP5, TP6, TP7, TP8 encountered a deposit of grey fine to medium sand which was not fully penetrated

Approximate Depth to Bedrock

The limit of excavation for the Phase II investigation ranged from about at a depth between 1.0 to 1.8 metres below ground surface. No bedrock was encountered. Information from other sources (geotechnical boreholes and well records) indicate bedrock is at or below some 9 or more metres depth.

Approximate Depth to Water Table

Where encountered (TP3, TP7 and TP8), groundwater levels were found to range from 0.8 metres to 1.6 metres below the existing ground surface. The water table was encountered in the native sand layer.

Proposed Buildings and Other Structures

The property is to be redeveloped into a residential subdivision with single family dwellings.

Water Bodies

There are no surface water features located on or within the vicinity of the subject site. The closest surface water body is the Rideau River located approximately 2 kilometres northwest from the subject site.

Areas of Natural Significance and Scientific Interest

Based on a review of the Land Information Ontario ANSI, online mapping designated as Areas of Natural and Scientific Interest (ANSI) there are no ANSI within at least 500 metres of the subject property.

Well Records

Several wells records indicated to be for wells on the subject site pertain to the construction and abandonment of a series of four monitoring wells that were constructed in December 2017 and subsequently abandoned on January 9, 2019. These wells correspond to a previous environmental investigation that was carried out at the site (by others).

The remaining well records are for water supply wells. These wells are all located offsite in adjacent residential subdivisions to the north and west (Lombardy Drive and Taylor Way).

Three water supply wells were installed at the site in 2021 and observed at the time of the site visit. Additionally, there are three monitoring wells with metal pedestals that were also installed in 2021 as part of the development approvals for a future residential subdivision at the site. However, the well records review did not include them (database outdated).

The property and area are serviced by private water supply wells.

Neighbouring Land Uses

Surrounding land use is mostly residential development with some commercial uses within 250 metres of the site.

The buildings and other nearby properties were all observed to be serviced with natural gas and/or electricity.

Physical Hydrogeology

Groundwater Levels

Groundwater investigation was not carried out as part of this investigation so groundwater levels were not measured. Open test pits encountered groundwater in some areas of the site at depths between 0.9 and 1.8 metres.

Groundwater Flow Directions

Previous environmental investigations at the site as well as other recent studies include monitoring wells. Based on those previous investigations, the shallow groundwater flow direction is to the northwest.

Hydraulic Gradients

Hydraulic gradients were not established for this site as no groundwater investigation was carried out.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

The following PCAs are identified to be present at or near the site based on historical activities at the site and on the adjacent properties.

There is one PCA identified at the site based on historical filling and some evidence of illegal dumping at the site, which occurred sometime between 1987 and 2000. That activity is identified in Table 2 of Schedule D of O. Reg. 153/04 - Item #30 Importation of Fill Materials of Unknown Quality.

The following PCAs ("Potentially Contaminating Activities", as identified in Table 2 of Schedule D of O. Reg. 153/04) were identified within the 250 metres Phase I ESA study area, along with information as to whether there is a corresponding APEC at the site from the activity.

Address / Occupant	Activity	Onsite/ Offsite	Distance from Subject Site	Potential Area of Concern on Subject Site (Y/N)?	Additional Comments
3200 Reids Lane / former City of Ottawa lands	PCA Item #30 Importation of Fill Materials of Unknown Quality	onsite	0 m	Y	-A previous Phase 2 ESA in 2017 encountered PAHs, arsenic and lead in shallow soil samples with no impacts to groundwater -some debris piles were observed during site visit in 2022
5491 Osgoode Main St / former Imperial Oil fuel depot / Reece Thomas automotive garage	PCA Item #27 and Item #28 Garages and Gasoline and Associated products Storage in Fixed Tanks	offsite	15 m S	Y	-A previous report by AMEC indicated some hydrocarbons in soil exceeded limits -groundwater testing results (Dillon 2016/2017) indicate no groundwater impact in two monitoring wells onsite adjacent to the former PCA -site is currently occupied by a single family dwelling
5543 Osgoode Main St / Jensen Garage	PCA Item #27 Garages	offsite	50 m E	N	-The site operates as an automotive garage -There are no records of any spills on the property, no registered USTs or any waste generation -There is no shared property line with the subject site (two other properties between the subject site and the garage). Any soil or groundwater impacts are expected to be localized and unlikely to extend to the subject site.
5566 Osgoode Main St / Drummond's Gas / A Raymond & Sons gas station	PCA Item # 28 Gasoline and Associated products Storage in Fixed Tanks	offsite	150 m E	N	-The site can be considered up gradient -No spills have been reported and USTs were removed and upgraded in 2019 with double walled fibreglass USTs -Given the distance between the site and the subject property, it is unlikely that contaminants would reach that far.
5514 Osgoode Main St	PCA Item # 28 Gasoline and Associated products Storage in Fixed Tanks	offsite	90 m SE	N	1990-2002-Licensed Retail Fuel Outlet with USTs, active in 2009, closed in 2012 with tanks removed by 2014 Service Stations-Gasoline, Oil & Natural Gas Current use appears to be storage of fuel delivery trucks and office (Francis Fuels)

As part of the development application for the subject property, three on site water supply wells were drilled on the subject property and metals, hydrocarbons and VOCs were tested in those wells. There was no presence of any VOCs or hydrocarbons above the method reporting limit. Additionally, previous groundwater wells in the shallow overburden aquifer were constructed and tested by Dillon Consulting in 2016 and 2017. There were no impacts in those wells for gasoline compounds, hydrocarbons, PAHs or PCBs. As such, the majority of offsite uses are not considered to have caused and APEC on the subject site.

Due to the PCAs at the subject site, the following APECs have been identified, locations as shown in Figure 2:

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (on-site/off-site)	Contaminants of Concern (COC)	Media Potentially Impacted (groundwater soil, sediment)
APEC 1 – approximate fill footprint/former debris piles	-Centre, south portion	Item #30: Importation of Fill Material of Unknown Quality -dumping of solid waste onsite from 1987-2000 -former testing by Dillon indicates PAHs, lead and arsenic exceedances in soils underlying former debris piles	-on-site	-Metals, PAHs	-soils only -groundwater testing was carried out and there are no groundwater impacts (Dillon, 2016/2017)
APEC 2 – Property line encroachment by former fuel oil depot at 5491 Osgoode Main St	-southwest portion of the site	PCA Item # 28: Gasoline and Associated products Storage in Fixed Tanks	- off-site	- PHCs F1-F4	-soils only -groundwater testing was carried out and there are no groundwater impacts (AMEC, 2003 and Dillon, 2016/2017)

Contaminants of Potential Concern

The following Contaminants of Potential Concern (COPCs) were identified with respect to the Phase II Property:

- Petroleum Hydrocarbons F1, F2, F3 and F4
- Metals, PAHs

Distribution and Extent of Soil Impacts

APEC 1 is identified as fill materials identified in the centre and south portion of the site. Testing of the soil for metals, PAHs, indicates that the soil is not impacted with metals or PAHs. However, one sample (TP3-2) did exceed the allowable standard for two PAH analytes, benzo(a)pyrene and dibenz(a,h)anthracene. The source of the exceedance is the asphaltic concrete pieces that were present at that location. A soil sample obtained from the native sand underlying that location (TP3 obtained December 1, 2022) encountered no presence of PAHs, and the shallow soil sample (TP3-1) obtained from the same test pit had low levels of PAHs within allowable limits. All of the other test pits (TP1, TP2, TP4, TP5, TP6) had no presence of PAHs above method reporting limits of any PAHs. All samples had acceptable levels of metals.

The exceedance encountered in one sample (TP3-2) is due to the presence of asphalt in the soil sample rather than representative of the fill materials/soils present at the site. The asphalt can be characterized as solid waste that must be disposed of. No further soil investigation is warranted.

At APEC 2, two test pits were put down with a total of four soil samples obtained and tested for both PHC F1-F4 and select VOCs (benzene, toluene, ethylbenzene and xylene). There was a presence of PHC F3 and F4 within one sample (TP8-1). However, the levels encountered were within the allowable limits. A deeper sample obtained from the same test pit encountered no presence of any PHCs or BTEX compounds. A second test pit (TP7) encountered no presence of any PHCs or BTEX. The soil impacts are within allowable limits. No further assessment or soil characterization is considered necessary.

Meteorological and Climatic Considerations

It is considered that the soils at the site are of medium to low permeability. Where encountered in the test pits, water table depth was present at 0.8 to 1.6 metres below ground surface, which may fluctuate seasonally. The investigation was carried out in November, at a time whereby the water table is generally lower.

Potential exposure pathways and receptors

No contaminated soil was encountered at the site. However, the potential exposure pathways to PAHs include root uptake by plants, direct uptake by soil and volatilization. The exposure route is through ingestion of soil and/or plants or dermal contact with soil.

Excess Fill Materials

The asphalt materials encountered within the fill materials at the site are not considered to be soil. Under the Excess Soil Regulations (O. Reg. 406/19), excess soil does not include processed material (such as wood, metal, bricks, asphalt or other construction debris). Soil containing these items is deemed waste and cannot be reused. However, the regulation also allows for the soil to be managed on site by various methods, that once processed, the excavated soil is not designated as waste. It is recommended that the asphalt be removed from the site by separating it from the soils and disposing or recycling the asphalt accordingly. The fill materials that are considered to be soil have been characterized and are acceptable for reuse on the site, once sorting has occurred to separate the asphalt pieces. As such, it is considered that the appropriate reuse of fill materials can be addressed and managed through the Excess Soil Regulations and no further soil characterization is necessary.

8.0 CONCLUSIONS

This Phase II ESA was carried out at the Phase II property in general accordance with O. Reg 153/04 to address the APECs identified in the Kollaard Associates Phase One ESA completed for the site. The APECs are associated with the following PCAs that were identified for the Site: imported fill materials at the site including illegal disposal of solid waste as well as some documented soil impacts from an offsite former fuel depot/automotive garage. Previous soil and groundwater investigations at the site indicated that no groundwater impacts had occurred from these former PCAs at or near the site. However, some shallow soil impacts were identified. Upon further soil investigation of these two APECs, no soil impacts were encountered at the site. However, the presence of asphaltic concrete pieces within imported fill materials is not considered to be acceptable from an excess soil consideration and did cause some minor exceedances of PAHs in one sample where asphaltic concrete was present. The soils from the area where asphaltic concrete pieces were encountered should be screened and any non-soil materials should be separated and disposed of offsite in an appropriate manner at a waste disposal facility. This process is considered acceptable and should be carried out in accordance with the policies of the Excess Soil Regulations.

Based on the results of soil and groundwater sampling and testing carried out for this Phase II ESA, no further soil or groundwater investigation is warranted at this site.

<u>Disclaimer</u>

This letter was prepared for the exclusive use of Crestview Innovations Inc. and is based on data and information collected by Kollaard Associates Inc. This letter may not be relied upon by any other person or entity without the express written consent of Crestview Innovations Inc. and Kollaard Associates Inc. Any use of this letter by a third party is the responsibility of the third party. Kollaard Associates Inc. accepts no responsibility for damages, if any, sustained by any third party as a result of decisions made or action based on this letter. Kollaard Associates Inc. has relied in good faith on information provided by others. We accept no responsibility for any deficiencies, or inaccuracies in this letter as a result of omissions, misinterpretations, or fraudulent acts of others.

The material in this letter reflects Kollaard Associates Inc. best judgement in view of the scope of work, and information available at the time of preparation. Due to the nature of the investigation

and the limited data available, we cannot warrant against undiscovered environmental liabilities. If new information is discovered during future work, including excavations, borings or other studies, Kollaard Associates Inc. should be requested to re-evaluate the conclusions presented in this report and provide amendments as required.

We trust that this letter is sufficient for your present requirements. If you have any questions concerning this letter, please do not hesitate to contact our office.

Yours truly,
Kollaard Associates Inc.

Colleen Vermeersch, P. Eng.

9.0 REFERENCES

Topographic Map: NRCan Topographic Maps, Ottawa, Ontario, 31 G/5, Edition 11, published 1998, current as of 1994, scale 1:50,000.

Surficial Geology Map: Geological Survey of Canada, Surficial Geology, Ottawa, Ontario, Map 1506A, published 1982, scale 1:50,000.

Bedrock Geology Map: Geological Survey of Canada, Generalized Bedrock Geology, Ottawa-Hull, Ontario and Quebec, Map 1508A, published 1979, scale 1:125,000.

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

10.0 QUALIFICATIONS OF ASSESSORS

Colleen Vermeersch, P. Eng.

Colleen Vermeersch is a professional engineer with Kollaard Associates Inc. in Kemptville, Ontario. Colleen has been conducting Phase I ESAs in accordance with the CSA Standard and Environmental Protection Act for more than 14 years. Colleen has conducted many Phase I ESAs for commercial/residential clients over her career and several Phase II ESAs, some of which have involved clean up supervision. Colleen Vermeersch obtained a Bachelor of Engineering (Environmental) from Carleton University in 2007 and achieved a professional designation in 2013.

Colleen joined Kollaard Associates Inc. in 2007 and has worked on numerous environmental and hydrogeological projects since that time. Colleen is fully trained in carrying out and analyzing pumping tests, and field and lab based testing to determine soil and aquifer properties, such as hydraulic conductivity, transmissivity and groundwater flow directions/gradients, as these apply to contaminant transport and migration, coordinating and conducting environmental site assessments, environmental remediation, and storage tank assessment and removal.

William Kollaard, P.Eng. – Owner – Kollaard Associates Inc.

Mr. William Kollaard is the founding member of Kollaard Associates and is a professional engineer and principal consultant with more than 20 years of experience in the environmental consulting industry. Mr. Kollaard provides leadership, technical guidance to other project staff, senior review of deliverables and direct consulting to clients. His work experience has included: project management, conducting site and field work, business development, report and proposal writing and review. His duties also include providing technical and professional advice to various clients throughout the industry. Mr. Kollaard provides liaison between clients, other stakeholders, regulatory officials and legal counsel where required.

As principal, Mr. Kollaard actively participates in the direction and planning of the company, and has various active roles in mentorship, business development, protocols and procedures and quality control/quality assurance.

Kollaard Associates is an engineering consulting firm that provides a complete range of engineering services for developers, builders and homeowners in Eastern Ontario. Kollaard Associates specializes in providing civil, structural, geotechnical, hydrogeological and environmental services to our clients. Kollaard Associates Inc. has been established as a team of engineers and consultants since 2005. Mr. William Kollaard is responsible for the overall company development and management of the firm.

KEY PLAN

FIGURE 1

NOT TO SCALE

Kollaard Associates
Engineers

Project No. 210064

Date June 2022

DRAWING NUMBER:
FIGURE 2

LEGEND:

SUBJECT SITE

AREA OF POTENTIAL ENVIRONMENTAL CONCERN (APEC)

NOTE: THIS DRAWING TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCE: PLAN SUPPLIED BY CITY OF OTTAWA EMAPS

REV.	NAME	DATE	DESCRIPTION

Kollaard Associates Engineers
PO, BOX 189, 210 PRESCOTT ST
KEMPTVILLE ONTARIO
K0G 1J0 FAX (613) 258-0475
http://www.kollaard.ca
(613) 860-0923
info@kollaard.ca

CLIENT:
CRESTVIEW INNOVATIONS INC.

PROJECT:
PHASE II ENVIRONMENTAL SITE ASSESSMENT
CONCEPTUAL SITE MODEL

LOCATION:
3200 REIDS LANE
CITY OF OTTAWA, ONTARIO

DESIGNED BY:	*DATE:*
--	JANUARY 2023
DRAWN BY:	*SCALE:*
CV	AS SHOWN

KOLLAARD FILE NUMBER:
210064

ATTACHMENT A

SOIL LABORATORY TESTING RESULTS

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2221349**	Page	: 1 of 10
Client	: **Kollaard Associates Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Dean Tataryn	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 613 860 0923	Telephone	: 613 225 8279
Project	: 210064	Date Samples Received	: 10-Nov-2022 09:10
PO	: ----	Date Analysis Commenced	: 14-Nov-2022
C-O-C number	: ----	Issue Date	: 25-Nov-2022 08:36
Sampler	: ----		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 16		
No. of samples analysed	: 16		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Centralized Prep, Waterloo, Ontario
Andrea Armstrong	Department Manager - Air Quality and Volatiles	Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
TP3-2	Soil/Solid	benzo(a)pyrene		ON153/04	T2-RPI-C	0.986 mg/kg	0.3 mg/kg
	Soil/Solid	dibenz(a,h)anthracene		ON153/04	T2-RPI-C	0.141 mg/kg	0.1 mg/kg

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
mg/kg	milligrams per kilogram

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	*Description*
AI	*Analytical interferences may be present. Result may be biased high.*
DLHM	*Detection Limit Adjusted: Sample has high moisture content.*

Analytical Results Evaluation

Matrix: **Solid**

Analyte	CAS Number	Unit	Client sample ID	TP1-1	TP1-2	TP2-1	TP2-2	TP3-1	TP3-2	TP4-1
			Sampling date/time	07-Nov-2022 12:00	07-Nov-2022 12:15	07-Nov-2022 12:30	07-Nov-2022 12:30	07-Nov-2022 12:45	07-Nov-2022 12:45	07-Nov-2022 13:00
			Sub-Matrix	Solid	Solid	Solid	Solid	Solid	Solid	Solid
				WT2221349-001	WT2221349-002	WT2221349-003	WT2221349-004	WT2221349-005	WT2221349-006	WT2221349-007
Physical Tests										
moisture	----	%		5.47	5.72	4.83	4.88	9.39	5.67	4.39
Metals										
antimony	7440-36-0	mg/kg		<0.10	<0.10	<0.10	<0.10	0.15	0.41	<0.10
arsenic	7440-38-2	mg/kg		3.70	3.61	2.55	2.72	3.39	3.86	2.67
barium	7440-39-3	mg/kg		34.4	43.0	20.5	20.8	45.7	65.4	61.7
beryllium	7440-41-7	mg/kg		0.26	0.24	0.24	0.25	0.32	0.34	0.31
boron	7440-42-8	mg/kg		<5.0	<5.0	<5.0	<5.0	7.4	9.7	7.1
cadmium	7440-43-9	mg/kg		0.068	0.068	0.057	0.051	0.145	0.108	0.066
chromium	7440-47-3	mg/kg		9.66	9.61	9.25	8.97	13.5	14.6	13.9
cobalt	7440-48-4	mg/kg		4.30	4.40	3.21	3.43	4.79	6.84	4.65
copper	7440-50-8	mg/kg		7.83	6.72	5.67	5.95	13.0	15.1	7.39
lead	7439-92-1	mg/kg		22.6	20.5	14.9	12.0	44.0	40.9	11.1
molybdenum	7439-98-7	mg/kg		0.97	1.10	0.49	0.51	0.83	1.18	0.45
nickel	7440-02-0	mg/kg		8.30	8.15	6.07	6.38	9.47	12.1	8.62
selenium	7782-49-2	mg/kg		<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
silver	7440-22-4	mg/kg		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
thallium	7440-28-0	mg/kg		0.103	0.113	0.061	0.061	0.120	0.159	0.086
uranium	7440-61-1	mg/kg		0.606	0.604	0.694	0.699	0.577	0.675	0.603
vanadium	7440-62-2	mg/kg		19.9	19.8	20.8	19.8	29.9	30.6	32.1
zinc	7440-66-6	mg/kg		20.2	18.5	16.9	16.9	46.9	37.6	22.8
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
acenaphthylene	208-96-8	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	0.112	<0.050
anthracene	120-12-7	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
benz(a)anthracene	56-55-3	mg/kg		<0.050	<0.050	<0.050	<0.050	0.147	0.411	<0.050
benzo(a)pyrene	50-32-8	mg/kg		<0.050	<0.050	<0.050	<0.050	0.219	0.986	<0.050
benzo(b+j)fluoranthene	n/a	mg/kg		<0.050	<0.050	<0.050	<0.050	0.259	0.520	<0.050

Analytical Results Evaluation

Matrix: **Solid**

Analyte	CAS Number	Unit	Client sample ID	TP1-1	TP1-2	TP2-1	TP2-2	TP3-1	TP3-2	TP4-1
			Sampling date/time	07-Nov-2022 12:00	07-Nov-2022 12:15	07-Nov-2022 12:30	07-Nov-2022 12:30	07-Nov-2022 12:45	07-Nov-2022 12:45	07-Nov-2022 13:00
			Sub-Matrix	Solid	Solid	Solid	Solid	Solid	Solid	Solid
				WT2221349-001	WT2221349-002	WT2221349-003	WT2221349-004	WT2221349-005	WT2221349-006	WT2221349-007
Polycyclic Aromatic Hydrocarbons										
benzo(g,h,i)perylene	191-24-2	mg/kg		<0.050	<0.050	<0.050	<0.050	0.131	1.20	<0.050
benzo(k)fluoranthene	207-08-9	mg/kg		<0.050	<0.050	<0.050	<0.050	0.097	0.175	<0.050
chrysene	218-01-9	mg/kg		<0.050	<0.050	<0.050	<0.050	0.174	0.582 AI	<0.050
dibenz(a,h)anthracene	53-70-3	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	0.141	<0.050
fluoranthene	206-44-0	mg/kg		<0.050	<0.050	<0.050	<0.050	0.181	0.506	<0.050
fluorene	86-73-7	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg		<0.050	<0.050	<0.050	<0.050	0.125	0.367	<0.050
methylnaphthalene, 1-	90-12-0	mg/kg		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
methylnaphthalene, 1+2-	----	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
methylnaphthalene, 2-	91-57-6	mg/kg		<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
naphthalene	91-20-3	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
phenanthrene	85-01-8	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	0.142	<0.050
pyrene	129-00-0	mg/kg		<0.050	<0.050	<0.050	<0.050	0.186	0.609	<0.050
Polycyclic Aromatic Hydrocarbons Surrogates										
fluorobiphenyl, 2-	321-60-8	%		94.0	90.7	94.3	89.4	88.7	96.5	102
terphenyl-d14, p-	1718-51-0	%		92.6	91.3	94.0	89.8	90.4	104	105

Analytical Results Evaluation

Matrix: **Solid**

Analyte	CAS Number	Unit	Client sample ID	TP4-2	TP5-1	TP5-2	TP6-1	TP6-2	TP7-1	TP7-2
			Sampling date/time	07-Nov-2022 13:00	07-Nov-2022 13:15	07-Nov-2022 14:00	07-Nov-2022 14:00	07-Nov-2022 14:30	07-Nov-2022 14:00	07-Nov-2022 14:15
			Sub-Matrix	Solid	Solid	Solid	Solid	Solid	Solid	Solid
				WT2221349-008	WT2221349-009	WT2221349-010	WT2221349-011	WT2221349-012	WT2221349-013	WT2221349-014
Physical Tests										
moisture	----	%		4.23	17.2	6.79	6.15	12.9	22.2	16.5
Metals										
antimony	7440-36-0	mg/kg		<0.10	0.46	<0.10	<0.10	<0.10	----	----
arsenic	7440-38-2	mg/kg		2.04	8.38	1.89	1.48	1.12	----	----
barium	7440-39-3	mg/kg		25.8	130	38.3	28.6	16.2	----	----
beryllium	7440-41-7	mg/kg		0.23	0.57	0.36	0.17	0.19	----	----
boron	7440-42-8	mg/kg		<5.0	5.8	<5.0	<5.0	<5.0	----	----
cadmium	7440-43-9	mg/kg		0.069	0.659	0.090	0.088	0.037	----	----
chromium	7440-47-3	mg/kg		8.33	20.9	11.8	10.6	10.1	----	----
cobalt	7440-48-4	mg/kg		2.89	7.57	4.04	2.24	2.07	----	----
copper	7440-50-8	mg/kg		5.64	9.02	2.77	1.64	3.40	----	----
lead	7439-92-1	mg/kg		18.9	57.5	6.75	5.86	3.94	----	----
molybdenum	7439-98-7	mg/kg		0.37	0.99	0.28	0.26	0.20	----	----
nickel	7440-02-0	mg/kg		5.29	8.78	7.92	4.21	4.72	----	----
selenium	7782-49-2	mg/kg		<0.20	0.56	<0.20	<0.20	<0.20	----	----
silver	7440-22-4	mg/kg		<0.10	0.11	<0.10	<0.10	<0.10	----	----
thallium	7440-28-0	mg/kg		<0.050	0.136	<0.050	<0.050	<0.050	----	----
uranium	7440-61-1	mg/kg		0.493	0.847	0.618	0.556	0.799	----	----
vanadium	7440-62-2	mg/kg		17.7	43.1	23.2	20.6	16.6	----	----
zinc	7440-66-6	mg/kg		19.7	105	21.6	31.4	16.1	----	----
Volatile Organic Compounds										
benzene	71-43-2	mg/kg		----	----	----	----	----	<0.0050	<0.0050
ethylbenzene	100-41-4	mg/kg		----	----	----	----	----	<0.015	<0.015
toluene	108-88-3	mg/kg		----	----	----	----	----	<0.050	<0.050
xylene, m+p-	179601-23-1	mg/kg		----	----	----	----	----	<0.030	<0.030
xylene, o-	95-47-6	mg/kg		----	----	----	----	----	<0.030	<0.030
xylenes, total	1330-20-7	mg/kg		----	----	----	----	----	<0.050	<0.050
BTEX, total	----	mg/kg		----	----	----	----	----	<0.10	<0.10
Hydrocarbons										

Analytical Results Evaluation

Matrix: **Solid**

Analyte	CAS Number	Unit	Client sample ID	TP4-2	TP5-1	TP5-2	TP6-1	TP6-2	TP7-1	TP7-2
			Sampling date/time	07-Nov-2022 13:00	07-Nov-2022 13:15	07-Nov-2022 14:00	07-Nov-2022 14:00	07-Nov-2022 14:30	07-Nov-2022 14:00	07-Nov-2022 14:15
			Sub-Matrix	Solid	Solid	Solid	Solid	Solid	Solid	Solid
				WT2221349-008	WT2221349-009	WT2221349-010	WT2221349-011	WT2221349-012	WT2221349-013	WT2221349-014
Hydrocarbons										
F1 (C6-C10)	----	mg/kg		----	----	----	----	----	<5.0	<5.0
F2 (C10-C16)	----	mg/kg		----	----	----	----	----	<10	<10
F3 (C16-C34)	----	mg/kg		----	----	----	----	----	<50	<50
F4 (C34-C50)	----	mg/kg		----	----	----	----	----	<50	<50
F1-BTEX	----	mg/kg		----	----	----	----	----	<5.0	<5.0
hydrocarbons, total (C6-C50)	----	mg/kg		----	----	----	----	----	<80	<80
chromatogram to baseline at nC50	n/a	-		----	----	----	----	----	YES	YES
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	%		----	----	----	----	----	75.0	74.3
dichlorotoluene, 3,4-	97-75-0	%		----	----	----	----	----	95.3	105
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	%		----	----	----	----	----	96.4	105
difluorobenzene, 1,4-	540-36-3	%		----	----	----	----	----	106	116
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
acenaphthylene	208-96-8	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
anthracene	120-12-7	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
benz(a)anthracene	56-55-3	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
benzo(a)pyrene	50-32-8	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
benzo(b+j)fluoranthene	n/a	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
benzo(g,h,i)perylene	191-24-2	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
benzo(k)fluoranthene	207-08-9	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
chrysene	218-01-9	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
dibenz(a,h)anthracene	53-70-3	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
fluoranthene	206-44-0	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
fluorene	86-73-7	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
methylnaphthalene, 1-	90-12-0	mg/kg		<0.030	<0.030	<0.030	<0.030	<0.030	----	----
methylnaphthalene, 1+2-	----	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----

Analytical Results Evaluation

Matrix: **Solid**

Analyte	CAS Number	Unit	Client sample ID	TP4-2	TP5-1	TP5-2	TP6-1	TP6-2	TP7-1	TP7-2
			Sampling date/time	07-Nov-2022 13:00	07-Nov-2022 13:15	07-Nov-2022 14:00	07-Nov-2022 14:00	07-Nov-2022 14:30	07-Nov-2022 14:00	07-Nov-2022 14:15
			Sub-Matrix	Solid	Solid	Solid	Solid	Solid	Solid	Solid
				WT2221349-008	WT2221349-009	WT2221349-010	WT2221349-011	WT2221349-012	WT2221349-013	WT2221349-014
Polycyclic Aromatic Hydrocarbons										
methylnaphthalene, 2-	91-57-6	mg/kg		<0.030	<0.030	<0.030	<0.030	<0.030	----	----
naphthalene	91-20-3	mg/kg		<0.010	<0.010	<0.010	<0.010	<0.010	----	----
phenanthrene	85-01-8	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
pyrene	129-00-0	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
fluorobiphenyl, 2-	321-60-8	%		99.6	94.3	103	103	90.3	----	----
terphenyl-d14, p-	1718-51-0	%		103	98.9	105	105	89.7	----	----

Analytical Results Evaluation

Matrix: **Solid**

Analyte	CAS Number	Unit	Client sample ID: TP8-1	TP8-2	----	----	----	----	----
		Sampling date/time	07-Nov-2022 15:00	07-Nov-2022 15:00	----	----	----	----	----
		Sub-Matrix	Solid	Solid	----	----	----	----	----
			WT2221349-015	WT2221349-016	--------	--------	--------	--------	--------
Physical Tests									
moisture	----	%	61.3	20.1	----	----	----	----	----
Volatile Organic Compounds									
benzene	71-43-2	mg/kg	<0.0058 DLHM	<0.0050	----	----	----	----	----
ethylbenzene	100-41-4	mg/kg	<0.015	<0.015	----	----	----	----	----
toluene	108-88-3	mg/kg	<0.050	<0.050	----	----	----	----	----
xylene, m+p-	179601-23-1	mg/kg	<0.030	<0.030	----	----	----	----	----
xylene, o-	95-47-6	mg/kg	<0.030	<0.030	----	----	----	----	----
xylenes, total	1330-20-7	mg/kg	<0.050	<0.050	----	----	----	----	----
BTEX, total	----	mg/kg	<0.10	<0.10	----	----	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	mg/kg	<5.0	<5.0	----	----	----	----	----
F2 (C10-C16)	----	mg/kg	<12	<10	----	----	----	----	----
F3 (C16-C34)	----	mg/kg	102	<50	----	----	----	----	----
F4 (C34-C50)	----	mg/kg	130	<50	----	----	----	----	----
F1-BTEX	----	mg/kg	<5.0	<5.0	----	----	----	----	----
hydrocarbons, total (C6-C50)	----	mg/kg	232	<80	----	----	----	----	----
chromatogram to baseline at nC50	n/a	-	YES	YES	----	----	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	%	68.6	73.0	----	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	%	68.2	96.8	----	----	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	%	75.5	97.2	----	----	----	----	----
difluorobenzene, 1,4-	540-36-3	%	88.7	106	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	ON153/04 T2-RPI-C
Physical Tests			
moisture	----	%	
Metals			
antimony	7440-36-0	mg/kg	**7.5 mg/kg**
arsenic	7440-38-2	mg/kg	**18 mg/kg**
barium	7440-39-3	mg/kg	**390 mg/kg**
beryllium	7440-41-7	mg/kg	**4 mg/kg**
boron	7440-42-8	mg/kg	**120 mg/kg**
cadmium	7440-43-9	mg/kg	**1.2 mg/kg**
chromium	7440-47-3	mg/kg	**160 mg/kg**
cobalt	7440-48-4	mg/kg	**22 mg/kg**
copper	7440-50-8	mg/kg	**140 mg/kg**
lead	7439-92-1	mg/kg	**120 mg/kg**
molybdenum	7439-98-7	mg/kg	**6.9 mg/kg**
nickel	7440-02-0	mg/kg	**100 mg/kg**
selenium	7782-49-2	mg/kg	**2.4 mg/kg**
silver	7440-22-4	mg/kg	**20 mg/kg**
thallium	7440-28-0	mg/kg	**1 mg/kg**
uranium	7440-61-1	mg/kg	**23 mg/kg**
vanadium	7440-62-2	mg/kg	**86 mg/kg**
zinc	7440-66-6	mg/kg	**340 mg/kg**
Volatile Organic Compounds			
benzene	71-43-2	mg/kg	**0.21 mg/kg**
BTEX, total	----	mg/kg	
ethylbenzene	100-41-4	mg/kg	**1.1 mg/kg**
toluene	108-88-3	mg/kg	**2.3 mg/kg**
xylene, m+p-	179601-23-1	mg/kg	
xylene, o-	95-47-6	mg/kg	
xylenes, total	1330-20-7	mg/kg	**3.1 mg/kg**
Hydrocarbons			
chromatogram to baseline at nC50	n/a	-	
F1 (C6-C10)	----	mg/kg	**55 mg/kg**
F1-BTEX	----	mg/kg	**55 mg/kg**
F2 (C10-C16)	----	mg/kg	**98 mg/kg**
F3 (C16-C34)	----	mg/kg	**300 mg/kg**
F4 (C34-C50)	----	mg/kg	**2800 mg/kg**
hydrocarbons, total (C6-C50)	----	mg/kg	
Polycyclic Aromatic Hydrocarbons			

Analyte	CAS Number	Unit	ON153/04 T2-RPI-C						
Polycyclic Aromatic Hydrocarbons - Continued									
acenaphthene	83-32-9	mg/kg	**7.9 mg/kg**						
acenaphthylene	208-96-8	mg/kg	**0.15 mg/kg**						
anthracene	120-12-7	mg/kg	**0.67 mg/kg**						
benz(a)anthracene	56-55-3	mg/kg	**0.5 mg/kg**						
benzo(a)pyrene	50-32-8	mg/kg	**0.3 mg/kg**						
benzo(b+j)fluoranthene	n/a	mg/kg	**0.78 mg/kg**						
benzo(g,h,i)perylene	191-24-2	mg/kg	**6.6 mg/kg**						
benzo(k)fluoranthene	207-08-9	mg/kg	**0.78 mg/kg**						
chrysene	218-01-9	mg/kg	**7 mg/kg**						
dibenz(a,h)anthracene	53-70-3	mg/kg	**0.1 mg/kg**						
fluoranthene	206-44-0	mg/kg	**0.69 mg/kg**						
fluorene	86-73-7	mg/kg	**62 mg/kg**						
indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.38 mg/kg**						
methylnaphthalene, 1+2-	----	mg/kg	**0.99 mg/kg**						
methylnaphthalene, 1-	90-12-0	mg/kg	**0.99 mg/kg**						
methylnaphthalene, 2-	91-57-6	mg/kg	**0.99 mg/kg**						
naphthalene	91-20-3	mg/kg	**0.6 mg/kg**						
phenanthrene	85-01-8	mg/kg	**6.2 mg/kg**						
pyrene	129-00-0	mg/kg	**78 mg/kg**						

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

ON153/04 Ontario Regulation 153/04 - April 15, 2011 Standards (JUL, 2011)

T2-RPI-C 153 T2-Soil-Res/Park/Inst. Property Use (Coarse)

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2221349**	Page	: 1 of 12
Client	: **Kollaard Associates Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Dean Tataryn	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 613 860 0923	Telephone	: 613 225 8279
Project	: 210064	Date Samples Received	: 10-Nov-2022 09:10
PO	: ----	Issue Date	: 25-Nov-2022 08:36
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 16		
No. of samples analysed	: 16		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP] TP7-1	E581.F1	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP] TP7-2	E581.F1	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP] TP8-1	E581.F1	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP] TP8-2	E581.F1	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap TP7-1	E601.SG-L	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	23-Nov-2022	40 days	9 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap TP7-2	E601.SG-L	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	23-Nov-2022	40 days	9 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap TP8-1	E601.SG-L	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	23-Nov-2022	40 days	9 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap TP8-2	E601.SG-L	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	23-Nov-2022	40 days	9 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP1-1	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP1-2	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP2-1	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP2-2	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP3-1	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP3-2	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP4-1	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP4-2	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP5-1	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP5-2	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP6-1	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap TP6-2	E440	07-Nov-2022	23-Nov-2022	----	----		23-Nov-2022	180 days	16 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP1-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP1-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP2-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP2-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP3-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP3-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP4-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP4-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP5-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP5-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP6-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP6-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP7-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP7-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP8-1	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap TP8-2	E144	07-Nov-2022	----	----	----		14-Nov-2022	----	----	
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP5-1	E642F	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP5-2	E642F	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP6-1	E642F	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP6-2	E642F	07-Nov-2022	15-Nov-2022	14 days	7 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP1-1	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP1-2	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap TP2-1	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap										
TP2-2	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap										
TP3-1	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap										
TP3-2	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap										
TP4-1	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by MeOH:Tol GC-MS										
Glass soil jar/Teflon lined cap										
TP4-2	E642F	07-Nov-2022	15-Nov-2022	14 days	8 days	✓	16-Nov-2022	40 days	2 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
TP7-1	E611A	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
TP7-2	E611A	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
TP8-1	E611A	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
TP8-2	E611A	07-Nov-2022	14-Nov-2022	14 days	7 days	✓	15-Nov-2022	40 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	742954	1	14	7.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	742955	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	742878	1	19	5.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	741332	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	742880	1	20	5.0	5.0	✓
PAHs by MeOH:Tol GC-MS	E642F	742877	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
BTEX by Headspace GC-MS	E611A	742954	1	14	7.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	742955	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	742878	1	19	5.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	741332	2	20	10.0	10.0	✓
Moisture Content by Gravimetry	E144	742880	1	20	5.0	5.0	✓
PAHs by MeOH:Tol GC-MS	E642F	742877	1	12	8.3	5.0	✓
Method Blanks (MB)							
BTEX by Headspace GC-MS	E611A	742954	1	14	7.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	742955	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	742878	1	19	5.2	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	741332	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	742880	1	20	5.0	5.0	✓
PAHs by MeOH:Tol GC-MS	E642F	742877	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	742954	1	14	7.1	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	742955	1	20	5.0	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	742878	1	19	5.2	5.0	✓
PAHs by MeOH:Tol GC-MS	E642F	742877	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Waterloo - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Sample extracts are subjected to in-situ silica gel treatment prior to analysis by GC-FID for CCME hydrocarbon fractions (F2-F4).
BTEX by Headspace GC-MS	E611A Waterloo - Environmental	Soil/Solid	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by MeOH:Tol GC-MS	E642F Waterloo - Environmental	Soil/Solid	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are extracted with methanol/toluene and analyzed by GC-MS. If reported, IACR (index of additive cancer risk, unitless) and B(a)P toxic potency equivalent (in soil concentration units) are calculated as per CCME PAH Soil Quality Guidelines fact sheet (2010) or ABT1.
F1-BTEX	EC580 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
Sum F1 to F4 (C6-C50)	EC581 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fractions F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50). F4G-sg is not used within this calculation due to overlap with other fractions.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 Waterloo - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl. This method is intended to liberate metals that may be environmentally available.
VOCs Methanol Extraction for Headspace Analysis	EP581 Waterloo - Environmental	Soil/Solid	EPA 5035A (mod)	VOCs in samples are extracted with methanol. Extracts are then prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.
Pesticides, PCB, PAH, and Neutral Extractable Chlorinated Hydrocarbons Extraction (High Level)	EP660-H Waterloo - Environmental	Soil/Solid	EPA 3570 (mod)	A homogenized subsample is extracted with organic solvents using a mechanical shaker.

QUALITY CONTROL REPORT

Work Order	: **WT2221349**	Page	: 1 of 10
Client	: Kollaard Associates Inc.	Laboratory	: Waterloo - Environmental
Contact	: Dean Tataryn	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: 613 225 8279
Project	: 210064	Date Samples Received	: 10-Nov-2022 09:10
PO	: ----	Date Analysis Commenced	: 14-Nov-2022
C-O-C number	: ----	Issue Date	: 25-Nov-2022 08:36
Sampler	: ---- 613 860 0923		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 16		
No. of samples analysed	: 16		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Centralized Prep, Waterloo, Ontario
Andrea Armstrong	Department Manager - Air Quality and Volatiles	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 742880)											
WT2221349-001	TP1-1	moisture	----	E144	0.25	%	5.47	5.45	0.316%	20%	----
Metals (QC Lot: 741332)											
WT2221344-001	Anonymous	antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	1.71	1.66	2.82%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	118	110	6.31%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.54	0.51	0.04	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.186	0.173	7.63%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	33.0	32.4	1.64%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	8.38	8.23	1.84%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	9.63	9.62	0.104%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	7.69	7.28	5.48%	40%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.39	0.38	0.02	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	15.7	15.5	1.03%	30%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.27	0.008	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.115	0.114	0.002	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.816	0.790	3.26%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	46.6	45.9	1.59%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	54.6	53.2	2.51%	30%	----
Volatile Organic Compounds (QC Lot: 742954)											
WT2221470-007	Anonymous	benzene	71-43-2	E611A	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	<0.015	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 742878)											
WT2221349-013	TP7-1	F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	<10	0	Diff <2x LOR	----
		F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	54	4	Diff <2x LOR	----
		F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	72	22	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Hydrocarbons (QC Lot: 742955)											
WT2221470-007	Anonymous	F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
Polycyclic Aromatic Hydrocarbons (QC Lot: 742877)											
WT2221349-001	TP1-1	acenaphthene	83-32-9	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		acenaphthylene	208-96-8	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		anthracene	120-12-7	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benz(a)anthracene	56-55-3	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(a)pyrene	50-32-8	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(b+j)fluoranthene	n/a	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(g,h,i)perylene	191-24-2	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(k)fluoranthene	207-08-9	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		chrysene	218-01-9	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		dibenz(a,h)anthracene	53-70-3	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		fluoranthene	206-44-0	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		fluorene	86-73-7	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		indeno(1,2,3-c,d)pyrene	193-39-5	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		methylnaphthalene, 1-	90-12-0	E642F	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		methylnaphthalene, 2-	91-57-6	E642F	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		naphthalene	91-20-3	E642F	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		phenanthrene	85-01-8	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		pyrene	129-00-0	E642F	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 742880)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 741332)						
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Volatile Organic Compounds (QCLot: 742954)						
benzene	71-43-2	E611A	0.005	mg/kg	<0.0050	----
ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	----
toluene	108-88-3	E611A	0.05	mg/kg	<0.050	----
xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	<0.030	----
xylene, o-	95-47-6	E611A	0.03	mg/kg	<0.030	----
Hydrocarbons (QCLot: 742878)						
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	----
Hydrocarbons (QCLot: 742955)						
F1 (C6-C10)	----	E581.F1	5	mg/kg	<5.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 742877)						
acenaphthene	83-32-9	E642F	0.05	mg/kg	<0.050	----
acenaphthylene	208-96-8	E642F	0.05	mg/kg	<0.050	----
anthracene	120-12-7	E642F	0.05	mg/kg	<0.050	----
benz(a)anthracene	56-55-3	E642F	0.05	mg/kg	<0.050	----
benzo(a)pyrene	50-32-8	E642F	0.05	mg/kg	<0.050	----
benzo(b+j)fluoranthene	n/a	E642F	0.05	mg/kg	<0.050	----
benzo(g,h,i)perylene	191-24-2	E642F	0.05	mg/kg	<0.050	----
benzo(k)fluoranthene	207-08-9	E642F	0.05	mg/kg	<0.050	----
chrysene	218-01-9	E642F	0.05	mg/kg	<0.050	----
dibenz(a,h)anthracene	53-70-3	E642F	0.05	mg/kg	<0.050	----
fluoranthene	206-44-0	E642F	0.05	mg/kg	<0.050	----
fluorene	86-73-7	E642F	0.05	mg/kg	<0.050	----
indeno(1,2,3-c,d)pyrene	193-39-5	E642F	0.05	mg/kg	<0.050	----
methylnaphthalene, 1-	90-12-0	E642F	0.03	mg/kg	<0.030	----
methylnaphthalene, 2-	91-57-6	E642F	0.03	mg/kg	<0.030	----
naphthalene	91-20-3	E642F	0.01	mg/kg	<0.010	----
phenanthrene	85-01-8	E642F	0.05	mg/kg	<0.050	----
pyrene	129-00-0	E642F	0.05	mg/kg	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 742880)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 741332)									
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	104	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	102	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	96.0	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	110	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
Volatile Organic Compounds (QCLot: 742954)									
benzene	71-43-2	E611A	0.005	mg/kg	3.475 mg/kg	100.0	70.0	130	----
ethylbenzene	100-41-4	E611A	0.015	mg/kg	3.475 mg/kg	99.0	70.0	130	----
toluene	108-88-3	E611A	0.05	mg/kg	3.475 mg/kg	98.1	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	6.95 mg/kg	96.9	70.0	130	----
xylene, o-	95-47-6	E611A	0.03	mg/kg	3.475 mg/kg	98.4	70.0	130	----
Hydrocarbons (QCLot: 742878)									
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	916.995 mg/kg	86.7	70.0	130	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	1190.25 mg/kg	96.5	70.0	130	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	879.735 mg/kg	82.1	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 742955)									
F1 (C6-C10)	----	E581.F1	5	mg/kg	69.1875 mg/kg	103	80.0	120	----
Polycyclic Aromatic Hydrocarbons (QCLot: 742877)									
acenaphthene	83-32-9	E642F	0.05	mg/kg	0.8 mg/kg	94.2	60.0	130	----
acenaphthylene	208-96-8	E642F	0.05	mg/kg	0.8 mg/kg	99.1	60.0	130	----
anthracene	120-12-7	E642F	0.05	mg/kg	0.8 mg/kg	99.4	60.0	130	----
benz(a)anthracene	56-55-3	E642F	0.05	mg/kg	0.8 mg/kg	100	60.0	130	----
benzo(a)pyrene	50-32-8	E642F	0.05	mg/kg	0.8 mg/kg	107	60.0	130	----
benzo(b+j)fluoranthene	n/a	E642F	0.05	mg/kg	0.8 mg/kg	95.1	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E642F	0.05	mg/kg	0.8 mg/kg	79.9	60.0	130	----
benzo(k)fluoranthene	207-08-9	E642F	0.05	mg/kg	0.8 mg/kg	104	60.0	130	----
chrysene	218-01-9	E642F	0.05	mg/kg	0.8 mg/kg	111	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E642F	0.05	mg/kg	0.8 mg/kg	83.6	60.0	130	----
fluoranthene	206-44-0	E642F	0.05	mg/kg	0.8 mg/kg	95.2	60.0	130	----
fluorene	86-73-7	E642F	0.05	mg/kg	0.8 mg/kg	94.2	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E642F	0.05	mg/kg	0.8 mg/kg	77.2	60.0	130	----
methylnaphthalene, 1-	90-12-0	E642F	0.03	mg/kg	0.8 mg/kg	98.4	60.0	130	----
methylnaphthalene, 2-	91-57-6	E642F	0.03	mg/kg	0.8 mg/kg	94.7	60.0	130	----
naphthalene	91-20-3	E642F	0.01	mg/kg	0.8 mg/kg	95.4	60.0	130	----
phenanthrene	85-01-8	E642F	0.05	mg/kg	0.8 mg/kg	95.7	60.0	130	----
pyrene	129-00-0	E642F	0.05	mg/kg	0.8 mg/kg	95.6	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 742954)										
WT2221470-007	Anonymous	benzene	71-43-2	E611A	2.13 mg/kg	3.125 mg/kg	90.6	60.0	140	----
		ethylbenzene	100-41-4	E611A	2.02 mg/kg	3.125 mg/kg	85.8	60.0	140	----
		toluene	108-88-3	E611A	2.07 mg/kg	3.125 mg/kg	87.8	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	4.02 mg/kg	6.25 mg/kg	85.4	60.0	140	----
		xylene, o-	95-47-6	E611A	2.04 mg/kg	3.125 mg/kg	86.6	60.0	140	----
Hydrocarbons (QCLot: 742878)										
WT2221349-013	TP7-1	F2 (C10-C16)	----	E601.SG-L	668 mg/kg	916.995 mg/kg	92.4	60.0	140	----
		F3 (C16-C34)	----	E601.SG-L	986 mg/kg	1190.25 mg/kg	105	60.0	140	----
		F4 (C34-C50)	----	E601.SG-L	610 mg/kg	879.735 mg/kg	87.9	60.0	140	----
Hydrocarbons (QCLot: 742955)										
WT2221470-007	Anonymous	F1 (C6-C10)	----	E581.F1	30.7 mg/kg	62.5 mg/kg	65.3	60.0	140	----
Polycyclic Aromatic Hydrocarbons (QCLot: 742877)										
WT2221349-001	TP1-1	acenaphthene	83-32-9	E642F	0.668 mg/kg	0.8 mg/kg	84.3	50.0	140	----
		acenaphthylene	208-96-8	E642F	0.677 mg/kg	0.8 mg/kg	85.4	50.0	140	----
		anthracene	120-12-7	E642F	0.698 mg/kg	0.8 mg/kg	88.1	50.0	140	----
		benz(a)anthracene	56-55-3	E642F	0.730 mg/kg	0.8 mg/kg	92.1	50.0	140	----
		benzo(a)pyrene	50-32-8	E642F	0.742 mg/kg	0.8 mg/kg	93.6	50.0	140	----
		benzo(b+j)fluoranthene	n/a	E642F	0.703 mg/kg	0.8 mg/kg	88.7	50.0	140	----
		benzo(g,h,i)perylene	191-24-2	E642F	0.537 mg/kg	0.8 mg/kg	67.8	50.0	140	----
		benzo(k)fluoranthene	207-08-9	E642F	0.722 mg/kg	0.8 mg/kg	91.0	50.0	140	----
		chrysene	218-01-9	E642F	0.823 mg/kg	0.8 mg/kg	104	50.0	140	----
		dibenz(a,h)anthracene	53-70-3	E642F	0.580 mg/kg	0.8 mg/kg	73.2	50.0	140	----
		fluoranthene	206-44-0	E642F	0.690 mg/kg	0.8 mg/kg	87.0	50.0	140	----
		fluorene	86-73-7	E642F	0.683 mg/kg	0.8 mg/kg	86.2	50.0	140	----
		indeno(1,2,3-c,d)pyrene	193-39-5	E642F	0.538 mg/kg	0.8 mg/kg	67.9	50.0	140	----
		methylnaphthalene, 1-	90-12-0	E642F	0.697 mg/kg	0.8 mg/kg	87.9	50.0	140	----
		methylnaphthalene, 2-	91-57-6	E642F	0.727 mg/kg	0.8 mg/kg	91.8	50.0	140	----
		naphthalene	91-20-3	E642F	0.694 mg/kg	0.8 mg/kg	87.5	50.0	140	----
		phenanthrene	85-01-8	E642F	0.805 mg/kg	0.8 mg/kg	102	50.0	140	----
		pyrene	129-00-0	E642F	0.681 mg/kg	0.8 mg/kg	85.9	50.0	140	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 741332)									
	RM	antimony	7440-36-0	E440	3.99 mg/kg	98.2	70.0	130	----
	RM	arsenic	7440-38-2	E440	3.73 mg/kg	110	70.0	130	----
	RM	barium	7440-39-3	E440	105 mg/kg	112	70.0	130	----
	RM	beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
	RM	boron	7440-42-8	E440	8.5 mg/kg	124	40.0	160	----
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	104	70.0	130	----
	RM	chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
	RM	cobalt	7440-48-4	E440	6.9 mg/kg	108	70.0	130	----
	RM	copper	7440-50-8	E440	123 mg/kg	106	70.0	130	----
	RM	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
	RM	nickel	7440-02-0	E440	26.7 mg/kg	107	70.0	130	----
	RM	silver	7440-22-4	E440	4.06 mg/kg	91.6	70.0	130	----
	RM	thallium	7440-28-0	E440	0.0786 mg/kg	109	40.0	160	----
	RM	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
	RM	vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----
	RM	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1009624

Page 1 of 2

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Canada Toll Free: 1 800 668 9878

Environmental Division Waterloo

Work Order Reference WT2221349

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	KOLLAARD ASSOCIATES INC.
Contact:	COLLEEN VERMEERSCH
Phone:	613-860-0923 x 230
	Company address below will appear on the final report
Street:	210 PRESCOTT ST, UNIT 1
City/Province:	KEMPTVILLE/ON
Postal Code:	K0G 1J0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	KOLLAARD
Contact:	MARY

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☐ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	colleen@kollaard.ca
Email 2	mary@kollaard.ca
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additic may apply to rush requests on weekends, statutory holidays and non-rout
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please co

Project Information	
ALS Account # / Quote #	Q71021
Job #:	210064
PO / AFE:	
LSD:	A.M.
ALS Lab Work Order # (ALS use only):	WT2221349

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler:

Analysis Req

Indicate Filtered (F), Preserved (P) or Filtered and

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	PAHs	Metals	SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see I
	TP1-1	07-NOV-22	12:00		2	✓	✓			
	TP1-2	07-NOV-22	12:15		2	✓	✓			
	TP2-1		12:30		2	✓	✓			
	TP2-2		12:30		2	✓	✓			
	TP3-1		12:45		2	✓	✓			
	TP3-2		12:45		2	✓	✓			
	TP4-1		13:00		2	✓	✓			
	TP4-2		13:00		2	✓	✓			
	TP5-1		13:15		2	✓	✓			
	TP5-2		14:00		2	✓	✓			
	TP6-1		14:00		2	✓	✓			
	TP6-2	07-NOV-22	14:30		2	✓	✓			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	OREG 153/04 Table 2 - Full Depth Generic Site Conditions for a Potable Water Condition - residential use, coarse soils
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)					
Cooling Method:	☐ NONE	☐ ICE	☐ ICE PACKS	☐ FROZEN	☐ COOLING INITIATED
Submission Comments Identified on Sample Receipt Notification:	☐ YES	☐ NO			
Cooler Custody Seals Intact:	☐ YES	☐ N/A	Sample Custody Seals Intact:	☐ YES	☐ N/A
INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
12.4			2.8		

SHIPMENT RELEASE (client use)		
Released by:	Date:	Time:
[signature]	08-NOV-22	

INITIAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
[signature]	11/09/22	7:45

FINAL SHIPMENT RECEPTION (ALS use only)		
Received by:	Date:	Time:
[signature]	NOV 09 22	9:10

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SOL-564/565, VS-084

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 20 - 1009625

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	KOLLAARD ASSOCIATES INC
Contact:	COLLEEN VERMEERSCH
Phone:	613-860-0923 x 230
	Company address below will appear on the final report
Street:	210 PRESCOTT ST UNIT 1
City/Province:	KEMPTVILLE / ON
Postal Code:	K0G 1J0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	MARY - for invoicing

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QC! Reports with COA	☐ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	colleen@kollaard.ca
Email 2	mary@kollaard.ca
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests.
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information	
ALS Account # / Quote #:	Q71021
Job #:	210064
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	WT2221349

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	PHCs F1-F4	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	TP7-1	07-NOV-22	14:00	SOIL	3	✓			
	TP7-2	07-NOV-22	14:15	SOIL	3	✓			
	TP8-1	07-NOV-22	15:00	SOIL	3	✓			
	TP8-2	07-NOV-22	15:00	SOIL	3	✓			

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	O.NT REG 153/04 Table 2 : residential use potable water coarse soils Full depth generic in potable water
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☑ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
12.9			2.8		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: C Vermeersch	Date: 08/11/22	Time:	Received by:	Date: 11/09/22	Time: 1245	Received by:	Date: 11/10/22	Time: 9:10

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using **an Authorized DW COC form.**

ALS Canada Ltd.

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CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2224331**	Page	: 1 of 4
Client	: **Kollaard Associates Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Dean Tataryn	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 613 860 0923	Telephone	: 613 225 8279
Project	: 210064	Date Samples Received	: 06-Dec-2022 14:40
PO	: ----	Date Analysis Commenced	: 08-Dec-2022
C-O-C number	: ----	Issue Date	: 15-Dec-2022 16:54
Sampler	: ----		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Niral Patel		Centralized Prep, Waterloo, Ontario

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Analytical Results Evaluation

Matrix: **Soil/Solid**

Analyte	CAS Number	Unit	Client sample ID						
			TP3	**----**	**----**	**----**	**----**	**----**	**----**
			Sampling date/time	01-Dec-2022	----	----	----	----	----	----
			Sub-Matrix	Soil/Solid	----	----	----	----	----	----
			WT2224331-001	--------	--------	--------	--------	--------	--------
Physical Tests										
moisture	----	%	18.0	----	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	mg/kg	<0.050	----	----	----	----	----	----
acenaphthylene	208-96-8	mg/kg	<0.050	----	----	----	----	----	----
anthracene	120-12-7	mg/kg	<0.050	----	----	----	----	----	----
benz(a)anthracene	56-55-3	mg/kg	<0.050	----	----	----	----	----	----
benzo(a)pyrene	50-32-8	mg/kg	<0.050	----	----	----	----	----	----
benzo(b+j)fluoranthene	n/a	mg/kg	<0.050	----	----	----	----	----	----
benzo(g,h,i)perylene	191-24-2	mg/kg	<0.050	----	----	----	----	----	----
benzo(k)fluoranthene	207-08-9	mg/kg	<0.050	----	----	----	----	----	----
chrysene	218-01-9	mg/kg	<0.050	----	----	----	----	----	----
dibenz(a,h)anthracene	53-70-3	mg/kg	<0.050	----	----	----	----	----	----
fluoranthene	206-44-0	mg/kg	<0.050	----	----	----	----	----	----
fluorene	86-73-7	mg/kg	<0.050	----	----	----	----	----	----
indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	<0.050	----	----	----	----	----	----
methylnaphthalene, 1-	90-12-0	mg/kg	<0.030	----	----	----	----	----	----
methylnaphthalene, 1+2-	----	mg/kg	<0.050	----	----	----	----	----	----
methylnaphthalene, 2-	91-57-6	mg/kg	<0.030	----	----	----	----	----	----
naphthalene	91-20-3	mg/kg	<0.010	----	----	----	----	----	----
phenanthrene	85-01-8	mg/kg	<0.050	----	----	----	----	----	----
pyrene	129-00-0	mg/kg	<0.050	----	----	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
acridine-d9	34749-75-2	%	92.3	----	----	----	----	----	----
chrysene-d12	1719-03-5	%	91.1	----	----	----	----	----	----
naphthalene-d8	1146-65-2	%	88.1	----	----	----	----	----	----
phenanthrene-d10	1517-22-2	%	101	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	ON153/04 T2-RPI-C						
Physical Tests									
moisture	----	%							
Polycyclic Aromatic Hydrocarbons									
acenaphthene	83-32-9	mg/kg	**7.9 mg/kg**						
acenaphthylene	208-96-8	mg/kg	**0.15 mg/kg**						
anthracene	120-12-7	mg/kg	**0.67 mg/kg**						
benz(a)anthracene	56-55-3	mg/kg	**0.5 mg/kg**						
benzo(a)pyrene	50-32-8	mg/kg	**0.3 mg/kg**						
benzo(b+j)fluoranthene	n/a	mg/kg	**0.78 mg/kg**						
benzo(g,h,i)perylene	191-24-2	mg/kg	**6.6 mg/kg**						
benzo(k)fluoranthene	207-08-9	mg/kg	**0.78 mg/kg**						
chrysene	218-01-9	mg/kg	**7 mg/kg**						
dibenz(a,h)anthracene	53-70-3	mg/kg	**0.1 mg/kg**						
fluoranthene	206-44-0	mg/kg	**0.69 mg/kg**						
fluorene	86-73-7	mg/kg	**62 mg/kg**						
indeno(1,2,3-c,d)pyrene	193-39-5	mg/kg	**0.38 mg/kg**						
methylnaphthalene, 1+2-	----	mg/kg	**0.99 mg/kg**						
methylnaphthalene, 1-	90-12-0	mg/kg	**0.99 mg/kg**						
methylnaphthalene, 2-	91-57-6	mg/kg	**0.99 mg/kg**						
naphthalene	91-20-3	mg/kg	**0.6 mg/kg**						
phenanthrene	85-01-8	mg/kg	**6.2 mg/kg**						
pyrene	129-00-0	mg/kg	**78 mg/kg**						

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

ON153/04 Ontario Regulation 153/04 - April 15, 2011 Standards (JUL, 2011)

T2-RPI-C 153 T2-Soil-Res/Park/Inst. Property Use (Coarse)

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2224331**	Page	: 1 of 5
Client	: **Kollaard Associates Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Dean Tataryn	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 613 860 0923	Telephone	: 613 225 8279
Project	: 210064	Date Samples Received	: 06-Dec-2022 14:40
PO	: ----	Issue Date	: 15-Dec-2022 16:55
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
TP3	E144	01-Dec-2022	----	----	----		08-Dec-2022	----	----	
Polycyclic Aromatic Hydrocarbons : PAHs by Hex:Ace GC-MS										
Glass soil jar/Teflon lined cap										
TP3	E641A	01-Dec-2022	08-Dec-2022	14 days	8 days	✓	15-Dec-2022	40 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Moisture Content by Gravimetry	E144	772726	1	18	5.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	772720	1	7	14.2	5.0	✓
Laboratory Control Samples (LCS)							
Moisture Content by Gravimetry	E144	772726	1	18	5.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	772720	1	7	14.2	5.0	✓
Method Blanks (MB)							
Moisture Content by Gravimetry	E144	772726	1	18	5.5	5.0	✓
PAHs by Hex:Ace GC-MS	E641A	772720	1	7	14.2	5.0	✓
Matrix Spikes (MS)							
PAHs by Hex:Ace GC-MS	E641A	772720	1	7	14.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Moisture Content by Gravimetry	E144 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
PAHs by Hex:Ace GC-MS	E641A Waterloo - Environmental	Soil/Solid	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are extracted with hexane/acetone and analyzed by GC-MS. If reported, IACR (index of additive cancer risk, unitless) and B(a)P toxic potency equivalent (in soil concentration units) are calculated as per CCME PAH Soil Quality Guidelines fact sheet (2010) or ABT1.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.

QUALITY CONTROL REPORT

Work Order	: **WT2224331**	Page	: 1 of 6
Client	: Kollaard Associates Inc.	Laboratory	: Waterloo - Environmental
Contact	: Dean Tataryn	Account Manager	: Costas Farassoglou
Address	: 210 Prescott Street Unit 1 Kemptville ON Canada K0G1J0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: 613 225 8279
Project	: 210064	Date Samples Received	: 06-Dec-2022 14:40
PO	: ----	Date Analysis Commenced	: 08-Dec-2022
C-O-C number	: ----	Issue Date	: 15-Dec-2022 16:54
Sampler	: ---- 613 860 0923		
Site	: ----		
Quote number	: SOA 2022		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Niral Patel		Waterloo Centralized Prep, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 772726)											
WT2224287-001	Anonymous	moisture	----	E144	0.25	%	17.5	18.8	7.00%	20%	----
Polycyclic Aromatic Hydrocarbons (QC Lot: 772720)											
WT2224340-003	Anonymous	acenaphthene	83-32-9	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		acenaphthylene	208-96-8	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		anthracene	120-12-7	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benz(a)anthracene	56-55-3	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(a)pyrene	50-32-8	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(b+j)fluoranthene	n/a	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(g,h,i)perylene	191-24-2	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		benzo(k)fluoranthene	207-08-9	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		chrysene	218-01-9	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		dibenz(a,h)anthracene	53-70-3	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		fluoranthene	206-44-0	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		fluorene	86-73-7	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		methylnaphthalene, 1-	90-12-0	E641A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		methylnaphthalene, 2-	91-57-6	E641A	0.030	mg/kg	<0.030	<0.030	0	Diff <2x LOR	----
		naphthalene	91-20-3	E641A	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		phenanthrene	85-01-8	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		pyrene	129-00-0	E641A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 772726)						
moisture	----	E144	0.25	%	<0.25	----
Polycyclic Aromatic Hydrocarbons (QCLot: 772720)						
acenaphthene	83-32-9	E641A	0.05	mg/kg	<0.050	----
acenaphthylene	208-96-8	E641A	0.05	mg/kg	<0.050	----
anthracene	120-12-7	E641A	0.05	mg/kg	<0.050	----
benz(a)anthracene	56-55-3	E641A	0.05	mg/kg	<0.050	----
benzo(a)pyrene	50-32-8	E641A	0.05	mg/kg	<0.050	----
benzo(b+j)fluoranthene	n/a	E641A	0.05	mg/kg	<0.050	----
benzo(g,h,i)perylene	191-24-2	E641A	0.05	mg/kg	<0.050	----
benzo(k)fluoranthene	207-08-9	E641A	0.05	mg/kg	<0.050	----
chrysene	218-01-9	E641A	0.05	mg/kg	<0.050	----
dibenz(a,h)anthracene	53-70-3	E641A	0.05	mg/kg	<0.050	----
fluoranthene	206-44-0	E641A	0.05	mg/kg	<0.050	----
fluorene	86-73-7	E641A	0.05	mg/kg	<0.050	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.05	mg/kg	<0.050	----
methylnaphthalene, 1-	90-12-0	E641A	0.03	mg/kg	<0.030	----
methylnaphthalene, 2-	91-57-6	E641A	0.03	mg/kg	<0.030	----
naphthalene	91-20-3	E641A	0.01	mg/kg	<0.010	----
phenanthrene	85-01-8	E641A	0.05	mg/kg	<0.050	----
pyrene	129-00-0	E641A	0.05	mg/kg	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 772726)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Polycyclic Aromatic Hydrocarbons (QCLot: 772720)									
acenaphthene	83-32-9	E641A	0.05	mg/kg	0.5 mg/kg	90.6	60.0	130	----
acenaphthylene	208-96-8	E641A	0.05	mg/kg	0.5 mg/kg	93.9	60.0	130	----
anthracene	120-12-7	E641A	0.05	mg/kg	0.5 mg/kg	96.9	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.05	mg/kg	0.5 mg/kg	93.8	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.05	mg/kg	0.5 mg/kg	104	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.05	mg/kg	0.5 mg/kg	86.0	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.05	mg/kg	0.5 mg/kg	70.4	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.05	mg/kg	0.5 mg/kg	91.2	60.0	130	----
chrysene	218-01-9	E641A	0.05	mg/kg	0.5 mg/kg	93.3	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.05	mg/kg	0.5 mg/kg	67.6	60.0	130	----
fluoranthene	206-44-0	E641A	0.05	mg/kg	0.5 mg/kg	92.8	60.0	130	----
fluorene	86-73-7	E641A	0.05	mg/kg	0.5 mg/kg	91.0	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.05	mg/kg	0.5 mg/kg	65.2	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.03	mg/kg	0.5 mg/kg	85.0	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.03	mg/kg	0.5 mg/kg	84.6	60.0	130	----
naphthalene	91-20-3	E641A	0.01	mg/kg	0.5 mg/kg	89.5	60.0	130	----
phenanthrene	85-01-8	E641A	0.05	mg/kg	0.5 mg/kg	91.1	60.0	130	----
pyrene	129-00-0	E641A	0.05	mg/kg	0.5 mg/kg	96.0	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 772720)										
WT2224340-003	Anonymous	acenaphthene	83-32-9	E641A	0.376 mg/kg	0.5 mg/kg	94.2	50.0	140	----
		acenaphthylene	208-96-8	E641A	0.389 mg/kg	0.5 mg/kg	97.4	50.0	140	----
		anthracene	120-12-7	E641A	0.407 mg/kg	0.5 mg/kg	102	50.0	140	----
		benz(a)anthracene	56-55-3	E641A	0.415 mg/kg	0.5 mg/kg	104	50.0	140	----
		benzo(a)pyrene	50-32-8	E641A	0.436 mg/kg	0.5 mg/kg	109	50.0	140	----
		benzo(b+j)fluoranthene	n/a	E641A	0.383 mg/kg	0.5 mg/kg	95.9	50.0	140	----
		benzo(g,h,i)perylene	191-24-2	E641A	0.303 mg/kg	0.5 mg/kg	75.9	50.0	140	----
		benzo(k)fluoranthene	207-08-9	E641A	0.406 mg/kg	0.5 mg/kg	102	50.0	140	----
		chrysene	218-01-9	E641A	0.421 mg/kg	0.5 mg/kg	105	50.0	140	----
		dibenz(a,h)anthracene	53-70-3	E641A	0.271 mg/kg	0.5 mg/kg	67.9	50.0	140	----
		fluoranthene	206-44-0	E641A	0.381 mg/kg	0.5 mg/kg	95.4	50.0	140	----
		fluorene	86-73-7	E641A	0.376 mg/kg	0.5 mg/kg	94.2	50.0	140	----
		indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.262 mg/kg	0.5 mg/kg	65.6	50.0	140	----
		methylnaphthalene, 1-	90-12-0	E641A	0.373 mg/kg	0.5 mg/kg	93.5	50.0	140	----
		methylnaphthalene, 2-	91-57-6	E641A	0.365 mg/kg	0.5 mg/kg	91.5	50.0	140	----
		naphthalene	91-20-3	E641A	0.372 mg/kg	0.5 mg/kg	93.2	50.0	140	----
		phenanthrene	85-01-8	E641A	0.375 mg/kg	0.5 mg/kg	94.0	50.0	140	----
		pyrene	129-00-0	E641A	0.394 mg/kg	0.5 mg/kg	98.7	50.0	140	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17

Pa

Environmental Division Waterloo

Work Order Reference WT2224331

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Kollaard Associates (27196)
Contact:	Colleen Vermeersch
Phone:	613.860.0923, ext.230
	Company address below will appear on the final report
Street:	210 Prescott Street, Unit 1 P.O. Box 189
City/Province:	Kemptville, Ontario
Postal Code:	K0G 1J0
Invoice To	Same as Report To ☑ Y ☐ N
	Copy of Invoice with Report ☐ Y ☑ N
Company:	Kollaard Associates Inc.
Contact:	mary@kollaard.ca

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL
Quality Control (QC) Report with Report	☑ Y ☐ N
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	dean@kollaard.ca
Email 2	
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	mary@kollaard.ca
Email 2	

Project Information	
ALS Account # / Quote #:	Q71021
Job #:	210064
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):	ALS Contact:	Sampler:

Select Service Level Below - Contact your AM

Regular [R] ☑ Standard TAT if received by

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Busine ☐ | Same Da ☐ | (Laborat ☐

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level

Analys

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	PAHs	SAMPLES ON HOLD	Sample is hazardous (please provide further de	NUMBER OF CONTAINERS
	TP3	1-Dec-22	12:00	soil	R			

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ Y ☑ N	Ontario Regulation 153/04 - April 15, 2011 Standards
Are samples for human consumption/ use? ☐ Y ☑ N	Table 2, Potable, Full depth residential standards, coarse-grained soils

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
21.8			6-4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date: 12/06/22	Time: 7:40	Received by:	Date: 7-Dec-22	Time: 9:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

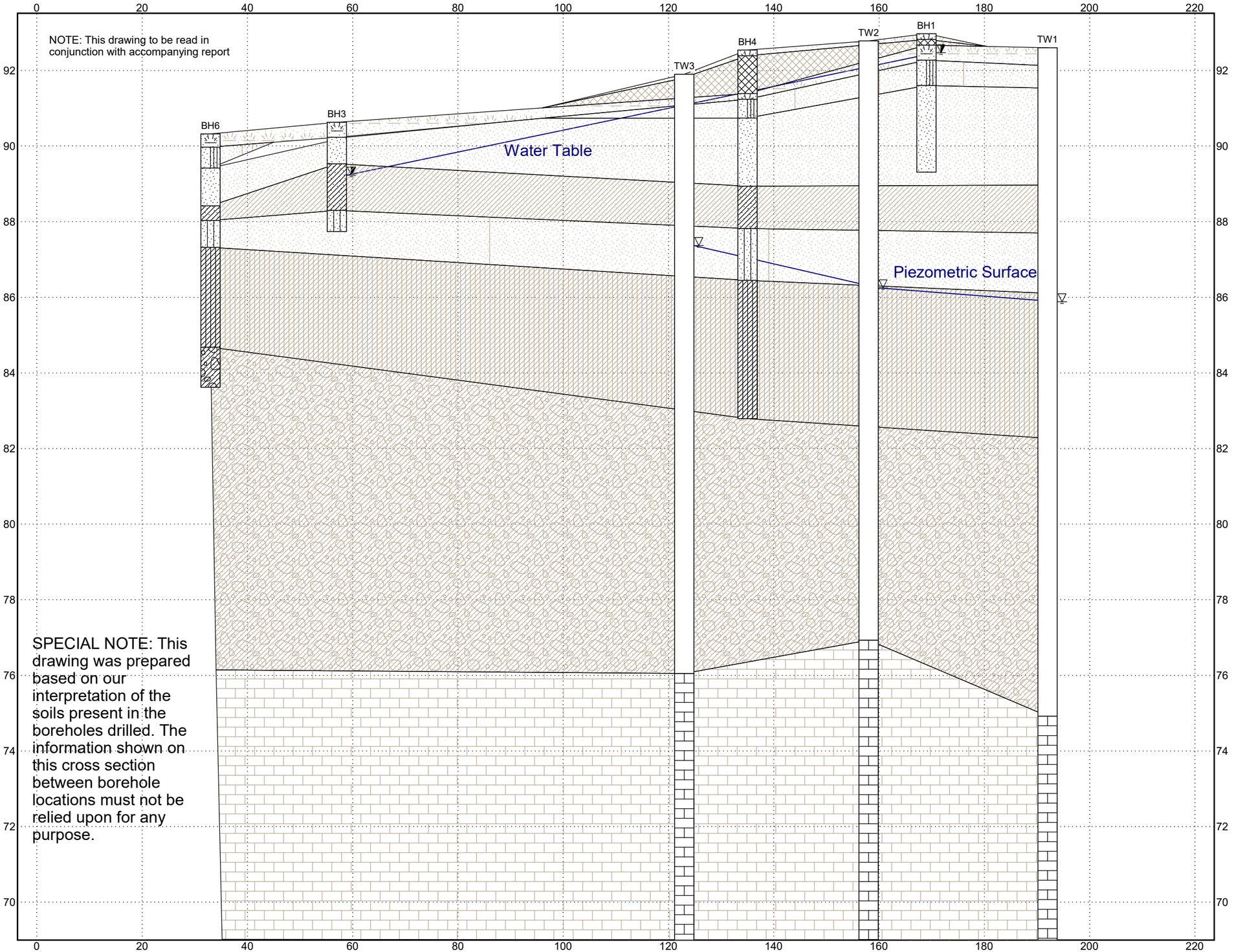
SBPT 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

SOL-991

NOTE: This drawing to be read in conjunction with accompanying report



SPECIAL NOTE: This drawing was prepared based on our interpretation of the soils present in the boreholes drilled. The information shown on this cross section between borehole locations must not be relied upon for any purpose.

CROSS-SECTION KOLLAARD 210064-CROSSSECTION.GPJ GINT STD CANADA.GDT 21-8-19

FIGURE 4

- TOPSOIL
- Yellow brown sand and gravel (FILL)
- Red brown fine to medium SAND, trace silt
- Grey fine to medium SAND
- Grey sandy CLAY, trace silt
- Grey SILTY SAND
- Grey SILTY CLAY
- Grey silty sand, trace to some gravel, cobbles and boulders, trace clay (GLACIAL TILL)
- LIMESTONE BEDROCK

Kollaard Associates
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K0G 1J0

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CLIENT:
Miles Yang

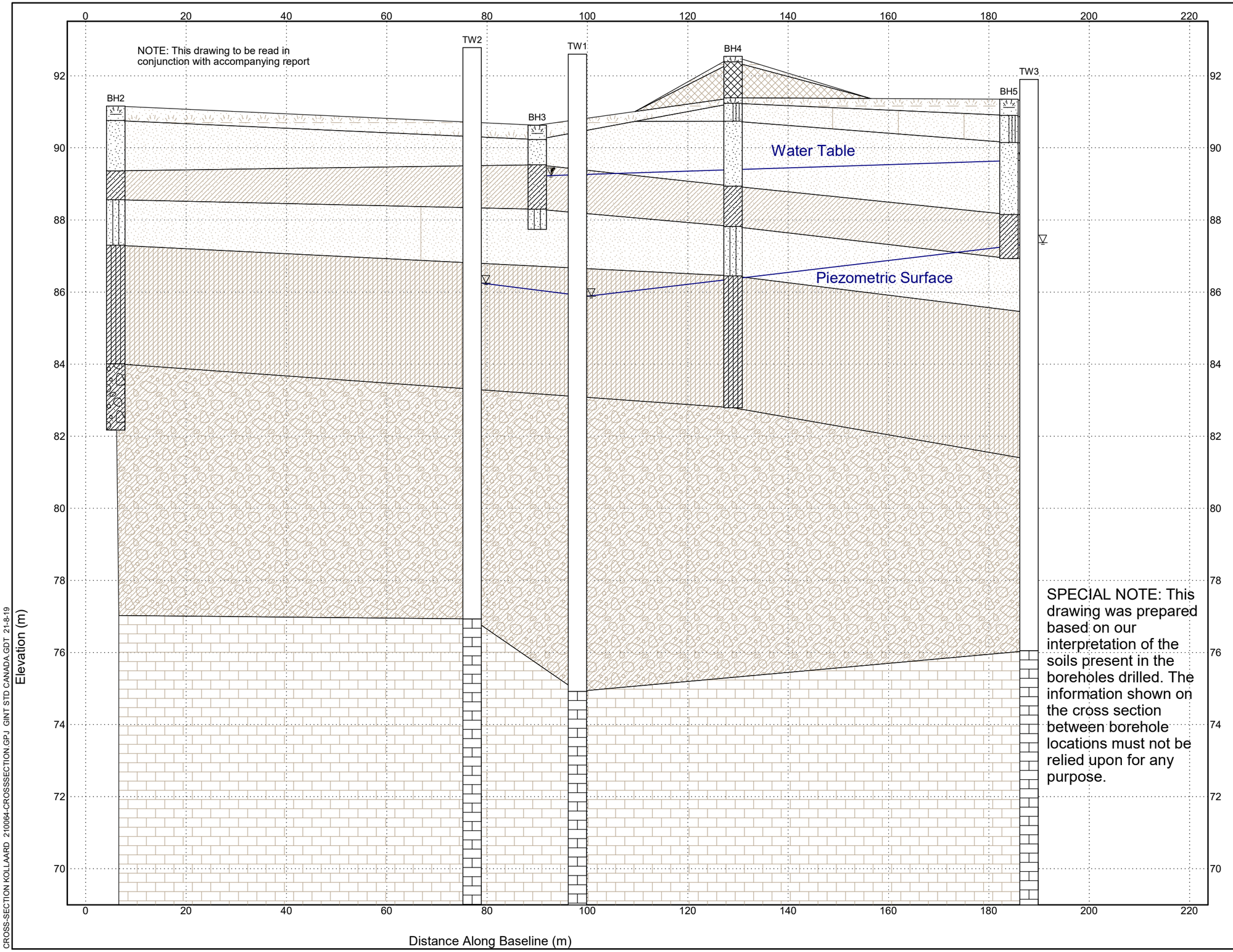
PROJECT:
Proposed Residential Subdivision

LOCATION:
3200 Reids Lane.
Osgoode. Ottawa. Ontario

DRAWING:
East-West Cross Section

DESIGNED BY:	*DATE:*
CV	July 2021
DRAWN BY:	*SCALE:*
CI	1:100

PROJECT NUMBER:
210064



CROSS-SECTION KOLLAARD 210064-CROSSSECTION.GPJ GINT STD CANADA.GDT 21-8-19

FIGURE 5

- TOPSOIL
- Yellow brown sand and gravel (FILL)
- Red brown fine to medium SAND, trace silt
- Grey fine to medium SAND
- Grey sandy CLAY, trace silt
- Grey SILTY SAND
- Grey SILTY CLAY
- Grey silty sand, trace to some gravel, cobbles and boulders, trace clay (GLACIAL TILL)
- LIMESTONE BEDROCK

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PROJECT:
Proposed Residential Subdivision

LOCATION:
3200 Reids Lane.
Osgoode. Ottawa. Ontario

DRAWING:
North-South Cross Section

DESIGNED BY:	*DATE:*
CV	July 2021
DRAWN BY:	*SCALE:*
CI	1:100

PROJECT NUMBER:
210064