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REPORT ON

**PHASE II  
ENVIRONMENTAL SITE ASSESSMENT  
114 ISABELLA STREET  
CITY OF OTTAWA, ONTARIO**

Submitted to:

Ashlar Homes  
22 Huntview Private  
Ottawa, Ontario K1V 0M5

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**ATTACHMENTS**

Record of Boreholes BH1 and BH2  
Tables I and II  
Figure 1, Site Plan  
Attachment A



## **1.0 EXECUTIVE SUMMARY**

A Phase II Environmental Site Assessment (ESA) was carried out for the subject site, a vacant lot at 114 Isabella Street, Ottawa, Ontario. The site was formerly occupied by a single family dwelling that burned down in 2003 and has been vacant since that time. It is planned to redevelop the site as a residential property. This Phase II ESA was requested by the client to assist with development plan approvals and it is understood that a Record of Site Condition is not required for this property.

The Phase II property consists of a vacant lot, located at civic address 114 Isabella Street. The site has an area of approximately 341 square metres (0.08 acres) and is located south of Highway 417, between O'Connor and Metcalfe Streets, for which the legal description is: Lot 32, Plan 35403, in the City of Ottawa, Ontario (See Key Plan, Figure 1) (PIN 04123-0086).

Areas of Potential Environmental Concern were identified at the site related to presence of fill materials containing building debris from the former building at the site, which may contain deleterious materials, off-site sources including the former use of the adjacent property east of the site, for which a clean-up and a Record of Site Condition were carried out in 2005, and some hydrocarbon impacts due to the proximity of nearby automotive garage (Griffin Auto).

Based on the results of soil and groundwater sampling and testing carried out for this Partial Phase II ESA, there is evidence of some possible minor impact in relation to the fill materials at the site from metals, including cobalt and vanadium. Extensive testing of the fill materials was not carried out because it is understood that the site is to be redeveloped into a residential apartment building and that all fill materials within the footprint of the building and adjacent parking areas are to be removed. When removed, the fill materials should be disposed of at a facility licensed to accept that type of waste. The underlying native soils meet the applicable MOE standards outlined in Table 5 with respect to metals and PAHs. No further soil and groundwater testing is warranted at this site.



## **2.0 INTRODUCTION**

### **2.1 BACKGROUND**

This Phase II Environmental Site Assessment (ESA) was carried out by Kollaard Associates Inc. for Ashlar Homes of Ottawa, Ontario for a vacant property at civic address 114 Isabella Street, which occupies an area of about 341 square metres (0.08 acres), located south of Highway 417, between O'Connor and Metcalfe Streets, in the City of Ottawa, Ontario. The Phase II ESA was carried out subsequent to a Phase I ESA for the same property in June 2013.

It is understood that the property is to be redeveloped for the purposes of residential redevelopment. The historical use of the former building was for residential purposes followed by mixed commercial and residential use. A Phase II ESA is required to address concerns identified in the above noted Phase I ESA report and to assist in site development approvals. It is understood that the City of Ottawa does not require that a Record of Site Condition (RSC) be filed for this property.

### **2.2 SITE DESCRIPTION**

The site is bordered on the north by Isabella Street, followed by Highway 417, on the east and south by residential development and on the west by commercial development. The site is vacant. The property was formerly occupied by a single family dwelling which burnt down and was subsequently demolished prior to current ownership.

The Phase II property consists of a vacant lot, located at civic address 114 Isabella Street. The site has an area of approximately 341 square metres (0.08 acres) and is located south of Highway 417, between O'Connor and Metcalfe Streets, in the City of Ottawa, Ontario (PIN 04123-0086). The approximate property boundary is shown on Figure 1.

### **2.3 PROPERTY OWNERSHIP**

The property is currently owned by Ashlar Construction Ltd. Authorization to proceed with this work was granted by Stephan Samne of Ashlar Construction Ltd.

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## **2.4 CURRENT AND PROPOSED FUTURE USES**

The subject site was first developed prior to 1933 and has been used as a single family dwelling since that time. The main floor of the building was occupied by Milligan Dental Laboratory for the years from about 1970 to 2001, with residential occupancy on the second floor. The building was abandoned subsequent to 2001, and was destroyed by a fire in 2003. The site has been vacant since that time.

The proposed future use of the site is for a multi-unit residential building.

## **2.5 APPLICABLE SITE CONDITION STANDARD**

Stratified soil standards established by the Ministry of the Environment (MOE) in *Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act* dated April 15, 2011 were used to assess the soil quality at the site. The site meets the following criteria; the site and all sites within 250 metres of the property boundaries are serviced by municipal water supply, the site is not located in a municipal wellhead protection area or other groundwater protected area, and is not an agricultural use. The results were compared to the MOE *Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act: Table 5* dated April 15, 2011, stratified site condition standards for residential/parkland/institutional property use in a non-potable groundwater condition. Fill materials were compared to standards for coarse grained soils while underlying clay soils were compared to standards for medium to fine grained soils, where applicable.

## **3.0 BACKGROUND INFORMATION**

### **3.1 PHYSICAL SETTING**

The site is located in a relatively flat lying area, at an elevation of approximately 67 metres above mean sea level. Surface water drainage at the site and surrounding areas is considered to occur typically towards catch basins along Isabella Street and in general towards the north from the site.



There are no buried utilities at the subject site. A buried hydro cable exists north of the site within the sidewalk (road allowance).

The Rideau and Ottawa Rivers are located some 1.1 kilometres southeast and 2.0 kilometres north of the site, respectively. The Rideau Canal is located some 390 metres east of the site. Based on a review of the topographical map for the site area, the upper groundwater flow is possibly north towards the Ottawa River, or east towards the Rideau River and Canal.

Based on a review of a geotechnical report that was prepared for the subject site, the overburden consists of some 0.30 to 1.5 metres of fill material, followed by approximately 27.3 metres (90 feet) of silty clay. Saturated soil conditions were encountered at about 7.6 to 8.5 metres below existing ground surface at the time of borehole investigation in May 2013. The bedrock occurs at or deeper than about 28.8 metres below existing ground surface.

Based on a review of the surficial geology map for the site area, it is expected that the site is underlain by deposits of clay and silt. Bedrock geology maps indicate that the bedrock underlying the site likely consists of black shale of the Billings Formation, dark grey almost black limestone of the Eastview Formation and/or limestone of the Ottawa Formation.

### **3.2 PAST INVESTIGATIONS**

There were no environmental reports reviewed for the subject site, with the exception of the Phase I Environmental Site Assessment carried out by Kollaard Associates in June 2013 (Section 2.1).

## **4.0 SCOPE OF THE INVESTIGATION**

### **4.1 OVERVIEW**

Soil and groundwater sampling carried out to address issues of potential environmental concern identified by a previous Phase I Environmental Site Assessment (ESA) carried out for the site by Kollaard Associates Inc. (KAI) Those issues include the presence of fill materials containing building debris from the former building at the site, and risk associated with off-site neighbouring sources. Those risks include the former use of the adjacent property east of the site, for which a clean-up and



a Record of Site Condition were carried out in 2005 and risk for some hydrocarbon impacts due to the proximity of a nearby automotive garage (Griffin Auto). The tasks completed for the Phase II ESA consist of the following:

- Excavating of seven test pits carried out on September 25 and November 13, 2013
- Groundwater sampling carried out on September 27 and November 13, 2013
- Submitting soil and groundwater samples for the analysis of potential contaminants
- Compare analytical results to stratified soil and groundwater standards (Table 3 and Table 5)

#### **4.2 MEDIA INVESTIGATED**

The soil and groundwater were investigated at the site. No sediment was encountered at the site.

Soil samples were collected from seven test pits to determine the soil quality of surficial fill materials and the underlying native soils. Soil samples obtained from the test pits were collected and prepared/preserved in the field using appropriate techniques and submitted to Exova Laboratories Ltd. in Nepean, Ontario, for testing.

The groundwater was assessed in one groundwater monitoring well, on two occasions. The monitoring well was purged repeatedly until approximately three volumes of groundwater were removed from the standpipe prior to a sample being obtained. The groundwater sample, obtained September 27, 2013, was prepared/preserved in the field using appropriate techniques and submitted to Exova Laboratories Ltd. in Nepean, Ontario. A second groundwater sample was obtained from the standpipe on November 13, 2013, after repeated purging and was tested for PAHs at Paracel laboratories in Ottawa, Ontario.

#### **4.3 PHASE ONE CONCEPTUAL SITE MODEL**

Based on the Phase I Conceptual Site Model and information acquired through the course of the Phase II site investigation, the following information is provided for the Phase II property and study area.



- The site and area are relatively flat lying. Surface water drainage at the site and surrounding areas is considered to occur typically towards catch basins along Isabella Street and in general towards the north.
- There are no underground utilities on the subject site. A buried hydro cable exists north of the site within the sidewalk.
- The Study Area is serviced by municipal water supply and there are no water wells in the Study Area.
- The site is not in a municipal wellhead protection area and is not a current or proposed agricultural use.
- The stratigraphy at the site consists of some 0.30 to 1.5 metres of fill material, followed by approximately 27.3 metres (90 feet) of low permeability silty clay.
- The bedrock is expected to be at or deeper than about 28.8 metres below existing ground surface.
- Saturated soil conditions were encountered at about 7.6 to 8.5 metres below existing ground surface at the time of borehole investigation in May 2013.
- Groundwater flow direction in the overburden is expected to be to the north towards the Ottawa River, with possible northeast flow due to the influence of the Rideau River and canal east of the site. The Rideau and Ottawa Rivers are located some 1.1 kilometres southeast and 2.0 kilometres north of the site, respectively.
- Based on a review of the City of Ottawa website zoning information, there are no areas of natural significance within the Phase I Study Area.

Potentially Contaminating Activities: The following PCAs were identified in the Phase I study area:

- Possible presence of lead and other contaminants associated with building debris in the fill materials at the site
- Possible presence of metals and other contaminants due to the proximity of a former printers and machine shop east of the site (112 Isabella) and a Record of Site Condition filing which indicates contamination clean up was carried out on the adjacent property east of the site at 100 Isabella Street (Palisades retirement residence)
- Risk of hydrocarbon impacts within west/southwest portion of site from a nearby automotive garage (Griffin Auto/Elie Autobody)



Areas of Potential Environmental Concern: Due to the PCAs at and near the subject site, the following APECs have been identified at the site, locations as shown in Figure 2:

- APEC 1 – fill and building debris within the former building footprint at the site which may contain deleterious metals and PAHs, due to the effects of a fire at the site
- APEC 2 – associated with off-site sources of metals due to the previous use of the 100 Isabella Street as a printers and a machine shop and information from the RSC filing (Attachment F) that indicated that the soils at the site were impacted mainly by metals (no groundwater impacts)
- APEC 3 – possible impacts from an offsite source at 120 Isabella Street due to the automotive fluids such as waste oil and possible gasoline compounds (VOCs) which could impact the soils and groundwater at the site

#### **4.4 DEVIATIONS FROM SAMPLING AND ANALYSIS PLAN**

The original sampling and analysis plan included two test pits put down on the east portion of the Phase II property to obtain soil samples for testing of potential contaminants of metals, due to the historical use of the adjacent property for a printers shop as well as a RSC filing on that same adjacent property. The laboratory results reported by Exova on October 2, 2013, indicated that two metals, vanadium and cobalt, slightly exceeded the MOE standards for those parameters in some of the samples. At the request of the client, the samples were submitted to a different laboratory for confirmatory testing.

One test pit was put down on the west portion of the site with the intention of obtain soil and groundwater samples for testing of hydrocarbon compounds due to the historical and current automotive garage and body shop that exists west of the site. No olfactory or visual evidence of hydrocarbons was observed in the test pit on the west portion of the site, therefore it was not considered necessary to place a monitoring well in this portion of the site to obtain a groundwater sample.

#### **4.5 IMPEDIMENTS**

There were no impediments that prevented the completion of the original defined scope of investigation.



## **5.0 INVESTIGATION METHOD**

### **5.1 GENERAL**

The soil and groundwater quality at the subject site was investigated at the locations shown on Figure 1 through test pit excavating and the installation of a groundwater monitoring well (at BH1 only.) The investigation methods are described in the following sections.

### **5.2 DRILLING AND EXCAVATING**

Two boreholes were put down at the site for the purposes of a geotechnical investigation. On May 27, 2013 two boreholes, numbered BH1 and BH2 were put down at the site using a track mounted drill rig equipped with a hollow stem auger owned and operated by OGS Inc. of Almonte, Ontario. A groundwater monitoring well was installed at BH1. The Borehole Logs are provided herein.

On September 25, 2013, three test pits were put down at the site (TP1A, TP2A and TP3A), using a backhoe supplied and operated by a local contractor (Crepin Cartage). On November 13, 2013, four additional test pits were put down at the site and labelled as TP1B, TP2B, TP3B and TP4B, using a backhoe supplied and operated by a local contractor (Crepin Cartage).

### **5.3 SOIL SAMPLING**

The field work was supervised throughout by a member of our engineering staff, who logged the test pits and cared for the samples obtained. The test pit locations are approximately as shown on the attached Site Plan, Figure 1. The test pits logs are provided as Table II.

- TP1A – SA1 from a depth of about 4.0 metres
- TP2A – SA1 from a depth of 0.8 to 1.0 metres
- TP2A – SA2 from a depth of 1.8 metres
- TP3A – SA1 from a depth of 1.8 metres

The subsurface soil conditions at the test pits were identified based on visual examination of the samples recovered from the test pits. Groundwater conditions in the test pits were noted at the time



of excavating. Soil samples were collected manually using black nitrile gloves and were placed in laboratory prepared glass jars and immediately placed in coolers. For samples considered for volatile organic compounds (VOC) or BTEX-F1 (benzene, toluene, ethylbenzene, xylenes and petroleum hydrocarbon fraction 1) testing, samples were collected using a core sampler and placed in a laboratory prepared vial containing a methanol preservative. All of the soil samples obtained from the test pits were collected and prepared/preserved in the field using appropriate techniques and submitted to Exova Laboratories Ltd. in Nepean, Ontario, for testing.

In general, the upper overburden materials encountered at the site are indicated to consist of topsoil and/or fill followed by a peat layer overlying silty clay.

#### **5.4 FIELD SCREENING MEASUREMENTS**

No field screening equipment was used for this project.

#### **5.5 GROUNDWATER: MONITORING WELL INSTALLATION**

Borehole 1 was constructed as a monitoring well, and was constructed as follows:

- A 31.75 mm diameter well screen was installed with a PVC riser pipe
- The screened interval was 1.5 metres long with a No.10 size slot screen (at a depth of about 7.5 to 9 metres below existing ground surface)
- Silica sand was placed around the annular space to the outer diameter of about 50 mm for the length of the screened interval
- The annular space was backfilled with auger cuttings to the ground surface.

At the time that water samples were obtained in September and November 2013, the monitoring well was developed by using a foot valve and inertial pump. Approximately three water volumes were removed and the water levels allowed a recovery period prior to obtaining water samples for chemical testing.



## **5.6 GROUNDWATER: FIELD MEASUREMENT OF WATER QUALITY PARAMETERS**

Groundwater levels were measured in BH1 on May 29, 2013. At that time, the groundwater level was approximately 8.2 metres below existing ground surface.

No measurement of field water quality parameters was carried out due to the nature of the soil at the site, which is low permeability silty clay. Field screening is carried out to measure parameters while pumping until water quality stabilizes at which time a well is considered to be properly developed (i.e. water in well is from formation and not from stagnant water in the well.) In this case, the well was pumped dry until three well volumes were removed from the well in order to ensure that water samples obtained are representative of the formation water.

## **5.7 GROUNDWATER SAMPLING**

At the time that water samples were obtained in September and November 2013, the monitoring well was developed by using a foot valve and inertial pump. Approximately three water volumes were removed and the water levels allowed a recovery period prior to obtaining water samples for chemical testing.

Well purging was carried out on September 25 and September 27, 2013. A water sample was obtained on September 27, 2013 and was stored in laboratory prepared bottles for PHC F1-F4 and BTEX testing.

Well purging was carried out on November 13, 2013. A water sample was obtained on November 13, 2013, and was stored in laboratory prepared bottles for PAHs testing.

## **5.8 SEDIMENT SAMPLING**

No sediment sampling was carried out for this investigation.

## **5.9 ANALYTICAL TESTING**

The following soil and groundwater samples, obtained from the site on September 25, 2013, were submitted to Exova Laboratories Ltd. in Nepean, Ontario, for testing as described below:



- TP1A-SA1 was tested for PHC F1-F4, BTEX (soil)
- TP2A-SA1, TP2A-SA2 and TP3-SA1 were tested for metals (soil)
- BH1-SA1 was tested for PHC F1-F4, BTEX (groundwater)

The following samples were re-submitted to Paracel Laboratories on October 10, 2013, for confirmatory testing:

- TP2A-SA1, TP2A-SA2 and TP3-SA1 were tested for cobalt and vanadium (soil)

The following samples, obtained from the site on November 13, 2013, were submitted to Paracel Laboratories for testing:

- TP3B-SA3, TP3B-SA4, TP4B-SA5, were tested for metals.
- TP1B-SA1, TP2B-SA2 were tested for metals and PAHs.
- BH1-SA2, a groundwater sample was tested for PAHs.

A summary of the test results is provided as Table 2 and the analytical results are included as Attachment A. The results were compared to the MOE *Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act: Table 3* dated April 15, 2011, full depth generic site condition standards for residential/parkland/institutional property use in a non-potable groundwater condition. However, it was noted that for this site, the Table 5 stratified soil standards may be used because the following conditions are met; the site and all sites within 250 metres of the property boundaries are serviced by municipal water supply, the site is not located in a municipal wellhead protection area or other groundwater protected area, and is not an agricultural use. Where samples were obtained from depths below 1.5 metres below existing ground surface, they were compared to the MOE *Soil, Groundwater and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act: Table 5* dated April 15, 2011, stratified site condition standards for residential/parkland/institutional property use in a non-potable groundwater condition.

## **5.10 RESIDUE MANAGEMENT PROCEDURES**

Soil cuttings from borehole construction were used in the annular space created by drilling. The groundwater did not show any visual or odour indicators of contamination. A minimal volume of purge water removed from the monitoring well was disposed of on the ground surface at the site. Material excavated from the test pits was put back into the ground at the site.



## **5.11 ELEVATION SURVEYING**

No elevation surveying was carried out at the site.

## **5.12 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
- 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 by the laboratory by testing blanks and/or duplicates and/or spikes of one or more samples to verify all results

## **6.0 REVIEW AND EVALUATION**

### **6.1 GEOLOGY**

Based on a review of the surficial geology map for the site area, it is expected that the site is underlain by deposits of clay and silt. Bedrock geology maps indicate that the bedrock underlying the site likely consists of black shale of the Billings Formation, dark grey almost black limestone of the Eastview Formation and/or limestone of the Ottawa Formation.

In general, the upper overburden materials encountered at the site are indicated to consist of topsoil and/or fill followed by a peat layer overlying silty clay. The bedrock is expected to be at or deeper than about 28.8 metres below existing ground surface.

### **6.2 GROUNDWATER: ELEVATIONS AND FLOW DIRECTION**

Saturated soil conditions were encountered at about 7.6 to 8.5 metres below existing ground surface at the time of borehole investigation in May 2013. Groundwater levels were measured in



BH1 on May 29, 2013. At that time, the groundwater level was approximately 8.2 metres below existing ground surface.

Groundwater flow direction in the overburden is expected to be to the north towards the Ottawa River, with possible northeast flow due to the influence of the Rideau River and canal east of the site. The Rideau and Ottawa Rivers are located some 1.1 kilometres southeast and 2.0 kilometres north of the site, respectively.

### **6.3 GROUNDWATER: HYDRAULIC GRADIENTS**

The scope of the investigation included only one monitoring well installation, and hydraulic gradients at the site were not established.

### **6.4 FINE-MEDIUM SOIL TEXTURE**

While the native soils at the site may be considered fine to medium grained for the purposes of analytical testing, no grain size distribution analyses were carried out on any samples. The fill materials were considered to be coarse grained. The Table 3 and Table 5 standards used and summarized in the attached Table 2, include only the standards for all soil types.

### **6.5 SOIL: FIELD SCREENING**

No field screening was carried out on soil samples obtained from the subject site.

### **6.6 SOIL QUALITY**

The results of the laboratory testing indicate that cobalt and vanadium may exceed the surface soil standards within fill materials at the location of TP2A (in the southeast corner of the site). However, confirmatory testing at a second laboratory indicated that the same sample met the applicable standards. All of the underlying native silty clay meets the Table 5 stratified site condition standards for metals and for PAHs (where tested).



## 6.7 GROUNDWATER QUALITY

The groundwater sampled at BH1 met the applicable standards for PHC F1-F4, BTEX and PAHs.

## 6.8 SEDIMENT QUALITY

Sediment samples were not tested as part of this investigation.

## 6.9 QUALITY ASSURANCE AND QUALITY CONTROL RESULTS

Laboratory blanks tested for quality control measures were within acceptable limits and analysis was not repeated for samples submitted to Exova in September 2013. Duplicates and spiked samples tested at Paracel for the samples submitted in October and November 2013 to verify results was outside the acceptable limits. However, other QC were acceptable and the results were considered acceptable.

## 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.

### Potential Contaminating Activities and Areas of Potential Environmental Concern

The Phase I CSM identified the following:

- Possible metals and PAHs associated with building debris and fill materials at the site
- Possible metals due to a former printing shop and machine shop east of the site, for which an RSC and clean-up were performed (100 Isabella)
- Possible hydrocarbon impacts within south/southwest portion of the site due to off-site garage (Griffin Auto)

The Phase II sampling and analytical program was provided to determine whether the APECs identified at the site have resulted in impacts at the subject site. This included testing of soil and



groundwater at the site for the following contaminants of concern; PAHs, metals and hydrocarbons (PHC F1-F4, BTEX)

#### Subsurface Structures and Utilities

No subsurface structures or utilities were encountered or are known to exist on the subject site, with the exception of an underground hydro corridor north of the site.

#### Physical Setting

- The overburden at the site consists of fill materials, including some buried building debris, followed by native peat and silty clay.
- Groundwater was encountered at about 7.6 to 8.5 metres below existing ground surface at the time of borehole investigation in May 2013. Groundwater levels were measured in BH1 on May 29, 2013. At that time, the groundwater level was approximately 8.2 metres below existing ground surface.
- Site soil conditions indicate soils are of low permeability silty clay for contaminant migration.

#### Distribution and Extent of Soil and Groundwater Impacts

Based on the results of soil and groundwater sampling and testing carried out for this Partial Phase II ESA, there is evidence of some possible minor impact in relation to the fill materials at the site from metals, including cobalt and vanadium. Extensive testing of the fill materials was not carried out because it is understood that the site is to be redeveloped into a residential apartment building and that all fill materials within the footprint of the building and adjacent parking areas are to be removed. When removed, the fill materials should be disposed of at a facility licensed to accept that type of waste. The underlying native soils meet the applicable MOE standards outlined in Table 5 with respect to metals and PAHs. No further soil and groundwater testing is warranted at this site.

The groundwater samples obtained from the subject site meet the applicable standards for PHC F1 to F4, BTEX and PAHs.



## **7.0 CONCLUSIONS**

Based on the results of soil and groundwater sampling and testing carried out for this Partial Phase II ESA, there is evidence of some possible minor impact in relation to the fill materials at the site from metals, including cobalt and vanadium. Extensive testing of the fill materials was not carried out because it is understood that the site is to be redeveloped into a residential apartment building and that all fill materials within the footprint of the building and adjacent parking areas are to be removed. When removed, the fill materials should be disposed of at a facility licensed to accept that type of waste. The underlying native soils meet the applicable MOE standards outlined in Table 5 with respect to metals and PAHs. No further soil and groundwater testing is warranted at this site.

### Disclaimer

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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.



C.E. Vermeersch, P. Eng.



William Kollaard, P. Eng.



## 8.0 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.

## 9.0 QUALIFICATIONS OF ASSESSORS

### Colleen Vermeersch, P. Eng.

Colleen Vermeersch is a professional engineer with Kollaard Associates Inc. in Kemptonville, Ontario. Colleen has been conducting Phase I ESAs in accordance with the CSA Standard and Environmental Protection Act for more than four years. Colleen has conducted more than thirty 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.

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 15 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



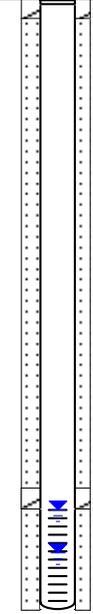
specializes in providing civil, structural, geotechnical, hydrogeological and environmental services to our clients. Kollaard Associates Inc. has been established as a team of engineers and consultants since 2005. Mr. William Kollaard is responsible for the overall company development and management of the firm.

# RECORD OF BOREHOLE BH1

**PROJECT:** Proposed Commercial Development  
**CLIENT:** Ashlar Homes  
**LOCATION:** 114 Isabella Street, Ottawa  
**PENETRATION TEST HAMMER:** 63.5kg, Drop, 0.76mm

**PROJECT NUMBER:** 130293  
**DATE OF BORING:** May 27, 2013  
**SHEET** 1 of 2  
**DATUM:**

DEPTH SCALE (meters)	SOIL PROFILE		SAMPLES			UNDIST. SHEAR STRENGTH		DYNAMIC CONE PENETRATION TEST		ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (M)	NUMBER	TYPE	BLOWS/0.3m	Cu, kPa		blows/300 mm		
							×	○			
0	Ground Surface										
0	Topsoil, gravel, sand, wood (FILL)		0.00	1	SS	16					
1				2	SS	7					
1.52	TOPSOIL			3	SS	6					
2	Stiff grey brown SILTY CLAY										
2.44	Firm grey SILTY CLAY										
3				4	SS	WH					
4											
5				5	SS	2					
6				6	SS	1					
7				7	SS	1					
8				8	SS	1					
9				9	SS	WH					
10				10	SS	WH					
11											
12											
13											
14											
15											
16											
17				11	SS	9					
17.26	Borehole continued as Probe Hole black silty clay with some sand, gravel, silt and shale fragments										
18											
19											
20											



Water observed in borehole at approximately 7.6 metres below the existing ground surface on May 27, 2013. Water measured in standpipe at approximately 8.2 metres below existing ground surface, May 29, 2013.

**DEPTH SCALE:** 1 to 75  
**BORING METHOD:** Power Auger



**AUGER TYPE:** 200 mm Hollow Stem

**LOGGED:** DT  
**CHECKED:** SD

# RECORD OF BOREHOLE BH1

**PROJECT:** Proposed Commercial Development  
**CLIENT:** Ashlar Homes  
**LOCATION:** 114 Isabella Street, Ottawa  
**PENETRATION TEST HAMMER:** 63.5kg, Drop, 0.76mm

**PROJECT NUMBER:** 130293  
**DATE OF BORING:** May 27, 2013  
**SHEET** 2 of 2  
**DATUM:**

DEPTH SCALE (meters)	SOIL PROFILE		SAMPLES			UNDIST. SHEAR STRENGTH				DYNAMIC CONE PENETRATION TEST				ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (M)	NUMBER	TYPE	BLOWS/0.3m	Cu, kPa				blows/300 mm					
							×	20	40	60	80	×	○			20
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">21</div> <div style="margin-bottom: 10px;">22</div> <div style="margin-bottom: 10px;">23</div> <div style="margin-bottom: 10px;">24</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">26</div> <div style="margin-bottom: 10px;">27</div> <div style="margin-bottom: 10px;">28</div> <div style="margin-bottom: 10px;">29</div> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">31</div> <div style="margin-bottom: 10px;">32</div> <div style="margin-bottom: 10px;">33</div> <div style="margin-bottom: 10px;">34</div> <div style="margin-bottom: 10px;">35</div> <div style="margin-bottom: 10px;">36</div> <div style="margin-bottom: 10px;">37</div> <div style="margin-bottom: 10px;">38</div> <div style="margin-bottom: 10px;">39</div> <div style="margin-bottom: 10px;">40</div> </div>			28.80													
	End of Borehole, refusal on large boulders or bedrock															

DEPTH SCALE: 1 to 75

BORING METHOD: Power Auger



**Kollaard Associates**  
Engineers

AUGER TYPE: 200 mm Hollow Stem

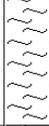
LOGGED: DT

CHECKED: SD

# RECORD OF BOREHOLE BH2

**PROJECT:** Proposed Commercial Development  
**CLIENT:** Ashlar Homes  
**LOCATION:** 114 Isabella Street, Ottawa  
**PENETRATION TEST HAMMER:** 63.5kg, Drop, 0.76mm

**PROJECT NUMBER:** 130293  
**DATE OF BORING:** May 27, 2013  
**SHEET** 1 of 2  
**DATUM:**

DEPTH SCALE (meters)	SOIL PROFILE		SAMPLES			UNDIST. SHEAR STRENGTH		DYNAMIC CONE PENETRATION TEST	ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (M)	NUMBER	TYPE	BLOWS/0.3m	Cu, kPa			
							20	40		
0	Ground Surface									
0	Grey crushed stone (FILL)		0.00							
0.30	Brown topsoil, brick, sand and clay (FILL)		1	SS	14					
1			2	SS	14					
1.62	Stiff grey brown SILTY CLAY		3	SS	5					
2.44	Firm to stiff grey SILTY CLAY		4	SS	WH					
3										
4										
5			5	SS	1					
6										
7			6	SS	2					
8										
9			7	SS	2					
10										
11										
12										
13										
			8	SS	WH					

Water observed in borehole at approximately 8.5 metres below the existing ground surface on May 28, 2013.



**DEPTH SCALE:** 1 to 75  
**BORING METHOD:** Power Auger

 **Kollaard Associates**  
 Engineers  
**AUGER TYPE:** 200 mm Hollow Stem

**LOGGED:** DT  
**CHECKED:** SD

# RECORD OF BOREHOLE BH2

**PROJECT:** Proposed Commercial Development  
**CLIENT:** Ashlar Homes  
**LOCATION:** 114 Isabella Street, Ottawa  
**PENETRATION TEST HAMMER:** 63.5kg, Drop, 0.76mm

**PROJECT NUMBER:** 130293  
**DATE OF BORING:** May 27, 2013  
**SHEET** 2 of 2  
**DATUM:**

DEPTH SCALE (meters)	SOIL PROFILE		SAMPLES			UNDIST. SHEAR STRENGTH				DYNAMIC CONE PENETRATION TEST					ADDITIONAL LAB TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (M)	NUMBER	TYPE	BLOWS/0.3m	Cu, kPa				blows/300 mm						
							×	20	40	60	80	×	○	20			40
14		[Diagonal Hatching]		9	SS	WH											
15		[Diagonal Hatching]															
16		[Diagonal Hatching]															
17		[Diagonal Hatching]															
17	Borehole continued as Probe Hole in grey/black silty clay, some sand, gravel and silt and shale fragments	[Diagonal Hatching]	17.10	10	SS	WH											
18		[Diagonal Hatching]															
19		[Diagonal Hatching]															
20		[Diagonal Hatching]															
21		[Diagonal Hatching]															
22		[Diagonal Hatching]															
22	End of Borehole, Practical refusal on large boulders	[Diagonal Hatching]	22.40														
23		[Diagonal Hatching]															
24		[Diagonal Hatching]															
25		[Diagonal Hatching]															
26		[Diagonal Hatching]															

DEPTH SCALE: 1 to 75

BORING METHOD: Power Auger



**Kollaard Associates**  
Engineers

AUGER TYPE: 200 mm Hollow Stem

LOGGED: DT

CHECKED: SD

**TABLE I - RESULTS OF ANALYTICAL TESTING**

SAMPLE DESCRIPTION	Sample Depth	Analytes	Results (ug/g)	Table 3 Full Depth Standards (ug/g)	Table 5 Stratified Standards (ug/g)
<b>September 25, 2013 - EXOVA</b>					
<u>TP1-SA1</u> silty clay-med/fine	4.0 metres	PHC F1-F4/BTEX	Less than detection limits		
<u>TP2-SA1</u> fill-coarse	0.8-1.0 metres	Metals Cobalt Vanadium	<b>27</b> <b>112</b>	22 86	250 160
<u>TP2-SA2</u> silty clay-med/fine	1.8 metres	Metals Cobalt Vanadium	21 95	22 86	250 160
<u>TP3-SA1</u> silty clay-med/fine	1.8 metres	Metals Cobalt Vanadium	25 114	22 86	250 160
<b>September 27, 2013 - EXOVA</b>					
<u>BH1-SA1</u> groundwater	NA	BTEX	Less than detection limits		
		PHC F1	<100	750	
		F2	<100	150	
		F3	500	500	
F4	<200	500			
<b>October 10, 2013 - PARACEL</b>					
<u>TP2-SA1</u> fill-coarse	0.8-1.0 metres	Cobalt Vanadium	15.7 75.0	22 86	250 160
<u>TP2-SA2</u> silty clay-med/fine	1.8 metres	Cobalt Vanadium	12.2 66.1	22 86	250 160
<u>TP3-SA1</u> silty clay-med/fine	1.8 metres	Cobalt Vanadium	17.2 95.2	22 86	250 160
<b>November 13, 2013 - PARACEL</b>					
<u>TP1-SA1</u> silty clay-med/fine	1.6 metres	Metals PAHs	Meets standards		
<u>TP2-SA2</u> silty clay-med/fine	1.8 metres	Metals PAHs	Meets standards		
<u>TP3-SA3</u> silty clay-med/fine	1.2 metres	Metals	Meets standards		
<u>TP3-SA4</u> silty clay-med/fine	1.8 metres	Metals	Meets standards		
<u>TP4-SA5</u> silty clay-med/fine	1.8 metres	Metals	Meets standards		
<u>BH1-SA2</u> groundwater		PAHs	Meets standards		



TABLE II  
RECORD OF TEST PITS  
114 ISABELLA STREET  
OTTAWA, ONTARIO

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP1A	0.00 – 1.22	Topsoil, clay, gravel, glass, brick, plastic, pottery, peat (FILL)
	1.22 – 1.83	PEAT
	1.83 – 3.96	Grey SILTY CLAY, trace to some silt and sand (alluvium)
	3.96	End of test pit
Water entering excavation at about 3.81 metres below existing ground surface, September 25, 2013. Water level at about 3.96 metres below existing ground surface upon completion of excavating, September 25, 2013.		
TP2A	0.00 – 0.99	Topsoil, sand, gravel, brick, concrete (FILL)
	0.99 – 1.75	PEAT
	1.75 – 3.20	Grey SILTY CLAY
	3.20	End of test pit
Test pit dry upon completion of excavating, September 25, 2013.		
TP3A	0.00 – 0.76	Topsoil, sand, gravel, brick, concrete (FILL)
	0.76 – 0.97	TOPSOIL
	0.97 – 1.09	Red brown SILTY SAND, trace clay
	1.09 – 1.83	Grey brown SILTY CLAY
	1.83	End of test pit

Test pit dry upon completion of excavating, September 25, 2013.



TABLE II (continued)

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP1B	0.00 – 1.22	Silty sand, topsoil, roots, foundation wall, brick, glass, ash (FILL)
	1.22 – 1.52	PEAT
	1.52 – 1.70	Grey brown SILTY CLAY
	1.70	End of test pit
Trace water entering excavation at about 1.70 metres below existing ground surface, November 13, 2013.		
TP2B	0.00 – 1.83	Boulders, bricks, wood, ash, topsoil, sand, gravel (FILL)
	1.83 – 1.98	Grey SILTY CLAY
	1.98	End of test pit
Trace water entering excavation at about 1.98 metres below existing ground surface, November 13, 2013.		
TP3B	0.00 – 0.15	Grey crushed stone, some sand (FILL)
	0.15 – 0.91	Sand, topsoil, bricks, gravel (FILL)
	0.91 – 1.09	PEAT
	1.09 – 1.78	Grey brown SILTY CLAY
	1.78	End of test pit

Trace water entering excavation at about 1.78 metres below existing ground surface, November 13, 2013.



TABLE II (continued)

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP4B	0.00 – 0.15	Grey crushed stone, some sand (FILL)
	0.15 – 0.91	Topsoil, clay, gravel, glass, brick, plastic, pottery, peat (FILL)
	0.91 – 1.52	PEAT
	1.52 – 1.83	Grey SILTY CLAY
	1.83	End of test pit

Test pit dry upon completion of excavating, November 13, 2013.



DRAWING NUMBER:  
SITE PLAN, FIGURE 1

- LEGEND:
- APPROXIMATE BOREHOLE LOCATION  
BH1
  - APPROXIMATE TEST PIT LOCATION  
SEPTEMBER 25, 2013  
TP1A
  - APPROXIMATE TEST PIT LOCATION  
NOVEMBER 13, 2013  
TP1B

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 (613) 860-0923  
KEMPTVILLE ONTARIO info@kollaard.ca  
KOG 1J0 FAX (613) 258-0475  
http://www.kollaard.ca

CLIENT:  
ASHLAR HOMES

PROJECT:  
PROPOSED RESIDENTIAL DEVELOPMENT  
PARTIAL PHASE II ENVIRONMENTAL SITE ASSESSMENT

LOCATION:  
114 ISABELLA STREET  
CITY OF OTTAWA, ONTARIO

DESIGNED BY: -- DATE: NOV 25, 2013

DRAWN BY: CV SCALE: N.T.S

KOLLAARD FILE NUMBER:  
130293



ATTACHMENT A  
LABORATORY TESTING RESULTS

Client: Kollaard Associates Inc.  
210 Prescott St., Box 189  
Kemptville, ON  
K0G 1J0  
Attention: Ms. Colleen Vermeersch  
PO#:  
Invoice to: Kollaard Associates Inc.

Report Number: 1321202  
Date Submitted: 2013-09-26  
Date Reported: 2013-10-02  
Project: 130293  
COC #: 152278

---

**Dear Colleen Vermeersch:**

**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

Revised Report - Guideline changed as per client request.

APPROVAL: \_\_\_\_\_

Craig Thompson  
Project Manager

Exova (Ottawa) is certified and accredited for specific parameters by:  
CALA, Canadian Association for Laboratory Accreditation (to ISO 17025), OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils), Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is certified and accredited for specific parameters by:  
SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only.

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 210 Prescott St., Box 189  
 Kemptville, ON  
 K0G 1J0  
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 Invoice to: Kollaard Associates Inc.

Report Number: 1321202  
 Date Submitted: 2013-09-26  
 Date Reported: 2013-10-02  
 Project: 130293  
 COC #: 152278

Group	Analyte	MRL	Units	Guideline	Lab I.D.	1060807	1060808	1060809	1060810
					Sample Matrix	Soil	Soil	Soil	Soil
					Sample Type	2013-09-25	2013-09-25	2013-09-25	2013-09-25
					Sampling Date	TP1-SA1	TP2-SA1	TP2-SA2	TP3-SA1
					Sample I.D.				
Inorganics	Antimony	1	ug/g	STD-7.5		<1	<1	<1	
	Arsenic	1	ug/g	STD-18		2	1	1	
	Barium	1	ug/g	STD-390		340	283	370	
	Beryllium	1	ug/g	STD-5		<1	<1	<1	
	Boron (total)	10	ug/g	STD-120		40	40	40	
	Cadmium	0.5	ug/g	STD-1.2		<0.5	<0.5	<0.5	
	Chromium Total	1	ug/g	STD-160		144	104	128	
	Cobalt	1	ug/g	STD-22		27*	21	25*	
	Copper	1	ug/g	STD-180		71	49	60	
	Lead	1	ug/g	STD-120		27	9	8	
	Molybdenum	1	ug/g	STD-6.9		1	<1	<1	
	Nickel	1	ug/g	STD-130		85	62	75	
	Selenium	1	ug/g	STD-2.4		<1	<1	<1	
	Silver	0.2	ug/g	STD-25		<0.2	<0.2	<0.2	
	Thallium	1	ug/g	STD-1		<1	<1	<1	
	Uranium	0.5	ug/g	STD-23		1.3	1.9	1.1	
Vanadium	2	ug/g	STD-86		112*	95*	114*		
Zinc	2	ug/g	STD-340		148	126	143		
Moisture	Moisture	0.1	%		44.5				
Petroleum Hydrocarbons	Petroleum Hydrocarbons F1	10	ug/g	STD-65		<10			
	Petroleum Hydrocarbons F1-BTEX	10	ug/g			<10			
	Petroleum Hydrocarbons F2	10	ug/g	STD-150		<10			
	Petroleum Hydrocarbons F3	20	ug/g	STD-1300		<20			
	Petroleum Hydrocarbons F4	20	ug/g	STD-5600		<20			
VOCs	Benzene	0.02	ug/g	STD-0.17		<0.02			
	Ethylbenzene	0.05	ug/g	STD-15		<0.05			

Guideline = O.Reg 153-T3-Res/Park-Med/Fine

\* = Guideline Exceedence

\*\* - Analysis completed in Mississauga

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Group	Analyte	MRL	Units	Guideline	Lab I.D.	Sample Matrix	Sample Type	Sampling Date	Sample I.D.
					1060807	1060808	1060809	1060810	
VOCs	m/p-xylene	0.05	ug/g		Soil	Soil	Soil	Soil	Soil
	o-xylene	0.05	ug/g		2013-09-25	2013-09-25	2013-09-25	2013-09-25	2013-09-25
	Toluene	0.20	ug/g	STD-6	TP1-SA1	TP2-SA1	TP2-SA2	TP3-SA1	
	Xylene Mixture	0.05	ug/g	STD-25	<0.05	<0.05	<0.20	<0.05	<0.05
VOCs Surrogates (%)	Toluene-d8	0	%		107				

**Guideline = O.Reg 153-T3-Res/Park-Med/Fine**

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
<b>Run No</b> 0	<b>Analysis Date</b> 2013-09-30	<b>Method</b> V 8260B	
Xylene Mixture			
<b>Run No</b> 258315	<b>Analysis Date</b> 2013-09-27	<b>Method</b> EPA 200.8	
Silver	<0.2 ug/g	86	70-130
Arsenic	<1 ug/g	96	70-130
Barium	<1 ug/g	90	70-130
Beryllium	<1 ug/g	95	70-130
Cadmium	<0.5 ug/g	90	70-130
Cobalt	<1 ug/g	93	70-130
Chromium Total	<1 ug/g	92	70-130
Copper	<1 ug/g	99	70-130
Molybdenum	<1 ug/g	92	70-130
Nickel	<1 ug/g	99	70-130
Lead	<1 ug/g	93	70-130
Antimony	<1 ug/g	94	70-130

**Guideline = O.Reg 153-T3-Res/Park-Med/Fine**

**\* = Guideline Exceedence**

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MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
Selenium	<1 ug/g	93	70-130
Thallium	<1 ug/g	92	70-130
Uranium	<0.5 ug/g	90	70-130
Vanadium	<2 ug/g	86	70-130
Zinc	<2 ug/g	99	70-130
<b>Run No 258340      Analysis Date 2013-09-27      Method M SM3120B-3050B</b>			
Boron (total)	<10 ug/g	83	
<b>Run No 258435      Analysis Date 2013-09-27      Method V 8260B</b>			
Benzene	<0.02 ug/g	94	80-120
Ethylbenzene	<0.05 ug/g	106	80-120
m/p-xylene	<0.05 ug/g	116	80-120
o-xylene	<0.05 ug/g	116	80-120
Toluene	<0.20 ug/g	112	80-120
Toluene-d8	106 %	109	
<b>Run No 258455      Analysis Date 2013-09-30      Method CCME</b>			
Petroleum Hydrocarbons F1	<10 ug/g	100	80-120
Petroleum Hydrocarbons F1-BTEX			

Guideline = O.Reg 153-T3-Res/Park-Med/Fine

\* = Guideline Exceedence

\*\* - Analysis completed in Mississauga

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Kollaard Associates Inc.  
 210 Prescott St., Box 189  
 Kemptville, ON  
 K0G 1J0  
 Attention: Ms. Colleen Vermeersch  
 PO#:   
 Invoice to: Kollaard Associates Inc.

Report Number: 1321202  
 Date Submitted: 2013-09-26  
 Date Reported: 2013-10-02  
 Project: 130293  
 COC #: 152278

**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
<b>Run No 258460    Analysis Date 2013-09-30    Method CCME</b>			
Petroleum Hydrocarbons F2	<10 ug/g	81	50-120
Petroleum Hydrocarbons F3	<20 ug/g	81	50-120
Petroleum Hydrocarbons F4	<20 ug/g	81	50-120
<b>Run No 258463    Analysis Date 2013-09-30    Method C SM2540B</b>			
Moisture	<0.1 %	100	80-120

**Guideline = O.Reg 153-T3-Res/Park-Med/Fine**

**\* = Guideline Exceedence**

\*\* - Analysis completed in Mississauga

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Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

## Certificate of Analysis

### Kollaard Associates Inc.

210 Prescott St. Unit 1  
Kemptville, ON K1G 4J8  
Attn: Colleen Vermeersch

Phone: (613) 860-0923  
Fax: (613) 860-0923

Client PO:

Report Date: 16-Oct-2013

Project:

Order Date: 10-Oct-2013

Custody: 12287

**Order #: 1341268**

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

Parcel ID	Client ID
1341268-01	TP2-SA1
1341268-02	TP3-SA1
1341268-03	TP2-SA2

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Report Date: 16-Oct-2013

Client: Kollaard Associates Inc.

Order Date: 10-Oct-2013

Client PO:

Project Description:

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	15-Oct-13	15-Oct-13
Solids, %	Gravimetric, calculation	11-Oct-13	11-Oct-13

**Certificate of Analysis**

Report Date: 16-Oct-2013

Client: Kollaard Associates Inc.

Order Date: 10-Oct-2013

Client PO:

Project Description:

<b>Client ID:</b>	TP2-SA1	TP3-SA1	TP2-SA2	-
<b>Sample Date:</b>	25-Sep-13	25-Sep-13	25-Sep-13	-
<b>Sample ID:</b>	1341268-01	1341268-02	1341268-03	-
<b>MDL/Units</b>	Soil	Soil	Soil	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	57.0	66.4	63.5	-
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**Metals**

Cobalt	1.0 ug/g dry	15.7	17.2	12.2	-
Vanadium	1.0 ug/g dry	75.0	95.2	66.1	-

**Certificate of Analysis**

Report Date: 16-Oct-2013

Client: Kollaard Associates Inc.

Order Date: 10-Oct-2013

Client PO:

Project Description:

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Metals</b>									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						

**Certificate of Analysis**

Report Date: 16-Oct-2013

Client: Kollaard Associates Inc.

Order Date: 10-Oct-2013

Client PO:

Project Description:

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Metals</b>									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	ND	1.0	ug/g dry	ND			0.0	30	
Barium	47.7	1.0	ug/g dry	46.3			3.0	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	5.20	1.0	ug/g dry	4.77			8.5	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	8.79	1.0	ug/g dry	7.91			10.6	30	
Cobalt	2.94	1.0	ug/g dry	2.88			2.2	30	
Copper	6.43	1.0	ug/g dry	5.82			10.0	30	
Lead	3.94	1.0	ug/g dry	3.40			14.8	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	5.08	1.0	ug/g dry	5.29			4.2	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	2.41	1.0	ug/g dry	ND			0.0	30	
Vanadium	16.8	1.0	ug/g dry	15.5			8.2	30	
Zinc	14.5	1.0	ug/g dry	27.4			61.4	30	QR-04
<b>Physical Characteristics</b>									
% Solids	85.7	0.1	% by Wt.	88.5			3.2	25	

**Certificate of Analysis**

Report Date: 16-Oct-2013

Client: Kollaard Associates Inc.

Order Date: 10-Oct-2013

Client PO:

Project Description:

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Metals</b>									
Antimony	210		ug/L	ND	85.8	70-130			
Arsenic	227		ug/L	ND	90.8	70-130			
Barium	1100		ug/L	926	70.3	70-130			
Beryllium	206		ug/L	2.62	81.2	70-130			
Boron	288		ug/L	95.4	77.2	70-130			
Cadmium	198		ug/L	1.43	78.8	70-130			
Chromium	343		ug/L	158	73.9	70-130			
Cobalt	233		ug/L	57.5	70.2	70-130			
Copper	308		ug/L	116	76.8	70-130			
Lead	255		ug/L	67.9	74.8	70-130			
Molybdenum	180		ug/L	3.66	70.5	70-130			
Nickel	284		ug/L	106	71.3	70-130			
Selenium	171		ug/L	ND	74.7	70-130			
Silver	190		ug/L	ND	75.9	70-130			
Thallium	163		ug/L	3.05	63.9	70-130			QM-07
Uranium	251		ug/L	ND	100	70-130			
Vanadium	501		ug/L	309	76.7	70-130			
Zinc	745		ug/L	548	78.9	70-130			

**Certificate of Analysis**

Client: **Kollaard Associates Inc.**  
Client PO:

Project Description:

Report Date: 16-Oct-2013  
Order Date: 10-Oct-2013

**Qualifier Notes:**

**QC Qualifiers :**

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

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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



Client: Kollaard Associates Inc.  
210 Prescott St., Box 189  
Kemptville, ON  
K0G 1J0  
Attention: Ms. Colleen Vermeersch  
PO#: 130293  
Invoice to: Kollaard Associates Inc.

Report Number: 1321323  
Date Submitted: 2013-09-27  
Date Reported: 2013-10-04  
Project: 130293  
COC #: 174161

---

**Dear Colleen Vermeersch:**

**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

APPROVAL: \_\_\_\_\_

Charlie (Long) Qu  
Laboratory Supervisor, Organics

Exova (Ottawa) is certified and accredited for specific parameters by:  
CALA, Canadian Association for Laboratory Accreditation (to ISO 17025), OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils), Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is certified and accredited for specific parameters by:  
SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only.

Client: Kollaard Associates Inc.  
 210 Prescott St., Box 189  
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 K0G 1J0  
 Attention: Ms. Colleen Vermeersch  
 PO#: 130293  
 Invoice to: Kollaard Associates Inc.

Report Number: 1321323  
 Date Submitted: 2013-09-27  
 Date Reported: 2013-10-04  
 Project: 130293  
 COC #: 174161

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Petroleum Hydrocarbons	Petroleum Hydrocarbons F1	100	ug/L	STD-750	1061130 Groundwater
	Petroleum Hydrocarbons F1-BTEX	100	ug/L		
	Petroleum Hydrocarbons F2	100	ug/L	STD-150	2013-09-27 BH1-SA1
	Petroleum Hydrocarbons F3	200	ug/L	STD-500	
	Petroleum Hydrocarbons F4	200	ug/L	STD-500	
VOCs	Benzene	0.5	ug/L	STD-430	<100
	Ethylbenzene	0.5	ug/L	STD-2300	<100
	m/p-xylene	0.5	ug/L		<100
	o-xylene	0.5	ug/L		<100
	Toluene	0.5	ug/L	STD-18000	<100
	Xylene Mixture	1.0	ug/L	STD-4200	<100
VOCs Surrogates (%)	Toluene-d8	0	%		108

**Guideline = O.Reg 153-T3-Non-Potable GW**

**\* = Guideline Exceedence**

\*\* - Analysis completed in Mississauga

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Kollaard Associates Inc.  
 210 Prescott St., Box 189  
 Kemptville, ON  
 K0G 1J0  
 Attention: Ms. Colleen Vermeersch  
 PO#: 130293  
 Invoice to: Kollaard Associates Inc.

Report Number: 1321323  
 Date Submitted: 2013-09-27  
 Date Reported: 2013-10-04  
 Project: 130293  
 COC #: 174161

**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
<b>Run No 0 Analysis Date 2013-10-01 Method V 8260B</b>			
Xylene Mixture			
<b>Run No 258492 Analysis Date 2013-10-01 Method O CCME Reg 153</b>			
Petroleum Hydrocarbons F1	<100 ug/L	89	80-120
<b>Run No 258495 Analysis Date 2013-10-01 Method V 8260B</b>			
Benzene	<0.5 ug/L	106	80-120
Ethylbenzene	<0.5 ug/L	100	80-120
m/p-xylene	<0.5 ug/L	107	80-120
o-xylene	<0.5 ug/L	107	80-120
Toluene	<0.5 ug/L	107	80-120
Toluene-d8	99 %	102	80-120
<b>Run No 258497 Analysis Date 2013-10-01 Method O CCME Reg 153</b>			
Petroleum Hydrocarbons F1-BTEX			
<b>Run No 258547 Analysis Date 2013-10-02 Method O CCME</b>			
Petroleum Hydrocarbons F2	<100 ug/L	101	50-120

**Guideline = O.Reg 153-T3-Non-Potable GW**

**\* = Guideline Exceedence**

\*\* - Analysis completed in Mississauga

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MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: Kollaard Associates Inc.  
 210 Prescott St., Box 189  
 Kemptville, ON  
 K0G 1J0  
 Attention: Ms. Colleen Vermeersch  
 PO#: 130293  
 Invoice to: Kollaard Associates Inc.

Report Number: 1321323  
 Date Submitted: 2013-09-27  
 Date Reported: 2013-10-04  
 Project: 130293  
 COC #: 174161

**QC Summary**

Analyte	Blank	QC % Rec	QC Limits
Petroleum Hydrocarbons F3	<200 ug/L	101	50-120
Petroleum Hydrocarbons F4	<200 ug/L	101	50-120

**Guideline = O.Reg 153-T3-Non-Potable GW**

**\* = Guideline Exceedence**

\*\*-Analysis completed in Mississauga

Results relate only to the parameters tested on the samples submitted.

Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline,  
 MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable  
 Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO =  
 Interim Provincial Water Quality Objective, TDR = Typical Desired Range

## Certificate of Analysis

### Kollaard Associates Inc.

210 Prescott St. Unit 1  
Kemptville, ON K1G 4J8  
Attn: Colleen Vermeersch

Phone: (613) 860-0923  
Fax: (613) 860-0923

Client PO:

Report Date: 19-Nov-2013

Project: 130293

Order Date: 13-Nov-2013

Custody: 13968

**Order #: 1346199**

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

Parcel ID	Client ID
1346199-01	TP1-SA1
1346199-02	TP2-SA2
1346199-03	TP3-SA3
1346199-04	TP3-SA4
1346199-05	TP4-SA5

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	15-Nov-13	15-Nov-13
PAHs by GC-MS	EPA 8270 - GC-MS, extraction	13-Nov-13	14-Nov-13
Solids, %	Gravimetric, calculation	14-Nov-13	14-Nov-13

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

Client ID:	TP1-SA1	TP2-SA2	TP3-SA3	TP3-SA4
Sample Date:	13-Nov-13	13-Nov-13	13-Nov-13	13-Nov-13
Sample ID:	1346199-01	1346199-02	1346199-03	1346199-04
MDL/Units	Soil	Soil	Soil	Soil

**Physical Characteristics**

% Solids	0.1 % by Wt.	70.3	68.7	86.9	76.9
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**Metals**

Antimony	1.0 ug/g dry	<1.0	2.1	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.6	1.3	<1.0	1.4
Barium	1.0 ug/g dry	257	291	37.3	227
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	6.9	7.2	3.7	4.4
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	110	121	24.8	97.5
Cobalt	1.0 ug/g dry	15.4	15.8	5.7	12.5
Copper	1.0 ug/g dry	30.5	36.9	15.7	42.6
Lead	1.0 ug/g dry	7.9	8.7	5.3	5.8
Molybdenum	1.0 ug/g dry	2.1	<1.0	<1.0	<1.0
Nickel	1.0 ug/g dry	43.6	45.2	15.2	35.3
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	1.0 ug/g dry	75.2	68.9	29.3	48.8
Zinc	1.0 ug/g dry	72.8	75.4	24.4	59.0

**Semi-Volatiles**

Acenaphthene	0.02 ug/g dry	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	<0.02	<0.02	-	-
Anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Biphenyl	0.02 ug/g dry	<0.02	<0.02	-	-
Chrysene	0.02 ug/g dry	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

	Client ID: Sample Date: Sample ID:	TP1-SA1 13-Nov-13 1346199-01	TP2-SA2 13-Nov-13 1346199-02	TP3-SA3 13-Nov-13 1346199-03	TP3-SA4 13-Nov-13 1346199-04
	MDL/Units	Soil	Soil	Soil	Soil
Fluorene	0.02 ug/g dry	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	<0.04	-	-
Naphthalene	0.01 ug/g dry	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g dry	<0.02	<0.02	-	-
Pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	28.2% [2]	35.7% [2]	-	-
Terphenyl-d14	Surrogate	82.8%	79.6%	-	-

	Client ID: Sample Date: Sample ID:	TP4-SA5 13-Nov-13 1346199-05	-	-	-
	MDL/Units	Soil	-	-	-

**Physical Characteristics**

% Solids	0.1 % by Wt.	64.9	-	-	-
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**Metals**

Antimony	1.0 ug/g dry	1.1	-	-	-
Arsenic	1.0 ug/g dry	1.5	-	-	-
Barium	1.0 ug/g dry	397	-	-	-
Beryllium	1.0 ug/g dry	<1.0	-	-	-
Boron	1.0 ug/g dry	3.6	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	1.0 ug/g dry	126	-	-	-
Cobalt	1.0 ug/g dry	16.3	-	-	-
Copper	1.0 ug/g dry	39.6	-	-	-
Lead	1.0 ug/g dry	6.7	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	1.0 ug/g dry	44.4	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.5 ug/g dry	<0.5	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	2.9	-	-	-
Vanadium	1.0 ug/g dry	79.8	-	-	-
Zinc	1.0 ug/g dry	85.3	-	-	-

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Metals</b>									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
<b>Semi-Volatiles</b>									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Biphenyl	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	1.12		ug/g		83.8	50-140			
Surrogate: Terphenyl-d14	1.14		ug/g		85.3	50-140			

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

**Method Quality Control: Duplicate**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Metals</b>									
Antimony	7.04	1.0	ug/g dry	6.35			10.4	30	
Arsenic	19.8	1.0	ug/g dry	20.3			2.7	30	
Barium	183	10.0	ug/g dry	168			8.6	30	
Beryllium	ND	1.0	ug/g dry	ND				30	
Boron	9.78	1.0	ug/g dry	9.82			0.5	30	
Cadmium	1.10	0.5	ug/g dry	1.02			7.6	30	
Chromium	134	10.0	ug/g dry	121			10.8	30	
Cobalt	150	10.0	ug/g dry	133			12.0	30	
Copper	606	10.0	ug/g dry	618			1.9	30	
Lead	115	1.0	ug/g dry	112			2.2	30	
Molybdenum	44.5	1.0	ug/g dry	46.2			3.8	30	
Nickel	674	10.0	ug/g dry	572			16.4	30	
Selenium	ND	1.0	ug/g dry	1.55			0.0	30	
Silver	ND	0.5	ug/g dry	0.66			0.0	30	
Thallium	ND	1.0	ug/g dry	ND				30	
Uranium	ND	1.0	ug/g dry	10.6			0.0	30	
Vanadium	41.1	1.0	ug/g dry	41.8			1.7	30	
Zinc	815	10.0	ug/g dry	677			18.5	30	
<b>Physical Characteristics</b>									
% Solids	62.7	0.1	% by Wt.	61.4			2.2	25	
<b>Semi-Volatiles</b>									
Acenaphthene	ND	0.04	ug/g dry	ND			0.0	40	
Acenaphthylene	0.152	0.04	ug/g dry	0.093			48.9	40	QR-04
Anthracene	0.049	0.04	ug/g dry	ND			0.0	40	
Benzo [a] anthracene	0.046	0.04	ug/g dry	ND			0.0	40	
Benzo [a] pyrene	0.137	0.04	ug/g dry	0.061			77.4	40	QR-04
Benzo [b] fluoranthene	0.153	0.04	ug/g dry	0.067			77.9	40	QR-04
Benzo [g,h,i] perylene	0.215	0.04	ug/g dry	0.145			38.9	40	
Benzo [k] fluoranthene	0.053	0.04	ug/g dry	ND			0.0	40	
Biphenyl	ND	0.04	ug/g dry	ND			0.0	40	GEN09
Chrysene	0.126	0.04	ug/g dry	0.053			81.2	40	QR-04
Dibenzo [a,h] anthracene	ND	0.04	ug/g dry	ND			0.0	40	GEN09
Fluoranthene	0.117	0.04	ug/g dry	0.060			64.5	40	QR-04
Fluorene	0.053	0.04	ug/g dry	ND			0.0	40	
Indeno [1,2,3-cd] pyrene	0.077	0.04	ug/g dry	0.045			53.2	40	QR-04
1-Methylnaphthalene	0.055	0.04	ug/g dry	ND			0.0	40	
2-Methylnaphthalene	0.066	0.04	ug/g dry	0.046			35.7	40	
Naphthalene	0.276	0.02	ug/g dry	0.228			18.9	40	
Phenanthrene	0.197	0.04	ug/g dry	0.100			65.9	40	QR-04
Pyrene	0.170	0.04	ug/g dry	0.102			50.4	40	QR-04
Surrogate: 2-Fluorobiphenyl	1.51		ug/g dry	ND	97.3	50-140			
Surrogate: Terphenyl-d14	1.41		ug/g dry	ND	90.9	50-140			

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Metals</b>									
Antimony	218		ug/L	ND	87.3	70-130			
Arsenic	222		ug/L	ND	88.6	70-130			
Barium	235		ug/L	ND	93.9	70-130			
Beryllium	223		ug/L	ND	89.3	70-130			
Boron	224		ug/L	ND	89.7	70-130			
Cadmium	221		ug/L	ND	88.5	70-130			
Chromium	229		ug/L	ND	91.8	70-130			
Cobalt	228		ug/L	ND	91.0	70-130			
Copper	229		ug/L	ND	91.4	70-130			
Lead	218		ug/L	ND	87.4	70-130			
Molybdenum	223		ug/L	ND	89.3	70-130			
Nickel	223		ug/L	ND	89.1	70-130			
Selenium	240		ug/L	ND	95.8	70-130			
Silver	221		ug/L	ND	88.3	70-130			
Thallium	225		ug/L	ND	89.9	70-130			
Uranium	246		ug/L	ND	98.2	70-130			
Vanadium	222		ug/L	ND	88.9	70-130			
Zinc	215		ug/L	ND	86.0	70-130			
<b>Semi-Volatiles</b>									
Acenaphthene	0.104	0.04	ug/g	ND	53.9	50-140			
Acenaphthylene	0.220	0.04	ug/g	0.093	65.6	50-140			
Anthracene	0.177	0.04	ug/g	ND	91.2	50-140			
Benzo [a] anthracene	0.169	0.04	ug/g	ND	87.3	50-140			
Benzo [a] pyrene	0.222	0.04	ug/g	0.061	83.1	50-140			
Benzo [b] fluoranthene	0.276	0.04	ug/g	0.067	108	50-140			
Benzo [g,h,i] perylene	0.219	0.04	ug/g	0.145	38.4	50-140			QM-06
Benzo [k] fluoranthene	0.192	0.04	ug/g	ND	99.0	50-140			
Biphenyl	0.098	0.04	ug/g	ND	50.6	50-140			
Chrysene	0.254	0.04	ug/g	0.053	104	50-140			
Dibenzo [a,h] anthracene	0.128	0.04	ug/g	ND	66.1	50-140			
Fluoranthene	0.224	0.04	ug/g	0.060	84.7	50-140			
Fluorene	0.155	0.04	ug/g	ND	80.2	50-140			
Indeno [1,2,3-cd] pyrene	0.148	0.04	ug/g	0.045	53.5	50-140			
1-Methylnaphthalene	0.122	0.04	ug/g	ND	63.0	50-140			
2-Methylnaphthalene	0.134	0.04	ug/g	0.046	45.7	50-140			QM-06
Naphthalene	0.287	0.02	ug/g	0.228	30.2	50-140			QM-06
Phenanthrene	0.265	0.04	ug/g	0.100	85.5	50-140			
Pyrene	0.297	0.04	ug/g	0.102	101	50-140			
Surrogate: 2-Fluorobiphenyl	1.22		ug/g		78.8	50-140			

**Certificate of Analysis**

Client: **Kollaard Associates Inc.**  
Client PO:

Project Description: 130293

Report Date: 19-Nov-2013  
Order Date: 13-Nov-2013

**Qualifier Notes:**

*Sample Qualifiers :*

2 : PAH surrogate recovery (2-Fluorobiphenyl) lower than expected due to matrix interference.

*QC Qualifiers :*

GEN09 : Elevated detection limits due to the nature of the sample matrix.

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

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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



## Certificate of Analysis

### Kollaard Associates Inc.

210 Prescott St. Unit 1  
Kemptville, ON K1G 4J8  
Attn: Colleen Vermeersch

Phone: (613) 860-0923  
Fax: (613) 860-0923

Client PO:

Report Date: 19-Nov-2013

Project: 130293

Order Date: 13-Nov-2013

Custody: 13968

**Order #: 1346200**

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

Paracel ID	Client ID
1346200-01	BH1-SA2

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc  
Laboratory Director

**Certificate of Analysis**

Client: Kollaard Associates Inc.  
Client PO:

Project Description: 130293

Report Date: 19-Nov-2013  
Order Date: 13-Nov-2013

**Analysis Summary Table**

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PAHs by GC-MS	EPA 625 - GC-MS, extraction	16-Nov-13	18-Nov-13

P: 1-800-749-1947  
E: PARACEL@PARACELLABS.COM

WWW.PARACELLABS.COM

**OTTAWA**  
300-2319 St. Laurent Blvd.  
Ottawa, ON K1G 4J8

**MISSISSAUGA**  
6845 Kitimat Rd. Unit #27  
Mississauga, ON L5N 6J3

**NIAGARA FALLS**  
5415 Morning Glory Cr.  
Niagara Falls, ON L2J 0A3

**SARNIA**  
123 Christina St. N.  
Sarnia, ON N7T 5T7

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

<b>Client ID:</b>	BH1-SA2	-	-	-
<b>Sample Date:</b>	13-Nov-13	-	-	-
<b>Sample ID:</b>	1346200-01	-	-	-
<b>MDL/Units</b>	Water	-	-	-

**Semi-Volatiles**

Acenaphthene	0.05 ug/L	<0.05	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] anthracene	0.01 ug/L	0.04	-	-	-
Benzo [a] pyrene	0.01 ug/L	0.02	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-
Biphenyl	0.05 ug/L	0.06	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-
Fluoranthene	0.01 ug/L	0.05	-	-	-
Fluorene	0.05 ug/L	0.15	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-
1-Methylnaphthalene	0.05 ug/L	0.08	-	-	-
2-Methylnaphthalene	0.05 ug/L	0.10	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	0.18	-	-	-
Naphthalene	0.05 ug/L	0.10	-	-	-
Phenanthrene	0.05 ug/L	0.37	-	-	-
Pyrene	0.01 ug/L	0.04	-	-	-
2-Fluorobiphenyl	Surrogate	79.1%	-	-	-
Terphenyl-d14	Surrogate	79.7%	-	-	-

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

**Method Quality Control: Blank**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Semi-Volatiles</b>									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Biphenyl	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	16.4		ug/L		82.2	50-140			
Surrogate: Terphenyl-d14	18.1		ug/L		90.3	50-140			

**Certificate of Analysis**

Report Date: 19-Nov-2013

Client: Kollaard Associates Inc.

Order Date: 13-Nov-2013

Client PO:

Project Description: 130293

**Method Quality Control: Spike**

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
<b>Semi-Volatiles</b>									
Acenaphthene	3.82	0.05	ug/L	ND	76.4	50-140			
Acenaphthylene	3.95	0.05	ug/L	ND	79.1	50-140			
Anthracene	4.00	0.01	ug/L	ND	80.1	50-140			
Benzo [a] anthracene	3.55	0.01	ug/L	ND	71.1	50-140			
Benzo [a] pyrene	3.22	0.01	ug/L	ND	64.3	50-140			
Benzo [b] fluoranthene	4.11	0.05	ug/L	ND	82.1	50-140			
Benzo [g,h,i] perylene	3.84	0.05	ug/L	ND	76.8	50-140			
Benzo [k] fluoranthene	4.09	0.05	ug/L	ND	81.8	50-140			
Biphenyl	3.24	0.05	ug/L	ND	64.8	50-140			
Chrysene	4.36	0.05	ug/L	ND	87.3	50-140			
Dibenzo [a,h] anthracene	4.17	0.05	ug/L	ND	83.4	50-140			
Fluoranthene	4.42	0.01	ug/L	ND	88.4	50-140			
Fluorene	4.01	0.05	ug/L	ND	80.2	50-140			
Indeno [1,2,3-cd] pyrene	4.11	0.05	ug/L	ND	82.2	50-140			
1-Methylnaphthalene	3.77	0.05	ug/L	ND	75.5	50-140			
2-Methylnaphthalene	4.03	0.05	ug/L	ND	80.6	50-140			
Naphthalene	3.68	0.05	ug/L	ND	73.7	50-140			
Phenanthrene	4.06	0.05	ug/L	ND	81.2	50-140			
Pyrene	4.56	0.01	ug/L	ND	91.2	50-140			
Surrogate: 2-Fluorobiphenyl	15.2		ug/L		76.2	50-140			

**Certificate of Analysis**

Client: **Kollaard Associates Inc.**  
Client PO:

Project Description: 130293

Report Date: 19-Nov-2013  
Order Date: 13-Nov-2013

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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Page \_\_\_ of \_\_\_

Client Name: <u>Kollaard Associates</u>	Project Reference: <u>130293</u>	TAT: <input checked="" type="checkbox"/> Regular <input type="checkbox"/> 3 Day  <input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day  Date Required: _____
Contact Name: <u>Colleen</u>	Quote #	
Address: <u>210 Prescott St, Kemptville</u>	PO #	
Telephone: <u>613 860 0923 ext 230</u>	Email Address: <u>colleen@kollaard.ca</u>	

Criteria:  O. Reg. 153/04 (As Amended) Table 3  RSC Filing  O. Reg. 558/00  PWQO  CCME  SUB (Storm)  SUB (Sanitary) Municipality: \_\_\_\_\_  Other: \_\_\_\_\_

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

Required Analyses

Paracel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		PAHS	153/04 Metals (ICP)	Required Analyses														
Sample ID/Location Name					Date	Time																	
1346199 - soil																							
1346200 - water																							
1	TP1-SA1	S		2	13/11/13	9:30 am	✓	✓															2x 250 ml
2	TP2-SA2	S		2	13/11/13	10 am	✓	✓															"
3	TP3-SA3	S		1	13/11/13	11 am		✓															250 ml
4	TP3-SA4	S		1	13/11/13	11 am		✓															↓
5	TP4-SA5	S		1	13/11/13	11:30 am		✓															
6	BH1-SA21	GW		1	13/11/13	11:30 am	✓																
7																							
8																							
9																							
10																							

Comments: soil samples all medium/fine grained, except for TP3-SA3 (coarse grained) Method of Delivery: Walk-in

Relinquished By (Sign): <u>C Vermeersch</u>	Received by Driver/Depot:	Received at Lab: <u>M/C</u>	Verified By: <u>M/C</u>
Relinquished By (Print): <u>C Vermeersch</u>	Date/Time: _____	Date/Time: <u>Nov 13/13 12:24</u>	Date/Time: <u>Nov 13/13 1:49</u>
Date/Time: <u>13/11/13 - 12:20 pm</u>	Temperature: _____ °C	Temperature: <u>6.5</u> °C	pH Verified: <u>N/A</u>