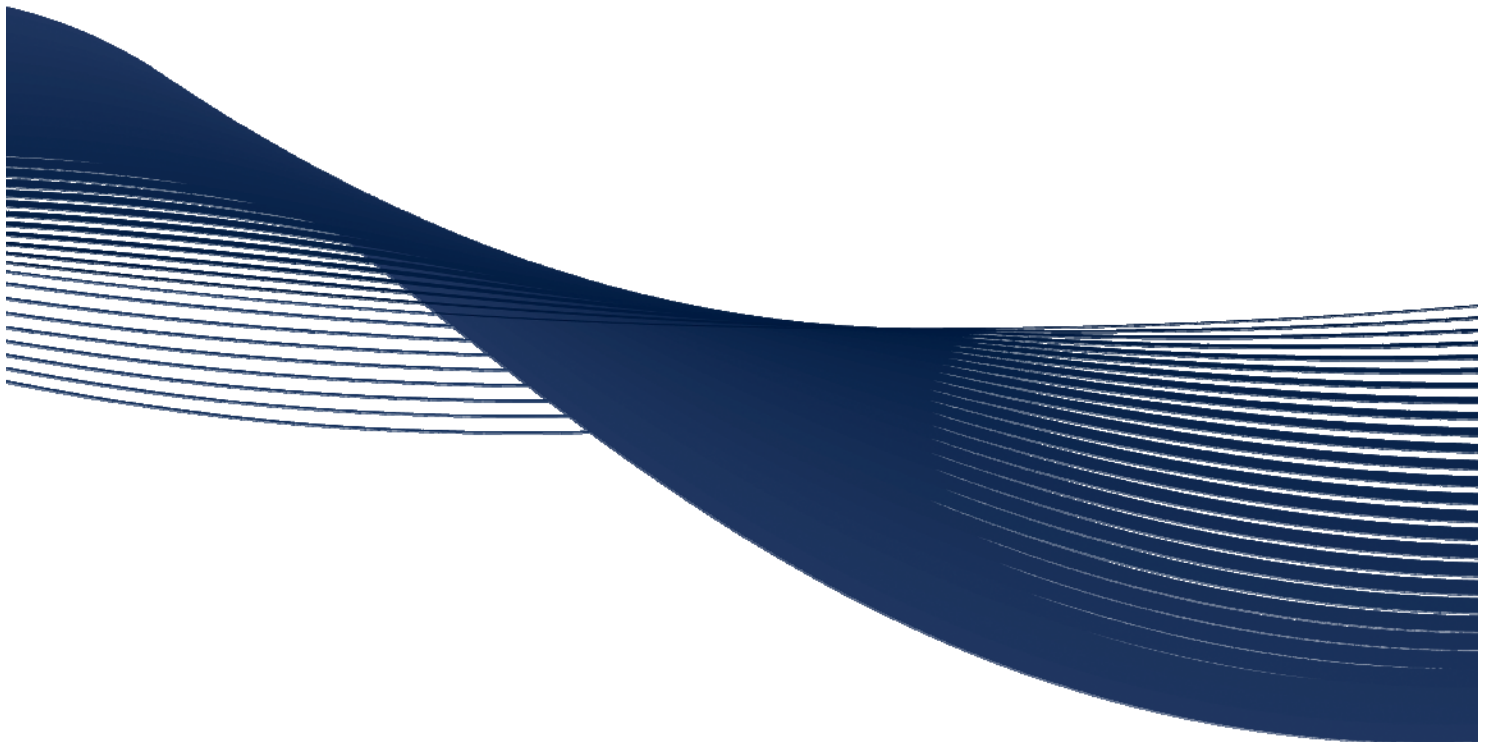


# MARIANNEVILLE DEVELOPMENTS LTD.

PHASE II ENVIRONMENTAL SITE ASSESSMENT

Estates of Glenway, Town of Newmarket

Project No.: L09-301



NOVEMBER 2013

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November 22, 2013

Our Ref: L09-301

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**Attention: Ms. Joanne Barnett**

Dear Ms. Barnett:

**Re: Phase II Environmental Site Assessment  
470 Crossland Gate, Newmarket, Ontario**

Cole Engineering Group Ltd. has completed the Phase II Environmental Site Assessment at the above mentioned property. A summary of the work undertaken and the soil and groundwater sampling results are documented in the accompanying report.

We thank you for the opportunity to undertake this work on your behalf. If you have any questions, please do not hesitate to call our office.

Yours truly,

**COLE ENGINEERING GROUP LTD.**



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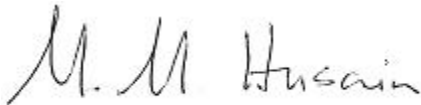
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**Issues and Revisions Registry**

Identification	Date	Description of issued and/or revision
Draft Report	April 11, 2012	For client/municipality review
Final Report	November 22, 2013	Final Submission

## **Statement of Conditions**

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## 1.0 Executive Summary

Cole Engineering Group Ltd. (CEG) was retained by Ms. Joanna Barnett of The Kerbel Group Inc. (on behalf of Marianneville Development Limited) to conduct a Phase II Environmental Site Assessment (ESA) for the property at 470 Crossland Gate in Newmarket, Ontario (herein referred to as the Site). The purpose of the Phase II ESA was to investigate potential soil impacts as a result of historical and current land use on-site for due diligence purposes. According to the latest amendment of Ontario Regulation (O. Reg.) 153/04, a Record of Site Condition (RSC) is not required for the Site as the proposed residential development does not constitute a change to a more sensitive land use. However, if an RSC is required for the Site by other parties, the Phase II ESA has been written in accordance with the latest amendments of O. Reg. 153/04 so that it may support the submission of an RSC for the Site.

The purpose of the study was to investigate the potential for the presence of on-site contamination related to on-site concerns stemming from pesticide use and off-site concerns related to fuel storage.

One (1) borehole was drilled on the Site and a total of two (2) soil samples (plus one (1) trip blank) were submitted for laboratory analysis. A total of four (4) surficial soil samples (including one (1) duplicate) were also submitted for laboratory analysis. The soil samples analyzed were compared to the applicable *Soil and Groundwater Standards – Table 2 Potable Groundwater - as amended April 15, 2011* for Residential/Parkland/Institutional Property Use for coarse-grained materials. A total of three (3) groundwater samples (plus two (2) trip blanks and one (1) duplicate sample) were also submitted for laboratory analysis. Groundwater samples were compared to the applicable *Soil and Groundwater Standards – Table 2 Potable Groundwater - as amended April 15, 2011* for All Types of Property Use for coarse-grained materials. Groundwater samples were collected from existing monitoring wells on-site that were installed as part of the Hydrogeological Investigation for the Site, also conducted by CEG.

All soil and groundwater samples were submitted to Maxxam Analytics (Maxxam) in Mississauga, Ontario for analysis.

The results of the soil analyses for OC Pesticides, volatile organic compounds (VOCs) and petroleum hydrocarbon (PHC) fractions F1-F4 indicated that all samples submitted for analysis met the applicable Table 2 Site Condition Standards (SCS).

The results of the groundwater analyses indicated that all samples submitted for analysis met the applicable Table 2 SCS.

Based on the findings of our soil and groundwater sampling program, contamination was not identified on the property. No further investigation is recommended.

## 2.0 Introduction

Cole Engineering Group Ltd. (CEG) was retained by Ms. Joanne Barnett of The Kerbel Group (on behalf of Marianneville Development Ltd.) to conduct a Phase II ESA for the property located at 470 Crossland Gate in Newmarket, Ontario. For the purposes of this report, the “Property” is defined as the area bounded to the north by Davis Drive, to the west by Bathurst Street and to the east and south by the property boundaries for 470 Crossland Gate. The “Site” includes all portions of the Property to the east of the hydro corridor and the park area south of the pumping reservoir, the lands east of Kirby Crescent and the north portion of the Site bordering Alex Doner Drive on the west side of the hydro corridor



**(Figure 1).** The purpose of the Phase II ESA was to investigate potential soil impacts as a result of historical and current land use on-site for due diligence purposes. The future land use of the Site is proposed to be residential. According to the latest amendment of O. Reg. 153/04, an RSC is not required for the Site as the proposed residential development does not constitute a change to a more sensitive land use. However, if an RSC is required for the Site by other parties, the Phase I ESA has been written in accordance with the latest amendments of O. Reg. 153/04 so that it may support the submission of an RSC for the Site. The Phase II ESA was conducted in accordance with the latest requirements of O.Reg. 153/04 (as amended by O. Reg. 269/11) as well as the guidelines and procedures established in the Canadian Standards Association (CSA) document Z769-00.

The purpose of the study was to investigate the potential for the presence of on-site contamination related to on-site concerns stemming from pesticide use and off-site concerns related to fuel storage.

## 2.1. Site Description

The Site is comprised of seven (7) Property Identification Numbers (PIN) numbers. The PIN numbers which make up the Site and their associated legal descriptions are described below:

### **PIN 03584-003 LT**

Parcel 73-1 Section 65M-2284, being Block 73 Plan 65 M-2284; together with easement over Part Lot 94 Concession 1 West of Yonge Street, designated as Part 1 Plan 65R-5721 as in LT109148; Newmarket.

### **PIN 03580-0293 LT**

Parcel 155-1 Section 65M-2205, being Block 155 Plan 65M-2205; together with easement over Part Lot 94 Concession 1 West of Yonge Street, designated as Part 1 Plan 65R-5721 as in LT109148; together with easement over Parts 1 & 2 Plan 65R-6519 for the purposes of ingress and egress to the said lands by pedestrians, golf carts and service vehicles, the exact terms and conditions of which may be the subject of further agreement with The Corporation of the Town of Newmarket, as set out on Plan 65M-2211 (subject to LT156090); subject to an easement over Parts 5, 6, 7, 8 & 9, Plan 65R-7111, Parts 5 & 6, Plan 65R-7112, Parts 13, 14 & 15, Plan 65R7114 and Parts 3 & 4, Plan 65R7113, as in LT195504; subject to an easement in LT317245, Newmarket (Amended 2001/02/05 at 10:06 by Lois Yakiwchuk, ADLR); subject to easement over Part 1 Plan 65R-23447, as in LT1596157.

### **PIN 03581-0209 LT**

Parcel 92-3 Section 65M-2212, being Part of Block 92 Plan 65M-2212 designated as Parts 1, 4, 5, 6 & 7 Plan 65R-7939; together with an easement in favour of the owners of Block 92, Plan 65M-2212 over those parts of Streets on Plan 65M-2212 designated as Part 1, Plan 65R-6520 for the purposes of ingress and egress to the said lands by pedestrians, golf carts and service vehicles, the exact terms and conditions of which may be the subject of further agreement with The Corporation of the Town of Newmarket, as set out on Plan 65M-2212; together with easement over Part Lot 94, Concession 1 designated as Part 1 Plan 65R-5721 as in LT109148; subject to LT195504, LT583898 Newmarket.

### **PIN 03581-0179 LT**

Parcel 144-1 Section 65M-2261, being Block 144 Plan 65M-2261; together with easement over Part of Lot 94 Concession 1 designated as Part 1 Plan 65R-5721 as in LT109148; LT474734 Newmarket.

**PIN 03581-0178 LT**

Parcel 142-1 Section 65M-2261, being Block 142 Plan 65M-2261; together with easement over Part of Lot 94 Concession 1 designated as Part 1 Plan 65R-5721 as in LT109148; Newmarket.

**PIN 03581-0027 LT**

Parcel 89-1 Section 65M-2263, being Block 89 Plan 65M-2263; together with easement over Part of Lot 94 Concession 1 designated as Part 1 Plan 65R-5721 as in LT109148; LT474734 Newmarket; subject to easement over Part 6, Plan 65R-22514, as in LT1570875; subject to easement over Parts 5 & 7, Plan 65R-22514, as in LT1570878\*

[\* only a portion of this PIN (as illustrated in Figure 1) was included in this investigation]

**PIN 03582-0505 LT**

Parcel 91-1 Section 65M-2212, being Block 91 Plan 65M-2212; together with easement over Part of Lot 94, Concession 1, designated as Part 1 Plan 65R-5721 as in LT109148; Newmarket.

The Site is irregular in shape and is approximately 36.3 hectares (ha) in area. It was most recently used as a golf course, with the majority of the Site area utilized as playing area (tee boxes, fairway, greens, etc.). No building structures were observed on-site. The Site is accessible from the northern portion of the Site off Alex Doner Drive or Crossland Gate. The former building structures were predominantly situated in the north-central portion of the Site (clubhouse, indoor tennis court, pump house, golf cart storage building). A system of five (5) ponds is located on the Site that is connected to the other ponds on the Property via a piping system. A hydro corridor runs through the middle of the Property in a northwest to southeast direction.

The land use surrounding the Site is predominantly residential. To the west of the hydro corridor is the remainder of the Glenway Estates golf course and a pumping reservoir. The Upper Canada Mall lies northeast of the Site and adjacent to the site to the east is a GO bus station, followed by a commercial plaza. The Ray Twinney recreation complex and Crossland Public School properties lie south of the Site.

A Site Location Map is attached as **Figure 1**.

**2.2. Property Ownership**

As per the chain of title search conducted during the Phase I ESA of the Site, the most recent owner of the Site is Marianneville Developments Limited.

The owner and client contact information is as follows:

Owner Contact Information	Client Contact Information
Marianneville Developments Limited 26 Lesmill Road, Unit 3 Toronto, ON M3B 2T5	Ms. Joanne Barnett Marianneville Developments Limited c/o The Kerbel Group Inc. 26 Lesmill Road, Unit 3 Toronto, ON M3B 2T5

### 2.3. Current and Proposed Future Uses

The Site is currently zoned for parkland use. The proposed future land use is residential. According to the latest amendment of O. Reg. 153/04, an RSC is not required for the Site as the proposed residential development does not constitute a change to a more sensitive land use. However, if an RSC is required for the Site by other parties, the Phase I ESA has been written in accordance with the latest amendments of O. Reg. 153/04 so that it may support the submission of an RSC for the Site.

### 2.4. Applicable Site Condition Standard

Generic SCS are provided in the Ministry of the Environment (MOE) document entitled, "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*," dated April 15, 2011. The 2011 standards are referenced in O. Reg. 153/04 – Records of Site Condition as amended (hereafter referred to as the 2011 MOE Standards).

The Standard provides SCS for certain chemicals based on combinations of six different site-specific conditions as follows:

- *Property use type* – residential/parkland/institutional. The proposed development is residential. The Site is not considered an environmentally sensitive area (i.e., MOE Table 1 Full Depth Background Site Condition Standards do not apply) due to the following:
  - The Site is not known to be within, adjacent to or 30 m from an “area of natural significance” as defined by O.Reg. 153/04 (as amended).
  - Soil pH measured during this Phase II ESA was within the applicable range of 5 to 9 for surface soils and 5 to 11 for subsurface soils.
- *Restoration of groundwater quality* – potable. The Site is located within an area of the Town of Newmarket where the groundwater is used for potable purposes at the Site or within the area adjacent to the Site; specifically within 250 m. Drinking water in the area around the Site is supplied by municipal sources.
- *Restoration depth* – full depth. For comparative purposes, results were compared to full depth standards.
- *Soil texture* – coarse-grained textures. In order to take a conservative approach, the coarse-grained texture criteria will apply.
- *Shallow Soil Property* – A shallow soil property means a property of which 1/3 or more of the area consists of soil equal to or less than 2 m in depth beneath the soil surface, excluding any non-soil surface treatment. During this Phase II ESA, boreholes were advanced across the Site to depths greater than 2 m and bedrock was not encountered in any of the boreholes. Therefore, it is interpreted that bedrock is not present within the upper 2 m of the property and the Site does not classify as a shallow soil property.
- *Within 30 m of a Water Body* – A small tributary of Ansnorveldt Creek is located in the north-western portion of the Site, however according to Ministry of Natural Resources data for watercourses, it is listed as ‘intermittent’ and thus is not considered as a ‘water body’ as defined by O. Reg. 153.

Based on the above, the applicable standards used for this Phase II ESA were determined to be the Table 2 Potable Ground Water SCS for Residential/Parkland/Institutional Property Use for Coarse-Grained Textures (Table 2 Standards) (MOE, April 2011).

## **3.0 Background Information**

### **3.1. Physical Setting**

Data and information obtained and reviewed through the Phase I ESA conducted by CEG regarding the physical setting of the Site is summarized below:

#### **3.1.1. Topography**

An Ontario Base Map containing topographic data of the area around the Site suggests a generally flat terrain with a mound on the western side of the Site. As the area is currently a golf course, the Site has been landscaped to appear generally rolling with some flat areas. Locally, the topography slopes toward the SWM ponds on site. Generally, there is a downward north-westerly slope toward Ansnorveldt Creek and south-easterly slope toward Western Creek. On a regional scale, the land slopes north towards Lake Simcoe

#### **3.1.2. Physiography**

A physiographic map of the area indicates that the Site is located within the Simcoe Lowlands Physiographic Region which is generally composed of sand, silt and clay. According to Chapman and Putnam, 1984, the area consists of level plains based on deep deposits of sand and silt. To the east of the Simcoe Lowlands Physiographic Region is the Schomberg Clay Plains Physiographic Region and to the west is the north slope of the Oak Ridges Moraine Physiographic Region.

#### **3.1.3. Bedrock Geology**

The bedrock geology of the north portion of the Site comprises the Ottawa Group, Simcoe Group and Shadow Lake Formation. This was formed in the Middle Ordovician period and is composed primarily of limestone, dolostone, shale, arkose and sandstone. The bedrock geology of the south portion of the Site comprises the Georgian Bay Formation, Blue Mountain Formation, Billings Formation, Collingwood Member and Eastview Member. This was formed in the Upper Ordovician period and is composed primarily of shale, limestone, dolostone and siltstone.

The subsurface information obtained from EcoLog ERIS's Water Well Information System search and the MOE Well Records search was used to estimate that the bedrock at the Site is located at approximately 100 meters below ground surface.

#### **3.1.4. Surficial Geology**

The surficial geology of the Site was deposited in the Pleistocene age. It consists of glaciolacustrine deposits composed of silt and clay that is massive to laminated or rhythmically bedded basin deposits and Newmarket Till, which is composed of massive, silty sand to sandy silt matrix, with moderate to high matrix carbonate and clast content.

Surficial geology information obtained from EcoLog ERIS's Water Well Information System search and the MOE Well Records search indicated that the surficial geology in the vicinity of the Site consist mostly of clays with some silt, sand and gravel at deeper depths.

### 3.1.5. Groundwater Flow Direction

According to the Hydrogeological Investigation conducted for the Site by CEG, on a regional scale, groundwater flows generally northerly towards Lake Simcoe. In general, there is a divide across the middle of the Site, from which groundwater flows north-westerly and south-easterly. No significant seasonal variation was observed in the flow pattern throughout the monitoring events.

### 3.1.6. Water Bodies and Areas of Natural Significance

The Site is located predominantly within the East Holland River Subwatershed with the west portion of the Site within the West Holland River Subwatershed, under the jurisdiction of the Lake Simcoe Region Conservation Authority. A small tributary of Ansnorveldt Creek is located in the north-western portion of the Site, however according to Ministry of Natural Resources data for watercourses, it is listed as 'intermittent' and thus is not considered as a 'water body' as defined by O. Reg. 153. As such, the Site is not considered a sensitive site. West of the Site is Western Creek. Both creeks flow into the East Holland River. A Natural Features Map is presented as **Figure 2**.

The National Heritage Information Centre (NHIC) was queried for areas of natural significance for a 1 kilometre (km) radius around the Site. The search results revealed no areas of natural significance within 1 km of the Site.

## 3.2. Past Investigations

As part of the current undertaking, CEG conducted a Phase I ESA for the Site. Table 3.1 identifies the potentially contaminating activities (PCAs) determined through the Phase I ESA investigation:

**Table 3.1 – Potentially Contaminating Activities**

Site	Potentially Contaminating Activity
Site (470 Crossland Gate)	Pesticides (including herbicides, fungicides and anti-fouling agents) manufacturing, processing, bulk storage and large-scale applications
Off-Site (306 Crossland Gate)	Pesticides (including herbicides, fungicides and anti-fouling agents) manufacturing, processing, bulk storage and large-scale applications
Off-Site (neighbouring parcel to the south – approximately 100 m south)	Gasoline and associated products storage in fixed tanks Pesticides (including herbicides, fungicides and anti-fouling agents) manufacturing, processing, bulk storage and large-scale applications

Based on the Phase I ESA, potential environmental concerns are present on the Site relating to pesticide use. Off-site concerns include pesticide use and gasoline and associated products storage.

The following Areas of Potential Environmental Concern (APECs) were identified for the subject Site and are summarized in Table 3.2:

**Table 3.2 – Areas of Potential Environmental Concern**

APEC #	Contaminants of Concern	Location	Rationale
APEC-1	Pesticides	Entire Site	Application of pesticides on the Site as well as potential spills from the off-site pesticides operator may have resulted in soil and groundwater contamination due to

**Table 3.2 – Areas of Potential Environmental Concern**

APEC #	Contaminants of Concern	Location	Rationale
APEC-2	Pesticides Petroleum Hydrocarbons (PHCs) (BTEX, F1-F4)	Neighbouring Parcel South of Site	migration of the chemicals. Storage of pesticides and fuel tanks may have historically had spills which may have resulted in soil and groundwater contamination on the Site due to migration of chemicals.

The list of APECs identified is based on our observations of current site conditions and understanding of historical uses through various searches.

## 4.0 Scope of the Investigation

### 4.1. Overview of Site Investigation

CEG's scope of work for this ESA consists of the following general tasks:

- A **Background Review** of previous environmental work that has been conducted on the property to assist in identifying potential areas of environmental concern where possible contamination may exist;
- **Development of a Work Plan** that focuses on the investigation of potential areas of environmental concern identified in previous work;
- An **Intrusive Investigation Program** that includes environmental sampling in areas previously identified as having the greatest likelihood for contamination;
- An **Analytical Program** that targets contaminants of concern, incorporates analyses from a Canadian Association for Laboratory Accreditation (CALA) Accredited Laboratory and compares analytical results to the applicable provincial regulatory criteria;
- Incorporating field, laboratory and overall project **Quality Assurance and Quality Control** policies and procedures; and
- **Reporting** which summarizes the overall findings of the ESA and provides conclusions and recommendations for future work including an estimate for additional costs, should contamination be identified.

### 4.2. Media Investigated

Based on the results of the Phase I ESA conducted by CEG, it was determined that surficial and subsurface soil and groundwater samples would be collected and analyzed for various parameters and at various depths in areas of potential environmental concern as outlined in the Phase I ESA conducted by CEG.

### 4.3. Phase One Conceptual Site Model

The stratigraphy underlying the subject Site generally includes fine grained materials characteristic of the Newmarket Till, however, is interspersed with sand deposits. The topography undulates on a site scale and tends to slope towards the northeast on a more regional scale. According to the

Hydrogeological Investigation conducted for the Site by CEG, on a regional scale, groundwater flows generally northerly towards Lake Simcoe. In general, there is a divide across the middle of the Site, from which groundwater flows north-westerly and south-easterly. No significant seasonal variation was observed in the flow pattern throughout the monitoring events.

Potential contaminants may be introduced to the Site via current and historical activities on the subject Site and from neighbouring properties. Fuel storage tanks that were used currently and historically on the property to the south of the Site may have leaked or spilled and resulted in soil contamination. Similarly, vehicle maintenance may have also contributed to impacts on the facility. Other potential environmental concerns on the Site would include pesticide and fertilizer use and storage and waste generation. Potential sources of PCBs, ODSs and lead in the buildings will need to be addressed prior to demolition. Potential off-site environmental concerns include pesticide use and storage.

There is the potential that spills may have occurred as a result of the use and mixing of pesticides and/or herbicides on-site as well as off-site. Although the half-life of most pesticides and herbicides is quite short when sprayed, the potential exists for larger spills to have occurred and not been reported resulting in soil contamination. Pesticides/herbicides storage was observed in the maintenance garage area and a landscaping company with a licensed pesticide operator is located in the residential area in the middle of the Site. If spills occurred, it is possible that the chemicals would be introduced to the soil and groundwater system. The use of more persistent chemicals for the spraying of the greens would likely be present in shallow soils in the area of application, provided that the soil materials were not reworked extensively or moved.

Fuel storage tanks that were used historically on the property to the south of the Site may have leaked or spilled and resulted in soil contamination. Two (2) ASTs and no underground storage tanks (USTs) were observed here. The ASTs were located southwest of the maintenance garage. The tanks appeared in good condition; however, staining was observed suggesting the potential for spills and leaks entering the subsurface soils. PHCs could travel downwards through the subsurface materials until intercepted by the water table. The water level in this area is known to be shallow. PHCs would likely flow in the direction of groundwater flow in a north, north-easterly direction if introduced and be limited to the zone of water table fluctuation.

The variety of potential contaminants of concern include: PHCs (BTEX, F1-F4), VOCs, pesticides and metals and inorganics. It is possible for these contaminants to travel downwards until intercepted by the water table. Preferential pathways introduced by road bedding and underground utilities could act to transmit potential concerns.

The Phase I ESA Conceptual Site Model figure is attached as **Figure 3**.

#### **4.4. Deviations from Sampling and Analysis Plan**

Deviations from the sampling and analysis plan can be encountered as a result of unexpected field and/or weather conditions as well as from equipment limitations.

No deviations from the sampling and analysis plan were encountered.



## 4.5. Impediments

Physical impediments may be encountered during the intrusive investigation which may impede the collection of samples at desired depths, hinder access to specific locations on the Site, or any other item which may prevent the completion of all aspects of the sampling and analysis plan.

No physical impediments were encountered during the investigation.

## 5.0 Investigation Method

### 5.1. General

The findings from the review of previous environmental work identified areas of potential environmental concern associated with pesticide use at the Site. Off-site concerns include pesticide use and gasoline and associated products storage. A work plan was developed taking these locations and the anticipated Site groundwater flow direction into consideration.

### 5.2. Drilling and Excavating

Sonic Soils conducted the borehole drilling program on March 14, 2012 under the supervision of Andre Lyn, B.E.S., P.Geo. (Ltd.) and management of Qualified Person Ms. Tabitha Lee, M.A.Sc., P.Eng.

The investigation program included the drilling of one (1) borehole and the collection of surficial and subsurface soil samples in areas deemed most likely to have been affected by potentially contaminating activities. Groundwater samples were also collected from existing monitoring wells installed on-site during the Hydrogeological Investigation being conducted concurrently by CEG.

Prior to commencing sampling activities, utility and service providers were contacted to identify and mark the locations of underground installations in the study area. The utility companies that were contacted included gas and telephone, local hydro, cable services, as well as the municipal Public Works Department for water and wastewater (sewers) servicing. Utility locates information is provided in **Appendix A**. A Site Plan, with all sampling locations is included as **Figure 4**.

Sonic Soils drilled one (1) borehole on the Site. A total of two (2) subsurface soil samples (plus one (1) trip blank) were submitted for laboratory analysis. A total of four (4) surficial soil samples (including one (1) duplicate) were collected in locations selected to be most likely to contain contaminated materials. A total of three (3) groundwater samples (plus one (1) duplicate and two (2) trip blanks) were collected from three (3) existing monitoring wells selected based on proximity to areas of potential environmental concern.

Borehole logs for the borehole drilled on-site as well as the three (3) monitoring wells utilized as part of this investigation indicating encountered soil types, colour, presence of deleterious materials and any visual or olfactory evidence of environmental contamination are included as **Appendix B**. Table 5.1 describes the APEC investigated, samples and analyses performed.



**Table 5.1 –Sample Description and Analysis Performed**

APEC Investigated	Media	Sample ID	Depth (mbg)	Analysis Performed
APEC-1	Soil	SS-1	0.15-0.30	OC Pesticides
		SS-2	0.15-0.30	
		SS-3	0.15-0.30	
		Dup-1 (duplicate of SS-2)	0.15-0.30	
APEC-2		BH1-4	0.91-1.37	Petroleum Hydrocarbon Fractions F1-F4, VOCs
		BH1-7	2.13-2.64	
-		Trip Blank (soil)	-	VOCs
APEC-1		MW11-S	-	OC Pesticides
		MW1-D	-	
APEC-2	Groundwater	MW1-S	-	Petroleum Hydrocarbon Fractions F1-F4, VOCs
		Dup (duplicate of MW1-S)	-	
-		2 x Trip Blank (water)	-	VOCs

### 5.3. Soil Sampling

#### 5.3.1. Soil Sampling Procedures

Soil samples were collected in accordance with accepted industry standards. Sampling, transportation and storage procedures were conducted according to the *MOE Guidance on Sampling and Analytical Methods for use at Contaminated Sites in Ontario* and O. Reg. 153/04 as amended April 2011.

A gasoline powered Pionjar with attached split-spoon samplers were used to obtain subsurface soils samples. Surficial soil samples were collected using a trowel. The top layer of earth was removed and soil samples were collected from approximately 0.15 to 0.30 mbg. The trowel was washed with an Alconox solution and rinsed prior to the collection of each sample. A new pair of Nitrile gloves was worn for each sample. Soil samples were collected in individually labelled Ziploc™ bags prior to being placed in laboratory-supplied sample containers. The samples were then placed in pre-labelled laboratory-supplied sample containers and stored within individual bubble wrap bags in an ice-packed cooler to maintain a temperature of approximately 4°C. VOC and PHC F1 soil samples were collected using the calibrated core soil sampler provided by the laboratory and methanol preservative procedures in the field in accordance with EPA 5035A as well as the amendments of O.Reg. 153/04.

Zero head space was maintained for the PHC F1-F4 and VOC soil samples.

#### 5.3.2. Soil Sampling Program

##### BH1

Borehole BH1 was drilled at the southern portion of the Site in the vicinity of MW1-S and MW1-D (**Figure 4**). The borehole was drilled to a depth of 3.05 mbg. The soil samples collected via split spoon at BH1 indicated a layer of moist, dark brown clayey silt to a depth of 0.30 mbg followed by a medium

brown, slightly moist silty clay with bits of yellow (likely from oxidization) to 1.68 mbg, a dark brown clayey silt with trace organics to 1.83 mbg, a slightly moist, dark brown silty clay to 2.13 mbg, a medium grey, wet silty clay with trace organics to 2.64 mbg and a brown silty clay to the borehole completion depth. No hydrocarbon odours were reported. The contaminants of concern for this location were PHC fractions F1 to F4 and VOCs. Two (2) soil samples were submitted to the laboratory for analysis.

### **SS-1, SS-2 and SS-3**

Surface soil samples SS-1, SS-2 and SS-3 were collected using a trowel from three locations on-site: in the north-central portion of the Site, to the west of the hydro corridor near the southwest portion of the Site and at the east-central portion of the Site (**Figure 3**). Samples were collected from approximately 0.15 to 0.30 mbg. The contaminants of concern for this location were OC Pesticides. Four (4) soil samples (including one (1) duplicate) were submitted to the laboratory for analysis.

## **5.4. Field Screening Measurements**

Soil samples were collected in duplicate for the purposes of screening and selection for laboratory analysis. One set of the duplicate soil samples were placed directly into pre-cleaned, laboratory-supplied glass sample jars/vials for chemical analyses. The other set of soil samples were placed in sealed Ziploc™ plastic bags for vapour screening.

Samples in plastic bags were allowed to reach ambient temperature (approximately 20°C) prior to field screening with a calibrated RKI Eagle combustible gas instrument (CGI) with methane elimination. The CGI was calibrated in fresh air in the field and the measurements were made by inserting the instrument's probe into the plastic bag while manipulating the sample to ensure volatilization of the soil gases. These readings provide a real-time indication of the relative concentration of organic vapours encountered during the drilling and are used to guide the selection of soil samples submitted for laboratory analysis if required.

The RKI is able to detect the following:

- Combustible gas (response to methane may be eliminated using switch)
- 0-100% lower explosive limit (LEL)
- 0-50,000 parts per million (ppm)

The accuracy of the RKI is listed at ± 5% of reading or ± 2% LEL (whichever is greater).

A summary of soil analysis results can be found in **Tables C-1** and **C-2** in **Appendix C**. The Certificates of Analysis are appended as **Appendix D**.

## **5.5. Ground Water: Monitoring Well Installation**

### **5.5.1. Monitoring Wells Utilized**

Three (3) existing on-site monitoring wells were utilized to collect groundwater samples based on proximity to areas of potential environmental concern. MW1-D and MW1-S are located at the southern portion of the hydro corridor that runs in a northwest to southeast direction while MW11-S is located near the northeastern portion of the Site.

Prior to sampling, the monitoring wells were developed and purged using dedicated Waterra tubing with a foot valve to allow for the influx of the surrounding groundwater.

Table 5.2 summarizes the monitoring well installation details.

**Table 5.2 – Monitoring Well Installation Details**

Monitoring Well ID	Diameter (m)	Material of Construction	Screen Length (m)	Depth (mbtp)	Depth to Water (mbtp) March 14, 2012	RKI Readings (ppm)
MW1-D	0.05	PVC	1.5	11.8	2.75	25
MW1-S	0.05	PVC	3.05	7.04	2.43	-
MW11-S	0.05	PVC	3.05	7.02	3.82	-

## 5.6. Ground Water: Field Measurement of Water Quality Parameters

All reasonable attempts were made to collect field measurements of water quality parameters on-site. Due to the low volumes of groundwater in the monitoring wells installed on-site, insufficient amounts of groundwater were able to be collected to allow for the stabilization of water quality parameters and the collection of samples in a timely manner.

## 5.7. Ground Water: Sampling

Groundwater samples were collected in accordance with accepted industry standards. Sampling, transportation and storage procedures were conducted according to the *CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites* and the *MOE Guidance on Sampling and Analytical Methods for use at Contaminated Sites in Ontario*.

Groundwater samples were collected using dedicated low density polyethylene Waterra tubing fitted with a foot valve. A new pair of Nitrile gloves was worn for each sample. The samples were placed in pre-labelled laboratory-supplied sample containers and glass vials and stored within individual bubble wrap bags in an ice-packed cooler to maintain a temperature of approximately 4°C. The samples were transported and submitted to the analytical laboratory under Chain of Custody documentation.

Zero head space was maintained for VOCs groundwater samples.

One (1) sample was collected from MW11-S on February 9, 2012 and submitted to the laboratory to be analyzed for OC Pesticides. One (1) sample was collected from MW1-D on February 17, 2012 and submitted to the laboratory to be analyzed for Petroleum Hydrocarbon Fractions F1-F4, BTEX and VOCs. One (1) sample was collected from MW1-S on March 14, 2012 and submitted to the laboratory to be analyzed for Petroleum Hydrocarbon Fractions F1-F4, BTEX and VOCs.

A summary of groundwater analysis results can be found in **Tables C-3-C5** in **Appendix C**. The Certificates of Analysis are appended as **Appendix D**.

## 5.8. Sediment: Sampling

Sediment sampling was not completed during the Phase II ESA as there were no water bodies on-site.

## 5.9. Analytical Testing

All analytical testing during this investigation was carried out by Maxxam Analytics in Mississauga, Ontario. Maxxam is accredited by the Canadian Association for Laboratory Accreditation (CALA), in accordance with ISO/IEC 17025:2005 – “General Requirements for the Competence of Testing and Calibration Laboratories” for the analysis of all parameters for all samples in the scope of work for which Site Condition Standards have been established under *O. Reg. 153/04*.

## 5.10. Residue Management Procedures

Residue management procedures were not necessary for this investigation as a Pionjar was utilized to collect soil samples. Minimal borehole cuttings remained following the sampling process. These remaining soils were used along with bentonite to backfill the borehole. No visual or olfactory evidence of environmental contamination was apparent.

## 5.11. Elevation Surveying

Elevation surveying of the three (3) monitoring wells utilized for this investigation was conducted as part of the concurrent Hydrogeological Investigation. Surveying was conducted by J.D. Barnes Limited.

## 5.12. Quality Assurance and Quality Control Measures

Soil samples were collected in accordance with accepted industry standards. Sampling, transportation and storage procedures were conducted according to *CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites* and the *MOE Guidance on Sampling and Analytical Methods for use at Contaminated Sites in Ontario* and followed standard chain of custody procedures. All containers used for sampling were provided by the laboratory and were labelled prior to sampling, taking caution not to open the container. All equipment used for sampling was washed with an Alconox solution and rinsed in between samples and a new pair of Nitrile gloves was worn for each sample.

The field quality control measures included the collection of duplicate samples at a minimum of one (1) duplicate for every ten (10) samples for each media sampled. One (1) duplicate soil sample and one (1) duplicate ground water sample was included in the laboratory analysis. Also included were trip blanks for groundwater and soil.

The laboratory quality control program included the analysis of laboratory duplicate samples, method blanks, matrix spikes and samples of reference materials in accordance with the laboratories QC protocols. Quality control reports comprise portions of the Certificates of Analysis in **Appendix D**. Maxxam reviews, validates and signs off on all analytical data and QC for the report.

## 5.13. Health and Safety Program

Before commencing the fieldwork, a site specific Health and Safety Program was developed for the fieldwork to be conducted at the Site. The program incorporates the CEG Health and Safety Policy, the responsibilities for the project managers, technicians and sub-contractors, an outline of potential incidents typical for this type of project and emergency procedures to follow in case of injury. Mandatory and optional personal protective equipment were outlined.

Prior to starting field activities, CEG personnel completed health and safety training for education with regards to industry related risks and appropriate mitigative actions.

The fieldwork was completed in accordance with the Ontario Ministry of Labour safety regulations and CEG’s Health and Safety Plan. Standard personal protective equipment including hard hat, steel-toed boots, reflector vests, etc. was worn by each employee on-site. For personal protection, nitrile gloves were worn when handling soil and groundwater.

## 6.0 Review and Evaluation

### 6.1. Geology

The soil samples collected via split spoon at BH1 indicated a layer of moist, dark brown clayey silt to a depth of 0.30 mbg followed by a medium brown, slightly moist silty clay with bits of yellow (likely from oxidization) to 1.68 mbg, a dark brown clayey silt with trace organics to 1.83 mbg, a slightly moist, dark brown silty clay to 2.13 mbg, a medium grey, wet silty clay with trace organics to 2.64 mbg and a brown silty clay to the borehole completion depth.

### 6.2. Ground Water: Elevations and Flow Direction

Based on the results from the Phase I ESA conducted by CEG, it was determined prior to the Phase II ESA investigation that the water table should be present at approximately 1-4 mbg. Based on the borehole logs reviewed, the monitoring wells were screened in units that were found to contain groundwater.

In order to gain an understanding of groundwater flow direction at the Site, survey data from the Hydrogeological Investigation was reviewed. Monitoring wells were surveyed to obtain relative elevations of the ground surface and top of the PVC riser pipe. Table 6.1 summarizes the survey data collected and relative groundwater elevations.

**Table 6.1 – Survey Data**

Monitoring Well ID	Northing	Easting	Ground Elevation (m)	Top of Pipe Elevation (m)	Stick up (m)	Depth to Water (mbtp)	Depth to Water (mbgs)	Ground Water Elevation (m) <i>Mar 14</i>
						<i>Mar 14</i>	<i>Mar 14</i>	
MW1-D	4878050	620780	276.49	277.55	1.06	2.75	1.69	274.8
MW1-S	4878050	620781	276.59	277.63	1.04	2.43	1.38	275.2
MW11-S	4878721	620764	277.33	278.41	1.08	3.82	2.73	274.6

The measurements of groundwater levels and the presence of PHC free-product were obtained using a Heron H.Oil Standard Oil/Water Interface Meter. Measurements were taken after allowing the water levels to recover to static conditions. Table 6.2 summarizes the results of measurements taken for groundwater and free-product levels.

**Table 6.2 – Groundwater and Free-Product Measurements**

Monitoring Well ID	Depth (mbtp)	Date	Depth to Water (mbtp)	Groundwater Elevation (m)	Depth to Free-product (mbtp)
MW1-D	11.8	March 14, 2012	2.75	274.8	-
MW1-S	7.1	March 14, 2012	2.43	275.2	-

Information regarding the groundwater flow direction was obtained from the Hydrogeological Investigation currently being undertaken by CEG.

According to the Hydrogeological Investigation conducted for the Site by CEG, on a regional scale, groundwater flows generally northerly towards Lake Simcoe. In general, there is a divide across the middle of the Site, from which groundwater flows north-westerly and south-easterly. No significant seasonal variation was observed in the flow pattern throughout the monitoring events. The interpreted groundwater flow direction map for the Site is presented as **Figure 4**.

The coarse grained beds commonly found in utility corridors present a preferential pathway for contaminants.

### 6.3. Fine-Medium Soil Texture

The applicable standards used for this Phase II ESA were determined to be the Table 2 Potable Ground Water SCS for Residential/Parkland/Institutional Property Use for Coarse-Grained Textures (as discussed in Section 2.4) and as such, the fine-medium soil texture standards did not apply.

### 6.4. Soil: Field Screening

Field screening for organic vapour concentrations, which were collected in the headspace of soil samples within Ziploc™ bags, was conducted using a RKI Eagle with methane elimination. Vapour concentration readings were observed to be below 5 ppm.

### 6.5. Soil Quality

The results of the soil analyses were compared to the applicable Table 2 SCS for coarse-grained materials for residential/parkland/institutional property use. Soil samples were collected for OC Pesticides, PHC fractions F1-F4 and VOCs. VOC and petroleum hydrocarbon fraction F1 samples were collected via TerraCore samplers and preserved with methanol during the field investigation prior to submission to the laboratory.

The results are summarized in the following sections:

#### OC Pesticides

The results of the soil analyses for OC Pesticides indicated that concentrations in all samples submitted for analysis met the Table 2 SCS. Analytical results for the soil samples analyzed for OC Pesticides are presented in **Table C-1 of Appendix C**.

## VOCs

The results of the soil analyses for VOCs indicated that concentrations in all samples submitted for analysis met the Table 2 SCS. Analytical results for the soil samples analyzed for VOCs are presented in **Table C-2 of Appendix C**.

## PHC Fractions F1-F4

The results of the soil analyses for PHC fractions F1-F4 indicated that concentrations in all samples submitted for analysis met the Table 2 SCS. Analytical results for the soil samples analyzed for PHC fractions F1-F4 are presented in **Table C-2 of Appendix C**.

## 6.6. Ground Water Quality

The results of the groundwater analyses were compared to the applicable *O.Reg. 153/04 Table 2: Potable Ground Water* standards for coarse-grained materials for all property use. Groundwater samples were collected for OC Pesticides, PHC fractions F1-F4, BTEX and VOCs. Zero headspace was maintained for VOCs samples. Table 6.3 summarizes the samples collected and analyses performed for each sample.

**Table 6.3 – Sample Description and Analysis Performed (Groundwater)**

Matrix	Sample ID	Depth (mbg)	Analysis Performed
Groundwater	MW1-D	Screen interval: 10.3-11.8	PHC fractions F1-F4, VOCs
Groundwater	MW1-S	Screen interval: 1.52-3.05	PHC fractions F1-F4, VOCs
Groundwater	MW11-S	Screen interval: 3.97-7.02	OC Pesticides

The results are summarized in the following sections:

### PHC Fractions F1-F4, BTEX

The results of the groundwater analyses for PHC fractions F1-F4 and BTEX indicated that concentrations met the applicable Table 2 SCS for all samples submitted for analysis. Analytical results for groundwater PHC fractions F1-F4 and BTEX are presented in **Table C-3 of Appendix C**.

### VOCs

The results of the groundwater analyses for VOCs indicated that concentrations met the applicable Table 2 SCS for all samples submitted for analysis. Analytical results for groundwater VOCs are presented in **Table C-4 of Appendix C**.

### OC Pesticides

The results of the groundwater analyses for OC Pesticides indicated that concentrations met the applicable Table 2 SCS for all samples submitted for analysis. Analytical results for groundwater OC Pesticides are presented in **Table C-5 of Appendix C**.

## 6.7. Sediment Quality

Sediment sampling was not completed during the Phase II ESA as there were no water bodies on-site.



## 6.8. Quality Assurance and Quality Control Results

One (1) duplicate soil sample and one (1) duplicate ground water sample were collected throughout the course of the investigation. Also included was two (2) trip blanks for water and one (1) trip blank for soil. The laboratory included QA/QC results with the certificate of analysis as described in Section 5.8. The Relative Percentage Difference (RPD) values are within acceptable ranges for the industry and are reported in **Appendix C**. The laboratory reported acceptable QA/QC results.

## 6.9. Remediation

On-site remediation was not necessary as part of this investigation as no exceedances of applicable SCS were encountered.

## 6.10. Phase Two Conceptual Site Model

### 6.10.1. Site Description

The Site is irregular in shape and is approximately 36.3 hectares (ha) in area. It was most recently used as a golf course, with the majority of the Site area utilized as playing area (tee boxes, fairway, greens, etc.). No building structures were observed on-site. The Site is accessible from the northern portion of the Site off Alex Doner Drive or Crossland Gate. The former building structures were predominantly situated in the north-central portion of the Site (clubhouse, indoor tennis court, pump house, golf cart storage building). A system of five (5) ponds is located on the Site that is connected to the other ponds on the Property via a piping system. A hydro corridor runs through the middle of the Property in a northwest to southeast direction.

The land use surrounding the Site is predominantly residential. To the west of the hydro corridor is the remainder of the Glenway Estates golf course and a pumping reservoir. The Upper Canada Mall lies northeast of the Site and adjacent to the site to the east is a GO bus station, followed by a commercial plaza. The Ray Twinney recreation complex and Crossland Public School properties lie south of the Site.

### 6.10.2. Geology and Hydrogeology

The surficial geology of the Site consists of clays with some silt, sand and gravel at deeper depths. The topography at the Site has been landscaped to appear generally rolling with some flat areas. Locally, the topography slopes toward the SWM ponds on site. Generally, there is a downward north-westerly slope toward Ansnorveldt Creek and south-easterly slope toward Western Creek. On a regional scale, the land slopes north towards Lake Simcoe. According to the Hydrogeological Investigation conducted for the Site by CEG, there is a divide across the middle of the Site, from which groundwater flows north-westerly and south-easterly. No significant seasonal variation was observed in the flow pattern throughout the monitoring events. Based on the results of the Phase I ESA, it is assumed that the depth to bedrock in the vicinity of the Site is approximately 100 mbgs. Based on the results of the Hydrogeological Investigation conducted on-site by CEG, the depth of the water table is approximately 0.4-2.7 mbgs.



### 6.10.3. Areas of Potential Environmental Concern

The following Areas of Potential Environmental Concern (APECs) were identified for the subject Site and are summarized in Table 6.4:

**Table 6.4 –Areas of Potential Environmental Concern**

APEC #	Contaminants of Concern	Location	Rationale
APEC-1	Pesticides	Entire Site	Application of pesticides on the Site as well as potential spills from the off-site pesticides operator may have resulted in soil and groundwater contamination due to migration of the chemicals.
APEC-2	Pesticides Petroleum Hydrocarbons (PHCs) (BTEX, F1-F4)	Neighbouring Parcel South of Site	Storage of pesticides and fuel tanks may have historically had spills which may have resulted in soil and groundwater contamination on the Site due to migration of chemicals.

The list of APECs identified is based on our observations of current site conditions and understanding of historical uses through various searches.

### 6.10.4. Identification of Contaminants of Concern

A detailed sampling program as shown in Table 6.1 was conducted to identify the presence of contaminants of concern. **Figure 4** illustrates the location of boreholes and monitoring wells. Soil and groundwater samples were collected to target source areas and anticipated pathways of migration.

For potential PHC impacts, soil samples were collected from samples exhibiting elevated vapour readings.

No staining or hydrocarbon odours were observed. Concentrations of all tested parameters in the subsurface soils met the applicable Table 2 SCS Potable Ground Water conditions for coarse-textured soils. Groundwater samples submitted for laboratory analysis also met the applicable Table 2 SCS.

### 6.10.5. Subsurface Structures and Utilities

The Site once contained a large building structure with no subsurface structure which would affect the migration of contaminants. This building has since been demolished and removed from the Site. **Figure 3** illustrates the building once observed on the Phase II ESA property. Underground utilities likely reside along Crossland Gate and may act to transport and distribute contaminants away from the Site.

#### 6.10.5.1 Water Table

According to the Hydrogeological Investigation conducted for the Site by CEG, there is a divide across the middle of the Site, from which groundwater flows north-westerly and south-easterly. No significant seasonal variation was observed in the flow pattern throughout the monitoring events. Based on the results of the Hydrogeological Investigation conducted on-site by CEG, the depth of the water table is approximately 0.4-2.7 mbgs.

#### **6.10.6. Environmentally Sensitive Features**

Environmentally sensitive features such as water bodies, watercourses, ANSIs and ESAs were not identified on-site or within 30 m of the Site boundaries. The Site is not considered a shallow soil property as the soil on-site extends beyond 2 mbgs.

#### **6.10.7. Soil Brought from Another Property**

No fill material has recently been brought from another property and placed on, in or under the phase two property. Fill materials associated with the original construction of the building may be present on-site.

#### **6.10.8. Proposed Buildings and Other Structures**

The Site will be redeveloped to contain a subdivision with multiple residential dwellings which will occupy the large majority of the property footprint. Existing buildings have been demolished.

#### **6.10.9. Distribution of Contaminants**

Impacted soil and groundwater was not encountered on-site during the Phase II ESA investigation.

#### **6.10.10. Reason for the Discharge into the Natural Environment**

Impacted soil and groundwater was not encountered on-site during the Phase II ESA investigation.

#### **6.10.11. Migration Away From Area of Potential Environmental Concern**

Impacted soil and groundwater was not encountered on-site during the Phase II ESA investigation.

#### **6.10.12. Climatic or Meteorological Conditions**

Climatic or meteorological conditions are not expected to have an influence on distribution or migration of the contaminants. The contaminants of concern would likely be present above the groundwater table within the unsaturated zone.

#### **6.10.13. Soil Vapour**

No soil gas vapour issues are anticipated as contaminants of concern are not highly volatile.

#### **6.10.14. Remedial Actions**

Concentrations of all tested parameters in the subsurface soils met the applicable Table 2 SCS Potable Ground Water conditions for coarse-textured soils. Groundwater samples submitted for laboratory analysis also met the applicable Table 2 SCS. Remedial actions were not necessary for the Site.

### 6.10.15. Conceptual Site Model Summary

There is the potential that spills may have occurred as a result of the use and mixing of pesticides and/or herbicides on-site as well as off-site. Although the half-life of most pesticides and herbicides is quite short when sprayed, the potential exists for larger spills to have occurred and not been reported resulting in soil contamination. However, concentrations of OC Pesticides were not found to be present in the subsurface soils at levels which exceed the applicable Table 2 SCS.

Fuel storage tanks that are active and were used historically off-site (approximately 100 m to the south of the Site) may have leaked or spilled and resulted in soil contamination. It is possible that free-product may have discharged from the tanks and into the surrounding soils as a result of improper storage or refuelling. However, concentrations of PHC fractions F1 to F4 were not found to be present in the subsurface soils or ground water at levels which exceed the applicable Table 2 SCS. Also, pathways introduced by road bedding and underground utilities could act to transmit potential concerns away from the Site. Visual and olfactory observations did not detect PHC contamination in the soils explored in this location.

Water level and petroleum hydrocarbon free-product measurements obtained from the on-site well did not reveal evidence of free-product.

## 7.0 Conclusions

The investigation program included the collection of surficial and subsurface soil samples in areas deemed most likely to have been affected by PCAs. Groundwater samples were also collected from existing monitoring wells installed on-site during the Hydrogeological Investigation conducted by CEG. A total of two (2) subsurface soil samples and four (4) surficial soil samples (including one (1) duplicate and one (1) trip blank) were collected in locations selected to be most likely to contain contaminated materials. A total of three (3) groundwater samples (plus one (1) duplicate and two (2) trip blanks) were collected from three (3) existing monitoring wells selected based on proximity to APECs. The purpose of the study was to investigate the potential for the presence of on-site contamination related to on-site concerns stemming from pesticide use and off-site concerns related to fuel storage.

The soil samples analyzed were compared to the applicable *Soil and Groundwater Standards – Table 2 Potable Groundwater - as amended April 15, 2011* for Residential/Parkland/Institutional Property Use for Coarse-Grained Materials. Groundwater samples were compared to the applicable *Soil and Groundwater Standards – Table 2 Potable Groundwater - as amended April 15, 2011* for All Types of Property Use for Coarse-Grained Materials.

The results of the soil analyses for OC Pesticides, VOCs and PHC fractions F1-F4 indicated that all samples submitted for analysis met the applicable Table 2 SCS.

The results of the groundwater analyses indicated that all samples submitted for analysis met the applicable Table 2 SCS.

Based on the findings of our soil and groundwater sampling program, contamination was not identified on the property. No further investigation is recommended.

## 7.1. Signatures

Prepared by:

**COLE ENGINEERING GROUP LTD.**



Tabitha Lee, M.A.Sc., P.Eng.  
Project Engineer



Andre Lyn, B.E.S., P.Geo. (Ltd.)  
Project Manager

/ao

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## 9.0 Assessor Qualifications

The Site visit for this assessment was completed by Andrew O'Connell, B.E.S. who is an environmental specialist with over five (5) years of experience conducting Phase I & II Environmental Site Assessments, including designing and conducting soil and groundwater sampling programs. Andrew also has extensive field experience in groundwater, surface water and distribution water quality monitoring and field testing programs, baseline environmental studies and ecosystem-based monitoring programs.

Andre Lyn has over thirteen (13) years of experience in Phase I and II Environmental Site Assessments (ESAs), remedial action plans, site remediation, site audits, environmental monitoring for construction projects, hazardous materials management and industrial site decommissioning. Responsibilities have included field surveys and obtaining groundwater, soil, sediment, lead and asbestos samples and preparing closure reports and tender documents and specifications.

Tabitha Lee has over ten (10) years of experience providing environmental consulting services to both public and private sector clients. She is the Business Unit Leader for Environmental Management which specializes in Site Assessment & Remediation, Hydrogeology and Environmental Assessments. Her portfolio includes a variety of experience in the environmental contamination industry from both a technical and management perspective including Phase I, II and III Environmental Site Assessments (ESAs), risk assessments, record of site conditions, soil management, groundwater investigations, contaminant transport modeling, landfill monitoring, contaminant inventories, environmental audits, compliance monitoring, peer review and the preparation of remedial action plans, contaminant management plans and environmental management plans.

She has provided environmental consulting services for federal clients including the Department of Fisheries and Oceans, Transport Canada and Pickering Lands Sites on behalf of Public Works and Government Services Canada (PWGSC), municipal clients such as York Region and the Town of Markham and utility providers such as Bell-Nexacor and Toronto Hydro. The contaminated sites she has been involved with have mainly included addressing soil and water contamination associated to petroleum hydrocarbon, dissolved phase DNAPL contamination and PCBs.

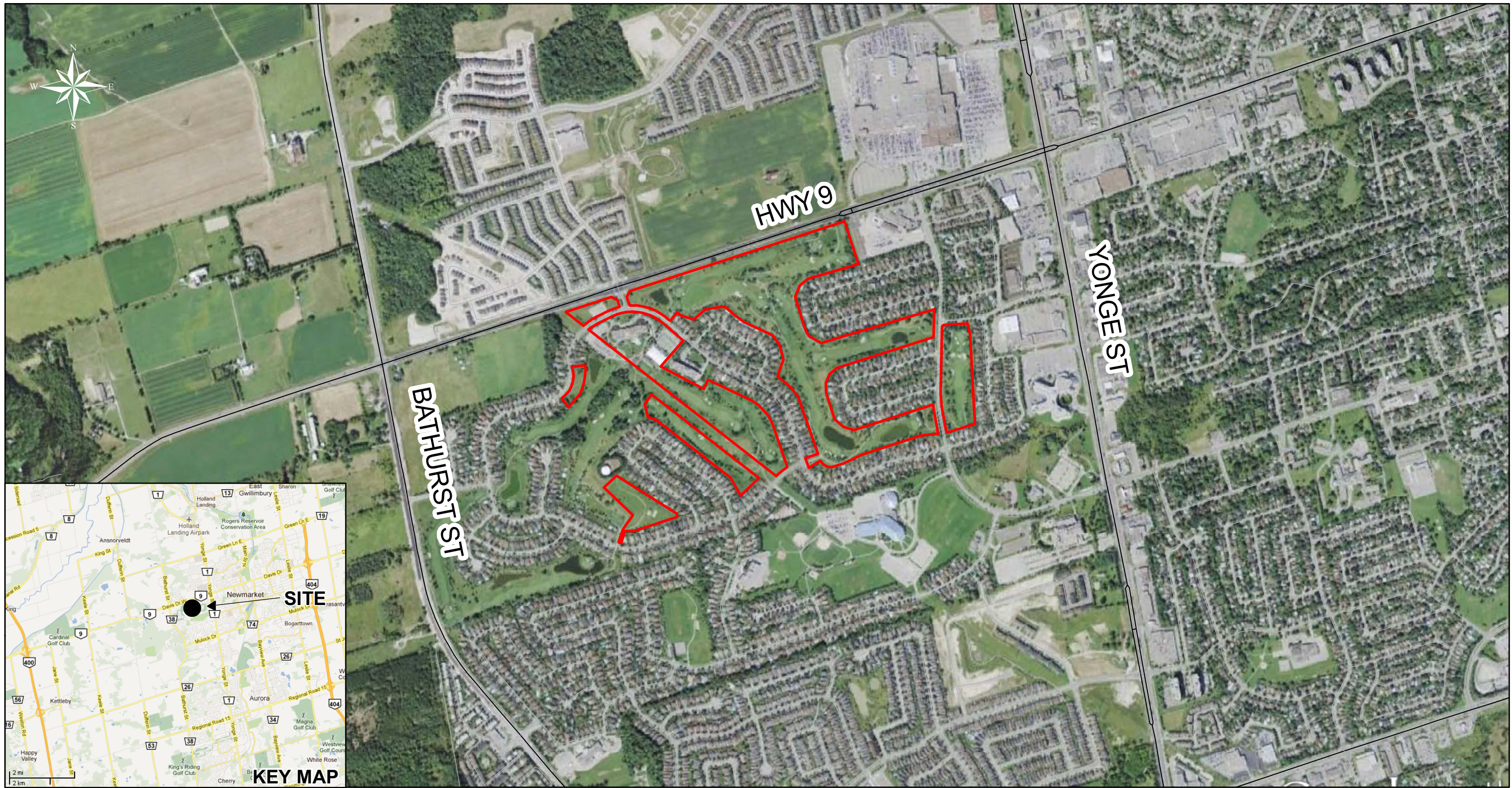
## 10.0 Limiting Conditions

This report was prepared solely for use by Ms. Joanne Barnett of The Kerbel Group Inc. on behalf of Marianneville Developments Ltd and the Town of Newmarket.

The findings contained herein have been produced in accordance with generally accepted environmental site assessment protocol. Cole Engineering Group Ltd. believes that the data presented in this report concerning the subject Site is reliable at the time it was collected. CEG does not guarantee that the information provided is absolutely accurate beyond current accepted environmental site assessment standards. There is a possibility that items of environmental concern could not be identified within the scope of the assessment or were not apparent during the Site visit.

## Figures





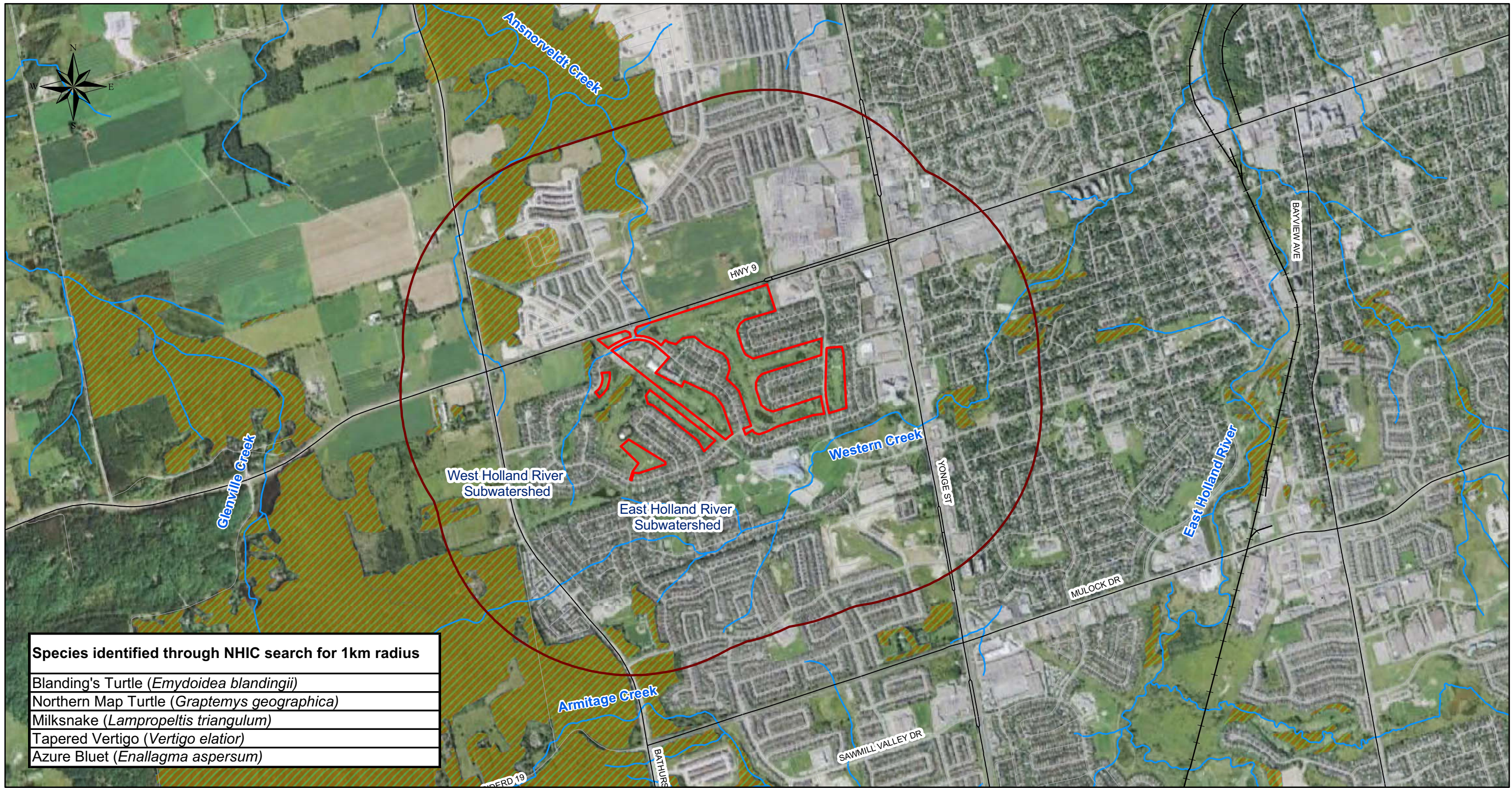
Source: Google Earth, 2012 (2009 image)  
 Google Maps, 2011 (Key Map)  
 Produced by Cole Engineering under license  
 from Ontario Ministry of Natural Resources  
 Copyright (c) Queen's Printer, 2010

<b>LEGEND</b>
Site
<b>Road</b>
Arterial
Collector

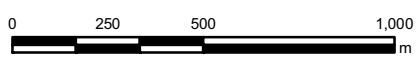
**Site Location Map**  
**Phase II Environmental Site Assessment**  
**Marianneville Development Limited**  
**470 Crossland Gate, Newmarket, ON**

 Figure No. <b>1</b>	Project No: L09-301
	Drawn By: AC
	Checked by: TL
	Date: March 2012





Species identified through NHIC search for 1km radius	
Blanding's Turtle	<i>Emydoidea blandingii</i>
Northern Map Turtle	<i>Graptemys geographica</i>
Milksnake	<i>Lampropeltis triangulum</i>
Tapered Vertigo	<i>Vertigo elatior</i>
Azure Bluet	<i>Enallagma aspersum</i>



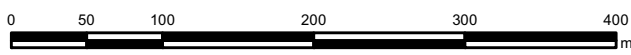
Source: Google Earth, 2011 (2009 image)  
 Produced by Cole Engineering under license  
 from Ontario Ministry of Natural Resources  
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 Ministry of Natural Resources, Natural  
 Heritage Information Centre, 2011

LEGEND		
Site	Railway	1 km Buffer Around Site
Road	Waterbody	
Arterial	Watercourse	
Collector	Wooded Area	

**Areas of Natural Significance**  
**Phase II Environmental Site Assessment**  
**Marianneville Development Limited**  
**470 Crossland Gate, Newmarket, ON**

	Project No: L09-301
	Drawn By: AC
Figure No. 2	Checked by: TL
	Date: March 2012





Source: Google Earth, 2011 (2009 image)  
 Produced by Cole Engineering under license  
 from Ontario Ministry of Natural Resources  
 Copyright (c) Queen's Printer, 2010

**LEGEND**

Site	APEC-3
<b>Road</b>	
Arterial	
Collector	

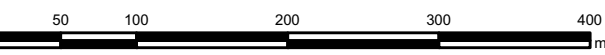
**Phase I ESA Conceptual Site Model**  
**Phase II Environmental Site Assessment**  
**Marianneville Development Limited**  
**470 Crossland Gate, Newmarket, ON**



Project No:	L09-301
Drawn By:	AC
Checked by:	TL
Date:	January 2012

Figure No.  
**3**





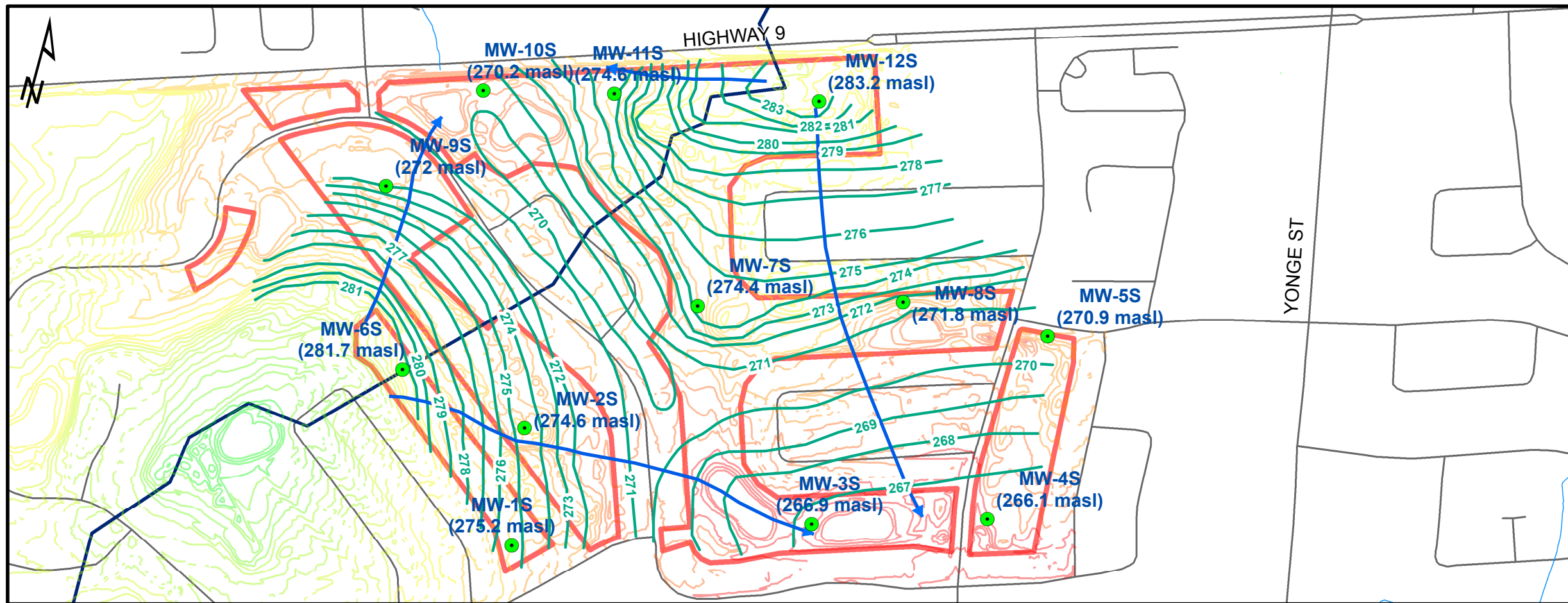
Source: Google Earth, 2011 (2009 image)  
 Produced by Cole Engineering under license  
 from Ontario Ministry of Natural Resources  
 Copyright (c) Queen's Printer, 2010

LEGEND	
	Site
	Hydro-Corridor
	Borehole
	Surficial Soil Sample
	Monitoring Well
	Road
	Arterial
	Collector

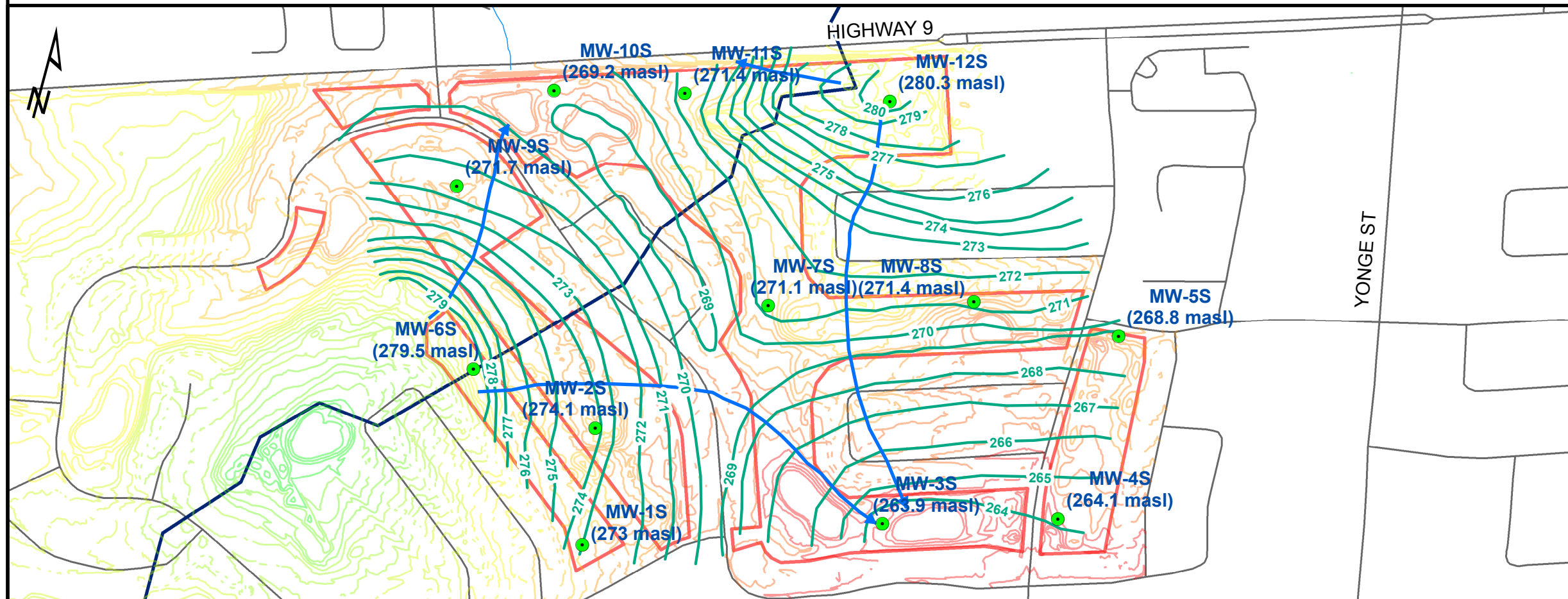
**Site Plan**  
**Phase II Environmental Site Assessment**  
**Marianneville Development Limited**  
**470 Crossland Gate, Newmarket, ON**

	Project No: L09-301
	Drawn By: AC
Figure No. 4	Checked by: TL
	Date: March 2012





SPRING SHALLOW GROUNDWATER CONTOURS (MARCH 14, 2012)



SUMMER SHALLOW GROUNDWATER CONTOURS (JULY 10, 2012)

**Legend**

- Site
- Road
- Watercourse
- Shallow Monitoring Well
- Groundwater Contour
- ➔ Interpreted Groundwater Flow Direction
- Watershed Boundary

**Topographic Contours**

- 265 - 269
- >269 - 272
- >272 - 276
- >276 - 280
- >280 - 284
- >284 - 288
- >288 - 292
- >292 - 296
- >296 - 304

Source: JD Barnes Topographic Survey, 2012.

Produced by Cole Engineering under license from Ontario Ministry of Natural Resources Copyright (c) Queen's Printer, 2010



**MARIANNEVILLE DEVELOPMENTS  
Estates of Glenway  
Phase II Environmental Site Assessment**




**Shallow Groundwater Flow Patterns  
(Spring/Summer)**


Project No.:	Date:
L09-301	NOVEMBER 2013
Drawn By:	Figure No.:
AC	5

# Appendix A

## Utility Locates



 <b>CANADIAN LOCATORS INC.</b> Servicing the Utilities Industry		Primary Locate Sheet				Request #: 2012054331			
		Tel: 905-479-5674		Fax: 905-479-8628		Toll Free:		Email:	
Utilities <input checked="" type="checkbox"/> Telecom <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Hydro <input type="checkbox"/> Street Lighting		Revised Work Date (mm/dd/yyyy):		Work Date (mm/dd/yyyy): Feb 9 2012		Request Type Status: <input type="checkbox"/> Homeowner <input checked="" type="checkbox"/> Contractor <input type="checkbox"/> Project			
Located <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Requested By: ALEXANDRA CHAN		Company (if applicable): COLE ENGINEERING		Tel: 905-940-6161		Fax/email: 905-940-2064	
Appt. Date:		Received Date: Feb 2 2012		Locate Address: 470 CROSSLAND GATE [ALEX DONER DR & EAGLE ST W]					
Type of Work: ENVIRONMENTAL								City: NEWMARKET, ONTARIO	
Caller's Remarks: RELOCATE OF 2012045927. W1201271555110 SEE SKETCH- 4 BOREHOLES ON FAIRWAY OF GOLF COURSE, LOCATE ENTIRE SOUTHERN PARCEL. FRONT, SIDE, BACK-**MEET REQUIRED SOUTHERN PARCEL REQUIRED ONLY NOT LOCATED CORRECTLY FIRST TIME**- DAVIS DR & EAGLE ST W-REL 2012045927 DEPTH UNKNOWN									
Telecom		Gas		Hydro		Street Lighting			
Mark	Clear	Mark	Clear	Mark	Clear	Mark	Clear	Mark	Clear
	1		1						
<b>LOCATED AREA: EXCAVATOR SHALL NOT WORK OUTSIDE THE LOCATED AREA WITHOUT OBTAINING ANOTHER LOCATE.</b>									
Records Reference:				<input type="checkbox"/> Third Party Notification BCGN01 ENGN01 routine (STANDARD) WAP #: Unit/Lot:					
<input type="checkbox"/> Map <input checked="" type="checkbox"/> Network X # <input type="checkbox"/> Byers <input checked="" type="checkbox"/> Datapak IHD3015CLI Field Notes: N/A Other: KW189, KW190 DPT Remarks:									
Apply Sticker here if Required									
Method of Field Marking: <input checked="" type="checkbox"/> Paint <input type="checkbox"/> Stakes <input type="checkbox"/> Flags <input type="checkbox"/> Offset Flags <input type="checkbox"/> Other (Telecom=Orange, Gas=Yellow, Hydro=Red)									
Caution: Locates are VOID after 30 days. See Disclaimer on reverse side for the specific Facility Owner's Guidelines.									
<b>Caution:</b> Any changes to location or nature of work requires a new locate. Excavator must not work outside the Located Area without a new locate. Privately owned services within the located area have not been marked - check with service/property owner. For all Locate requests including remarks contact: Ontario One Call at 1-800-400-2255 or www.on1call.com									
Locator Name: Patrick Loughlin		Start Time: 2:40 PM		<input checked="" type="checkbox"/> Mark & Fax <input type="checkbox"/> Left on Site <input type="checkbox"/> Emailed					
ID #: 211		End Time: 3:35 PM		Locate Received By: Print: ALEXANDRA CHAN					
Date (mm/dd/yyyy): Feb 7 2012		Total Hours:		Signature:					
A copy of this Primary Locate Sheet and Auxiliary Locate Sheet(s) must be on site and in the hands of the machine operator during work operations. If sketch and markings do not coincide, the Excavator must obtain a new locate.									












 <p><b>CANADIAN LOCATORS INC.</b> Servicing the Utilities Industry</p>	<b>Auxiliary Locate Sheet</b>			Request #: <b>2012054331</b>
	Tel: 905-479-5674	Fax: 905-479-8628	Toll Free:	Email:

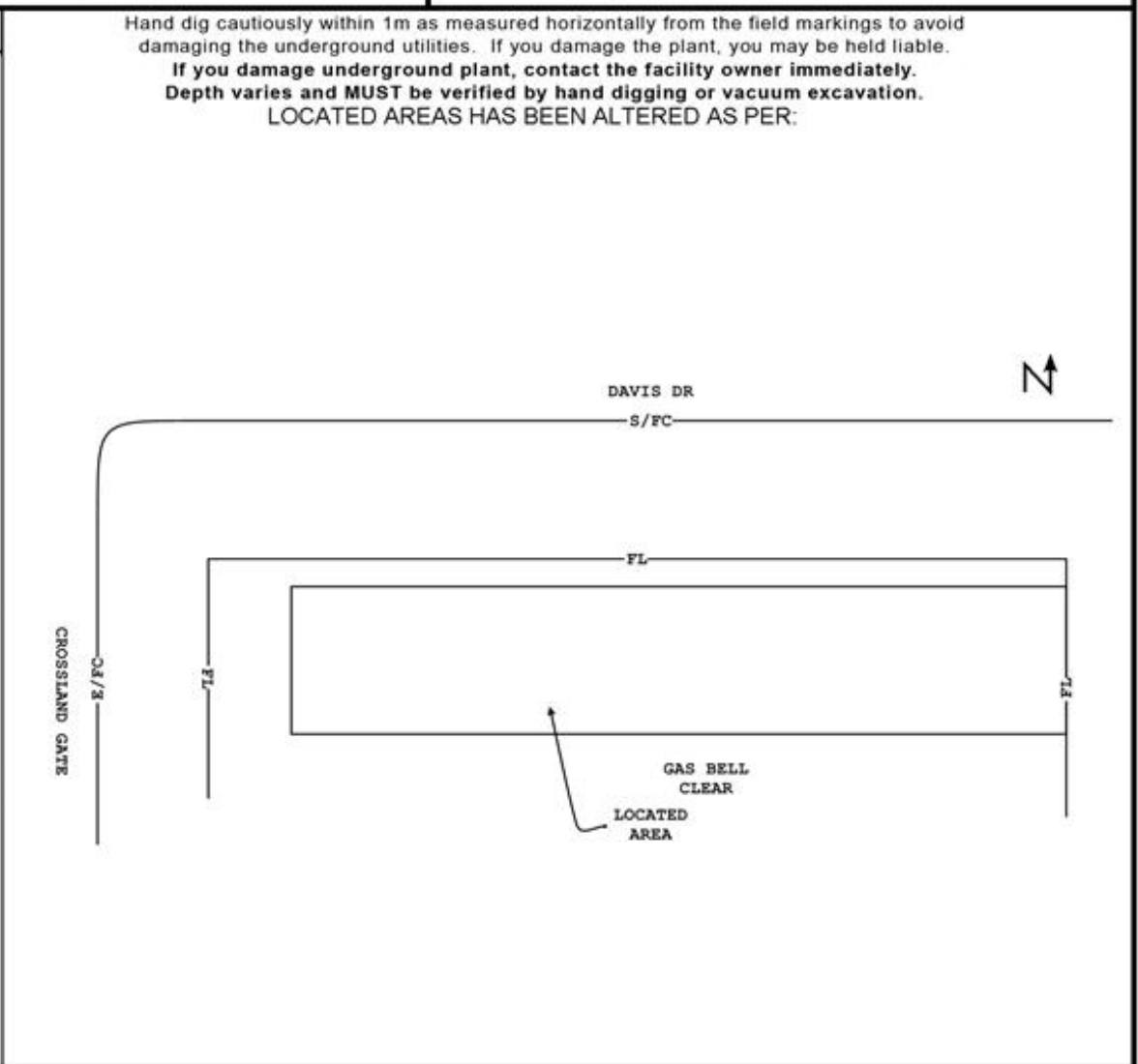
Utilities <input checked="" type="checkbox"/> Telecom <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Hydro <input type="checkbox"/> Street Lighting Located <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Date Located: Feb 7 2012
---	-----------------------------

Number of Services marked: (Specify building/house numbers)  
0

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


FROM: 1.0M S OF FL S/S/FC DAVIS DR	TO: 100.0M S/S/FC DAVIS DR
FROM: 20.0M E/E/FC CROSSLAND GATE	TO: 2ND FL E/E/FC CROSSLAND GATE

Legend	
Building Line	—BL—
Fence Line	—FL—
Face of Curb	—FC—
Road Edge	—RE—
Property Line	—PL—
Driveway	—DW—
Catch Basin	
Sidewalk	
Demarcation	
Railway	
Pole	○
Flush to Gate Pedestal	
Pedestal	
Buried Cable	—B—
Conduit	—C—
Buried Service Wire	—BSW—
Manhole	
Fiber Optic Cable	—FO—
Gas Main	—GM—
Gas Service	—GS—
Gas Valve	
Hydrant	
Transformer	
Hydro	—H—
Hydro Pole	X
Street Light Cable	—SL—
Street Light	
North	N
South	S
East	E
West	W



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

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

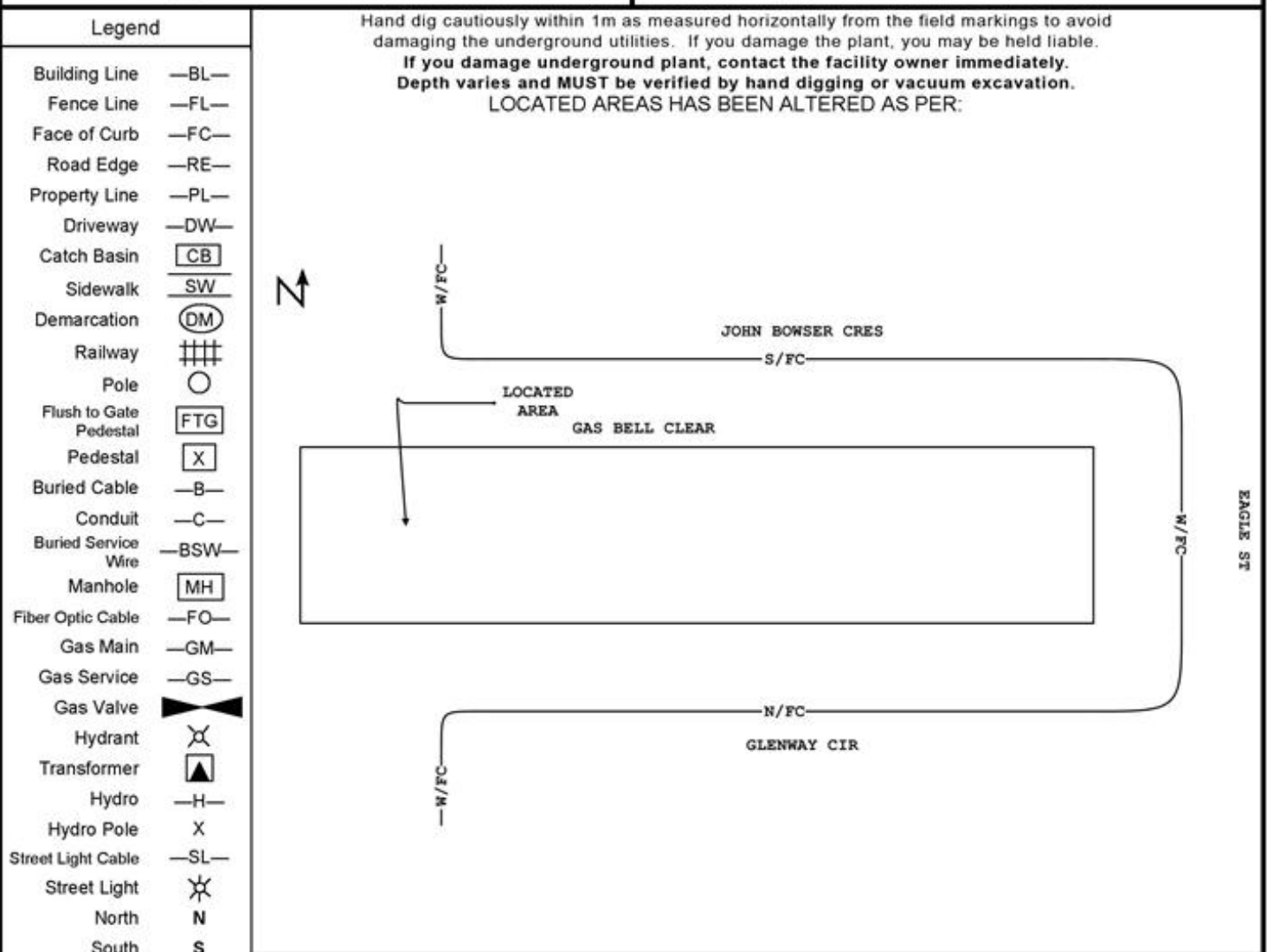
 <p><b>CANADIAN LOCATORS INC.</b> Servicing the Utilities Industry</p>	<b>Auxiliary Locate Sheet</b>			Request #:
				2012054331
Tel:	Fax:	Toll Free:	Email:	
905-479-5674	905-479-8628			

Utilities <input checked="" type="checkbox"/> Telecom <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Hydro <input type="checkbox"/> Street Lighting Located <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Date Located: Feb 7 2012
---	-----------------------------

Number of Services marked: (Specify building/house numbers)  
 0

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


FROM: 40.0M W/W/FC EAGLE ST	TO: 10.0M W/W/FC JOHN BOWSER CRES
FROM: 40.0M S/S/FC JOHN BOWSER CRES	TO: 40.0M N/N/FC GLENWAY CIR



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

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



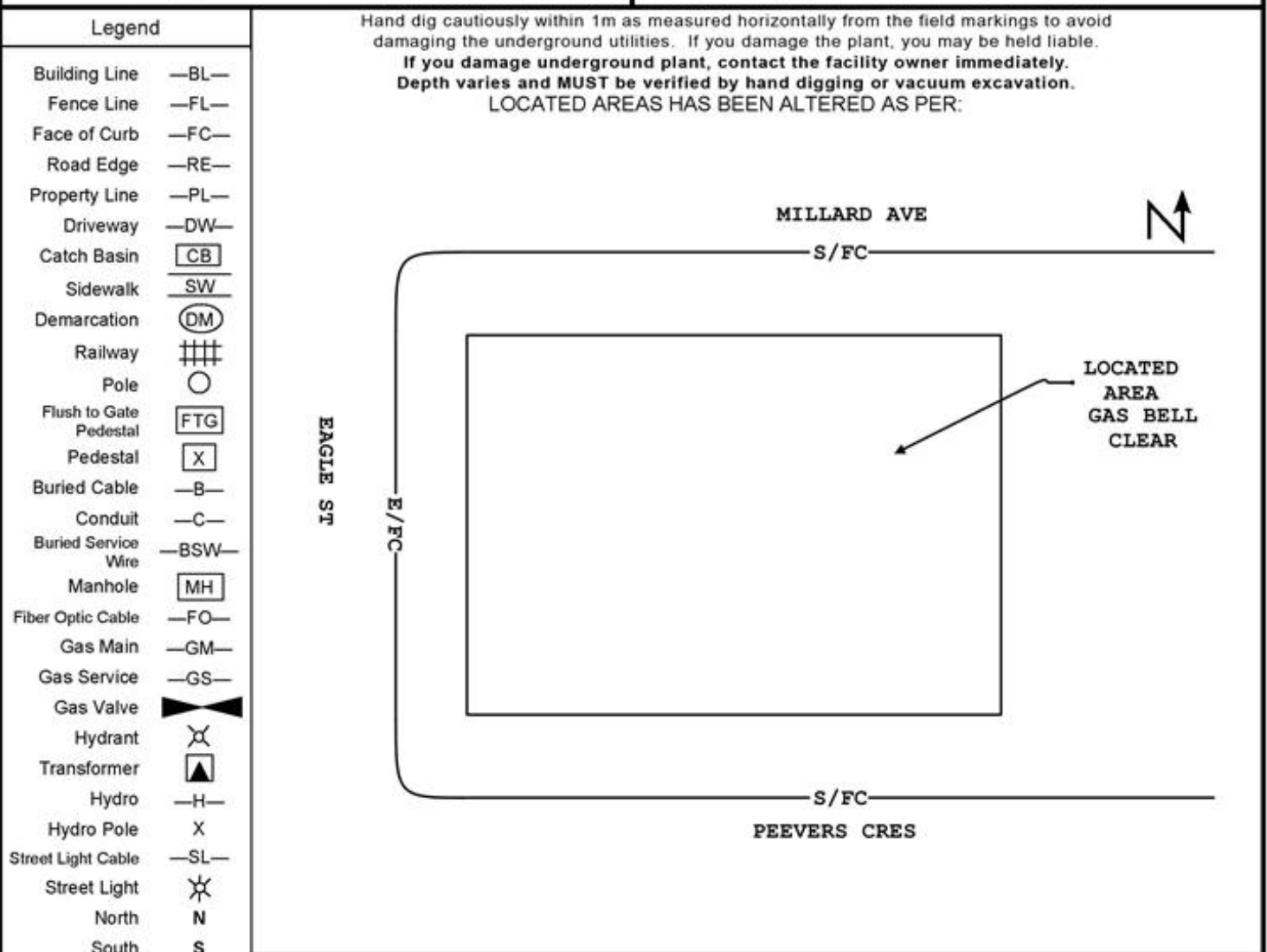
 <p><b>CANADIAN LOCATORS INC.</b> Servicing the Utilities Industry</p>	<b>Auxiliary Locate Sheet</b>			Request #:  2012054331
	Tel: 905-479-5674	Fax: 905-479-8628	Toll Free:	Email:

Utilities <input checked="" type="checkbox"/> Telecom <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Hydro <input type="checkbox"/> Street Lighting Located <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Date Located: Feb 7 2012
---	-----------------------------

Number of Services marked: (Specify building/house numbers)  
0


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

FROM: 10.0M E/E/FC EAGLE ST	TO: 100.0M E/E/FC EAGLE ST
FROM: 10.0M S/S/FC MILLARD AVE	TO: 10.0M N/N/FC PEEVERS CRES



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

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

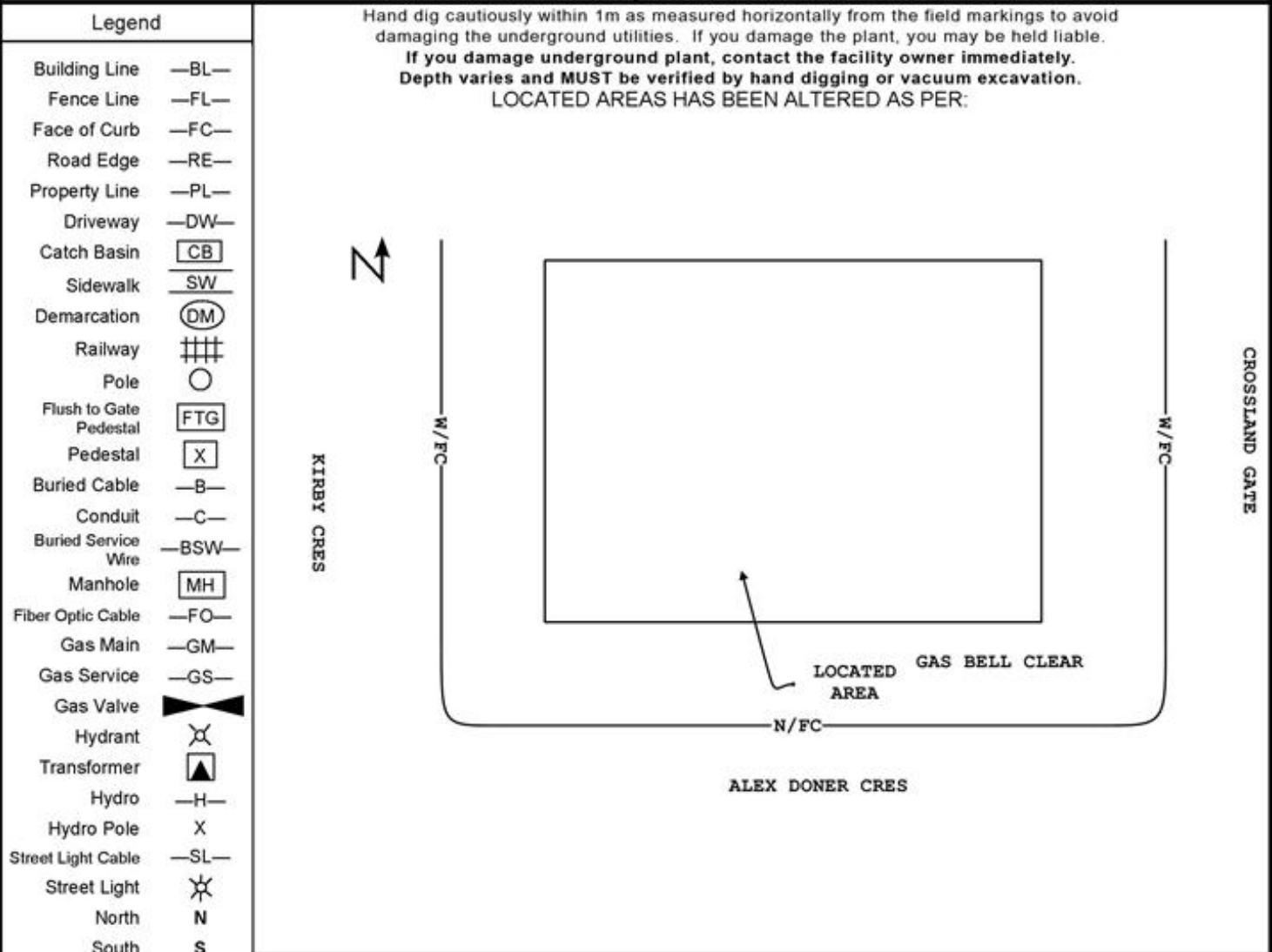
 <p><b>CANADIAN LOCATORS INC.</b> Servicing the Utilities Industry</p>	<b>Auxiliary Locate Sheet</b>			Request #:
				2012054331
Tel:	Fax:	Toll Free:	Email:	
905-479-5674	905-479-8628			

Utilities <input checked="" type="checkbox"/> Telecom <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Hydro <input type="checkbox"/> Street Lighting Located <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Date Located: Feb 7 2012
---	-----------------------------

Number of Services marked: (Specify building/house numbers)  
 0


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

FROM: 40.0M N/N/FC ALEX DONER CRES	TO: 500.0M N/N/FC ALEX DONER CRES
FROM: 40.0M E/E/FC KIRBY CRES	TO: 40.0M W/W/FC CROSSLAND GATE



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

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

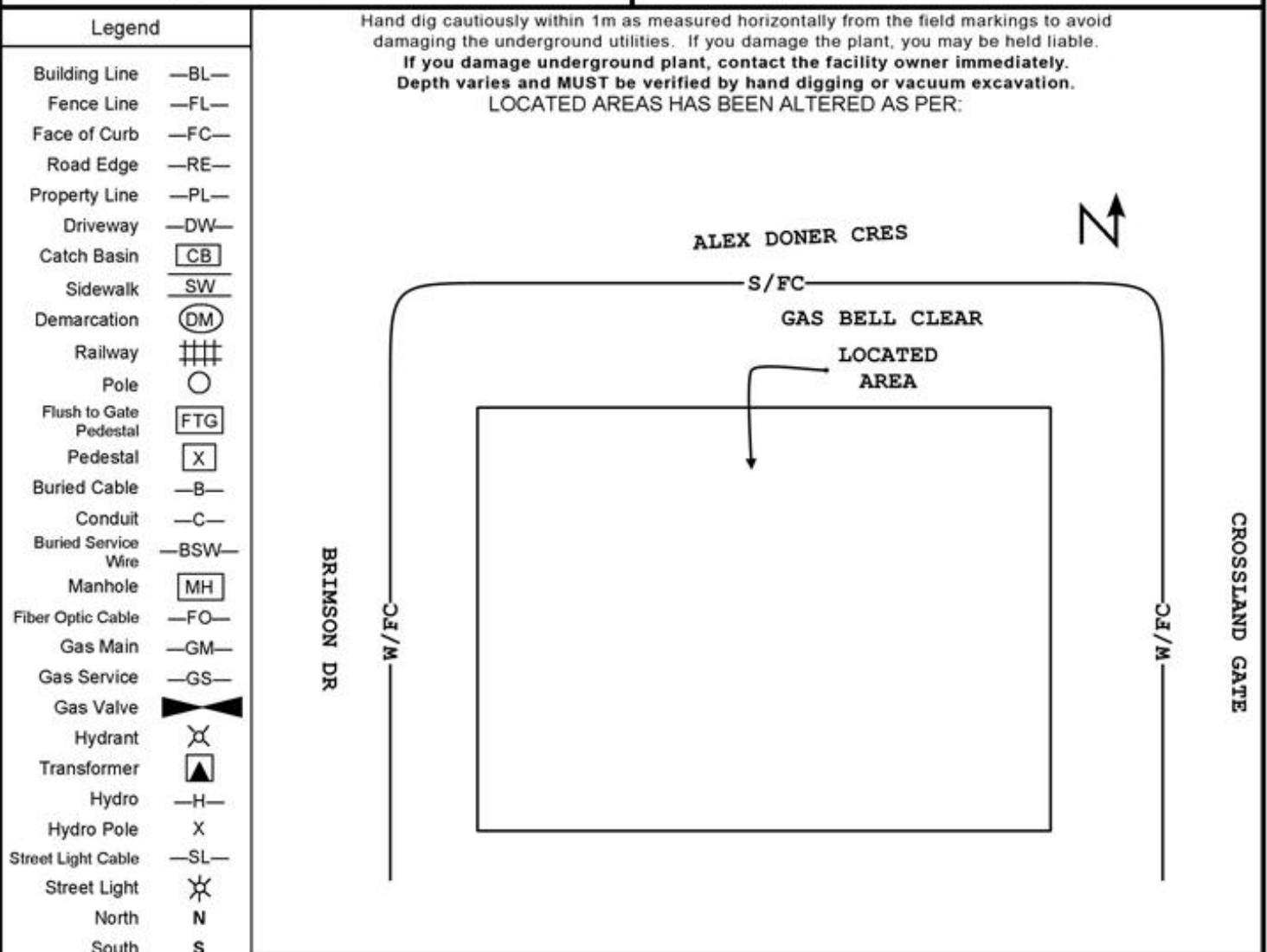
 <p><b>CANADIAN LOCATORS INC.</b> Servicing the Utilities Industry</p>	<b>Auxiliary Locate Sheet</b>		Request #: <b>2012054331</b>	
	Tel: 905-479-5674	Fax: 905-479-8628	Toll Free:	Email:

Utilities <input checked="" type="checkbox"/> Telecom <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Hydro <input type="checkbox"/> Street Lighting Located <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Date Located: Feb 7 2012
---	-----------------------------

Number of Services marked: (Specify building/house numbers)  
0

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

FROM: 40.0M S/S/FC ALEX DONER CRES	TO: 100.0M S/S/FC ALEX DONER CRES
FROM: 40.0M W/W/FC CROSSLAND GATE	TO: 40.0M E/E/FC BRIMSON DR



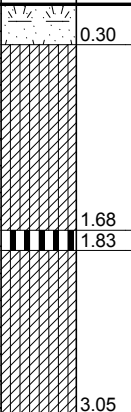
THIS FORM VALID ONLY WITH Primary Locate Form. This sketch is not to scale.  
 Any privately owned services, including sewer service lines, within the located area have not been marked - check with the service/property owner.

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

## Appendix B

### Borehole Logs

<b>CLIENT</b> <u>Marianneville Developments Limited</u>	<b>PROJECT NAME</b> <u>Phase II ESA</u>
<b>PROJECT NUMBER</b> <u>L09-301</u>	<b>PROJECT LOCATION</b> <u>470 Crossland Gate, Newmarket, ON</u>
<b>DATE STARTED</b> <u>3/14/12</u> <b>COMPLETED</b> <u>3/14/12</u>	<b>GROUND ELEVATION</b> _____ <b>HOLE SIZE</b> <u>50.8 mm</u>
<b>DRILLING CONTRACTOR</b> <u>Sonic Soil Sampling Inc.</u>	<b>GROUND WATER LEVELS:</b>
<b>DRILLING METHOD</b> <u>Pionjar</u>	<b>AT TIME OF DRILLING</b> <u>---</u>
<b>LOGGED BY</b> <u>SP</u> <b>CHECKED BY</b> <u>AL</u>	<b>AT END OF DRILLING</b> <u>---</u>
<b>NOTES</b> <u>*Soil sample submitted for lab analysis</u>	<b>AFTER DRILLING</b> <u>---</u>

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	RECOVERY LENGTH (M)	VAPOUR READING	
1			TOPSOIL moist, dark brown, no hydrocarbon odour		BH1-1			
2			SILTY CLAY moist, brown, no hydrocarbon odour		BH1-2			
3	1					BH1-3		
4						BH1-4*		
5						BH1-5		
6	1.68			CLAYEY SILT dark brown, slightly moist, trace organics, no hydrocarbon odour		BH1-6		
7	1.83			SILTY CLAY dark brown, slightly moist, trace organics, no hydrocarbon odour		BH1-7*		
8				becoming grey, wet at 2.13 mbgs		BH1-8		
9			slightly moist, brown at 2.67 mbgs					
10	3		3.05					

Bottom of borehole at 3.05 meters.

JOB NO: 1111-S053

# LOG OF BOREHOLE NO: MW-1D

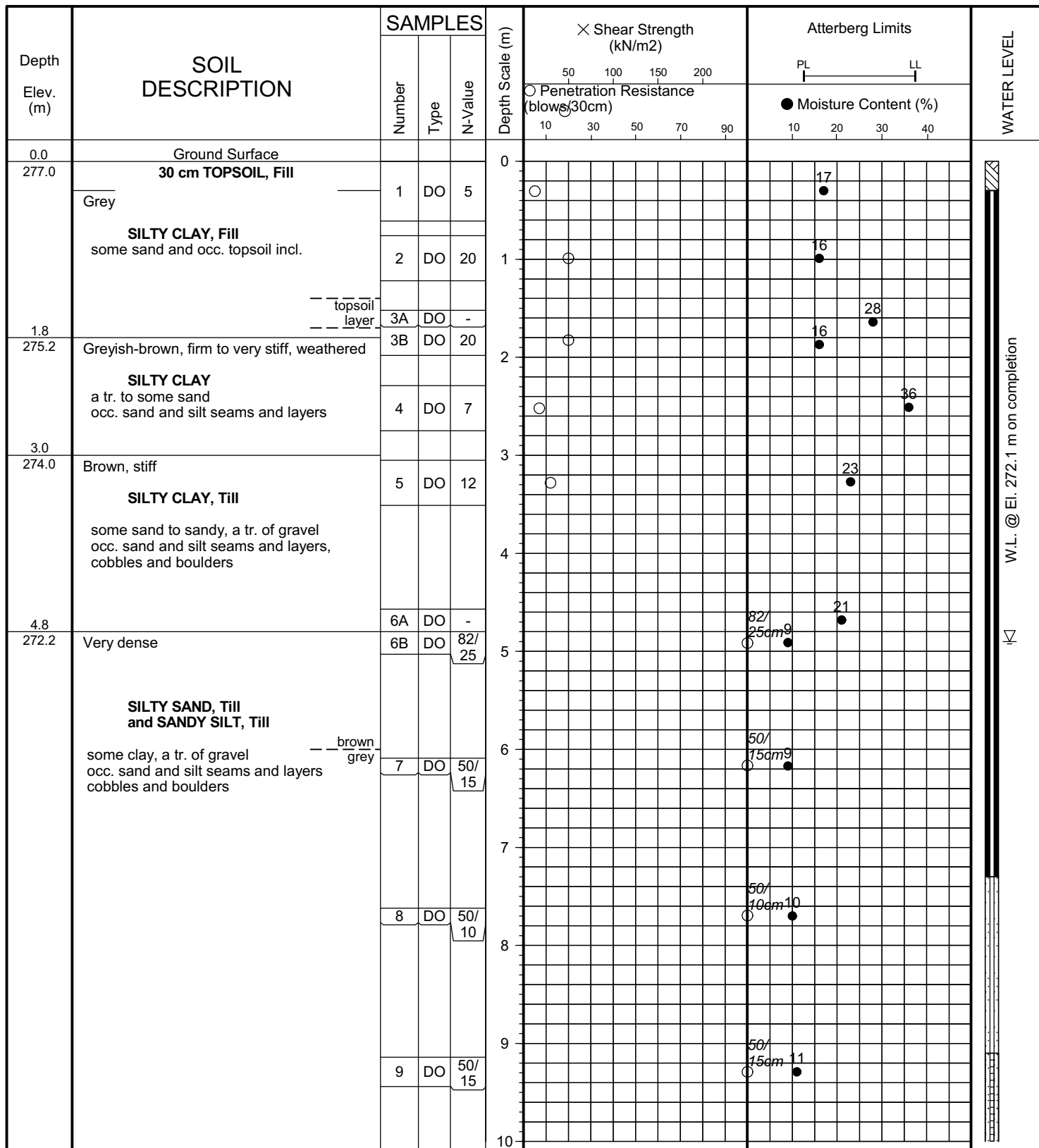
FIGURE NO: 19A

JOB DESCRIPTION: Proposed Residential Subdivision (Estates of Glenway Newmarket)

JOB LOCATION: Davis Drive West and Bathurst Street, Town of Newmarket

METHOD OF BORING: Flight-Auger

DATE: December 12, 2011





**JOB NO:** 1111-S053

**LOG OF BOREHOLE NO: MW-1D**

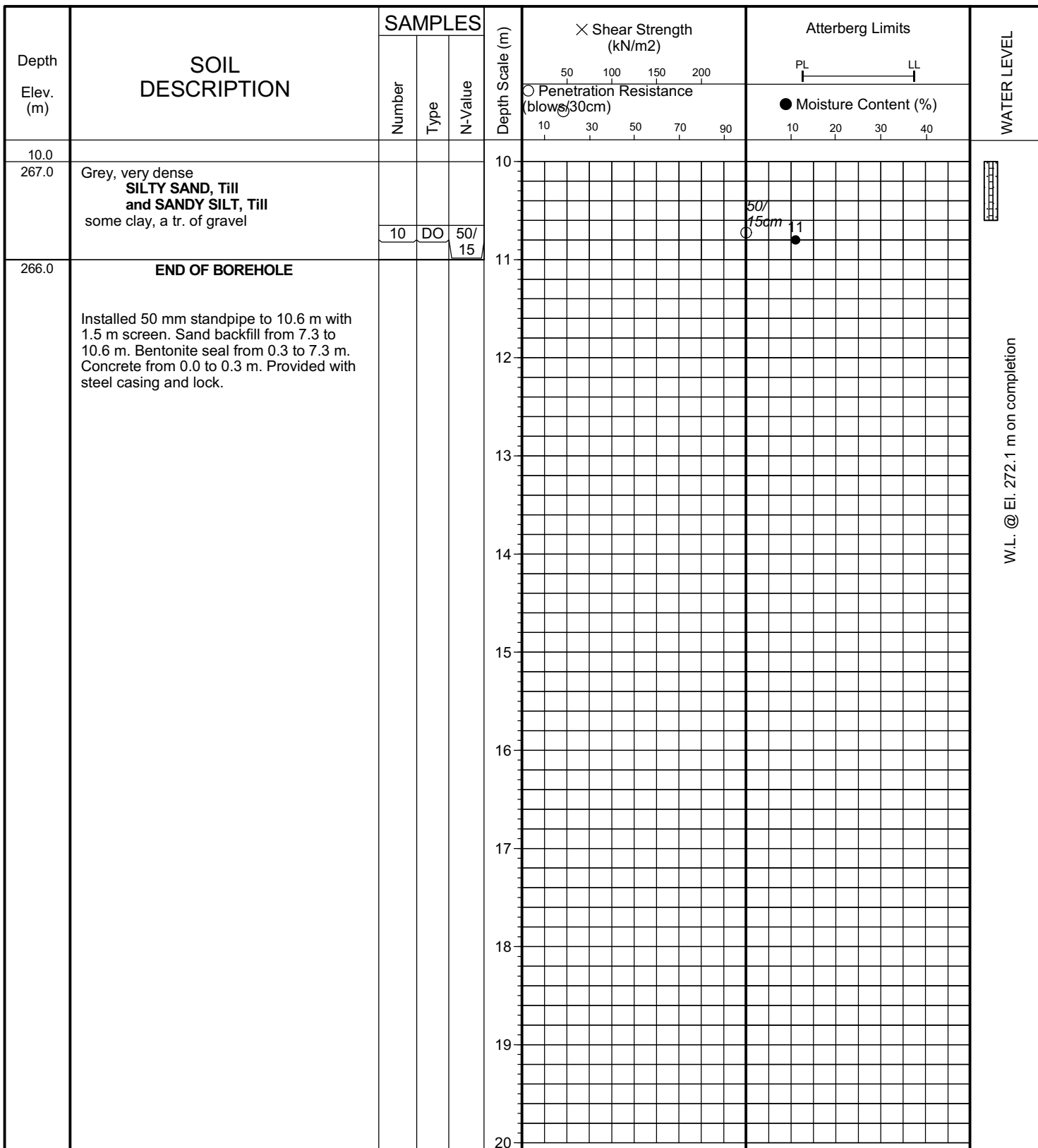
**FIGURE NO: 19B**

**JOB DESCRIPTION:** Proposed Residential Subdivision (Estates of Glenway Newmarket)

**JOB LOCATION:** Davis Drive West and Bathurst Street, Town of Newmarket

**METHOD OF BORING:** Flight-Auger

**DATE:** December 12, 2011



**JOB NO:** 1111-S053

**LOG OF BOREHOLE NO: MW-1S**

**FIGURE NO: 20**

**JOB DESCRIPTION:** Proposed Residential Subdivision (Estates of Glenway Newmarket)

**JOB LOCATION:** Davis Drive West and Bathurst Street, Town of Newmarket

**METHOD OF BORING:** Flight-Auger

**DATE:** December 12, 2011

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES			Depth Scale (m)	× Shear Strength (kN/m <sup>2</sup> ) ○ Penetration Resistance (blows/30cm)	Atterberg Limits PL _____ LL _____ ● Moisture Content (%)	WATER LEVEL
		Number	Type	N-Value				
0.0	Ground Surface				0			
277.0	30 cm TOPSOIL, Fill Grey  SILTY CLAY, Fill some sand and occ. topsoil incl.				1			
1.8	topsoil layer				2			
275.2	Greyish-brown, firm to very stiff, weathered  SILTY CLAY tr. to some sand occ. sand and silt seams and layers				3			
3.0					4			
274.0	Brown, stiff  SILTY CLAY, Till  some sand to sandy, a tr. of gravel occ. sand and silt seams and layers, cobbles and boulders				5			
4.8					6			
272.2	Brown, very dense  SILTY SAND, Till and SANDY SILT, Till some clay, a tr. of gravel occ. sand and silt seams and layers cobbles and boulders				7			
6.0					8			
271.0	END OF BOREHOLE  Installed 50 mm standpipe to 6.0 m with 3.0 m screen. Sand backfill from 1.8 to 6.0 m. Bentonite seal from 0.3 to 1.8 m. Concrete from 0.0 to 0.3 m. Provided with steel casing and lock.				9			
					10			

JOB NO: 1111-S053

**LOG OF BOREHOLE NO: MW-11S**

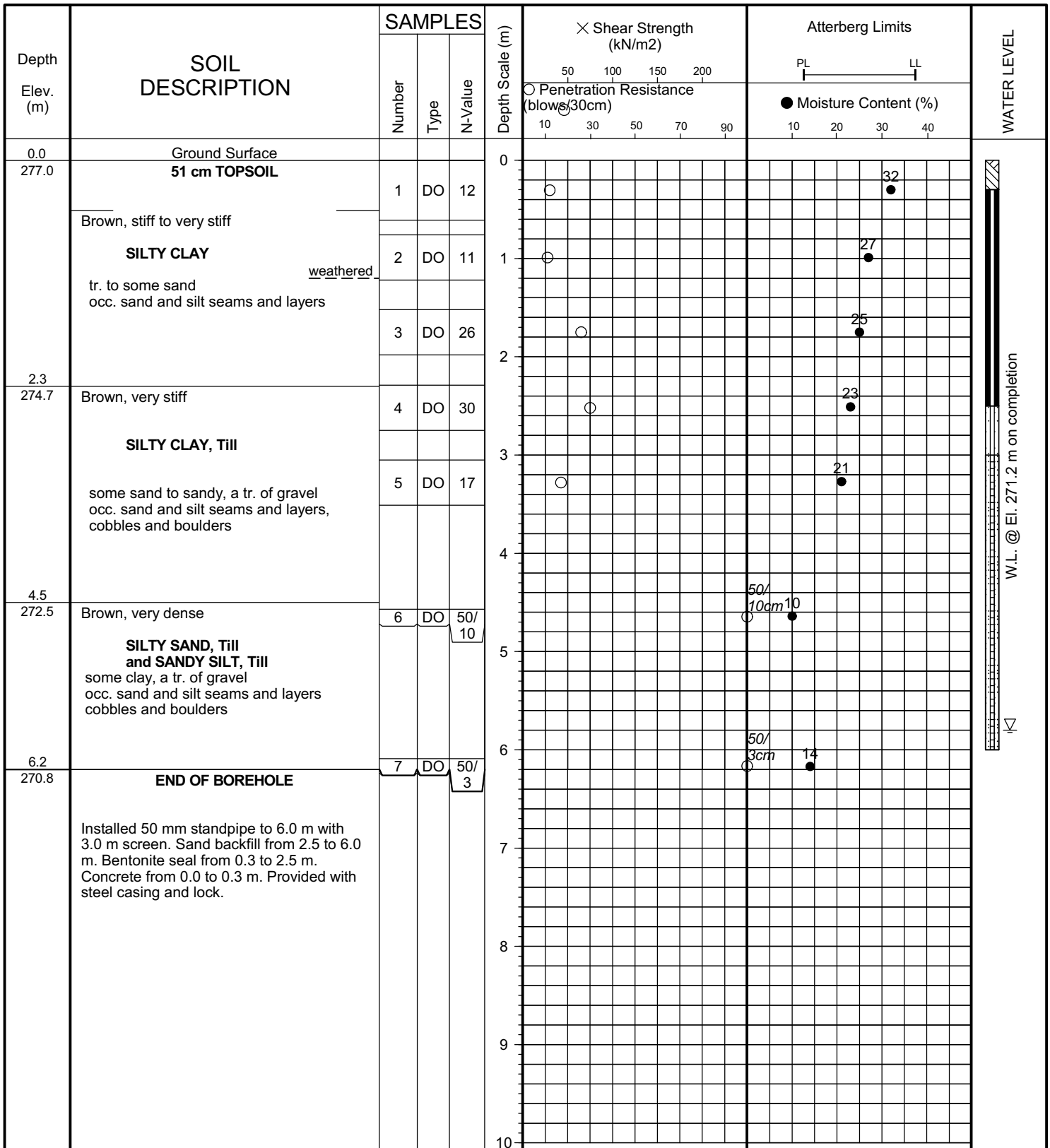
FIGURE NO: 34

JOB DESCRIPTION: Proposed Residential Subdivision (Estates of Glenway Newmarket)

JOB LOCATION: Davis Drive West and Bathurst Street, Town of Newmarket

METHOD OF BORING: Flight-Auger

DATE: December 15, 2011



## Appendix C

# Analytical Results

**Table C-1: Soil OC Pesticides Herbicides Analysis Results**

	Units	RPI O.Reg 153/04 Table 2	SS1	SS2	RDL	SS3	RDL	DUP1 (duplicate of SS-2)	RDL
<b>Pesticides &amp; Herbicides</b>									
Hexachlorobutadiene	µg/g	0.012	ND	ND	0.005	ND	0.005	ND	0.005
Hexachloroethane	µg/g	0.089	ND	ND	0.05	ND	0.01	ND	0.005
Aldrin	µg/g	0.05	ND	ND	0.02	ND	0.004	ND	0.002
α-Chlordane	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
γ-Chlordane	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
Chlordane (Total)	µg/g	0.05	ND	ND	0.02	ND	0.004	ND	0.002
o,p-DDD	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
p,p-DDD	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
o,p-DDD + p,p-DDD	µg/g	3.3	ND	ND	0.02	ND	0.004	ND	0.002
o,p-DDE	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
p,p-DDE	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
o,p-DDE + p,p-DDE	µg/g	0.26	ND	ND	0.02	ND	0.004	ND	0.002
o,p-DDT	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
p,p-DDT	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
o,p-DDT + p,p-DDT	µg/g	1.4	ND	ND	0.02	ND	0.004	ND	0.002
Dieldrin	µg/g	0.05	ND	ND	0.02	ND	0.004	ND	0.002
Endosulfan I (alpha)	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
Endosulfan II	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
Total Endosulfan	µg/g	0.04	ND	ND	0.02	ND	0.004	ND	0.002
Endrin	µg/g	0.04	ND	ND	0.02	ND	0.004	ND	0.002
Heptachlor	µg/g	0.15	ND	ND	0.02	ND	0.004	ND	0.002
Heptachlor epoxide	µg/g	0.05	ND	ND	0.02	ND	0.004	ND	0.002
Hexachlorobenzene	µg/g	0.52	ND	ND	0.02	ND	0.004	ND	0.002
Lindane	µg/g	NV	ND	ND	0.02	ND	0.004	ND	0.002
Methoxychlor	µg/g	0.13	ND	ND	0.05	ND	0.01	ND	0.005
Total PCB	µg/g	0.35	ND	ND	0.3	ND	0.06	ND	0.03
Aroclor 1242	µg/g	NV	ND	ND	0.15	ND	0.03	ND	0.015
Aroclor 1248	µg/g	NV	ND	ND	0.15	ND	0.03	ND	0.015
Aroclor 1254	µg/g	NV	ND	ND	0.15	ND	0.03	ND	0.015
Aroclor 1260	µg/g	NV	ND	ND	0.15	ND	0.03	ND	0.015

ND = Non-Detect

NV = No Value

RDL = Reportable Detection Limit

Soil, Groundwater and Sediment Standards for Use Under Part XV.1 Of the Environmental Protection Act as amended April 15, 2011

RPI O.Reg 153/04 Table 2 = Table 2: Potable Ground Water - Residential/Parkland/Institutional Property Use - Coarse-Grained Materials

**Table C-2: Soil BTEX, PHC and VOC Analysis Results**

	Units	RPI O.Reg 153/04 Table 2	RDL	BH1-4	BH1-7	TRIP BLANK
<b>BTEX &amp; F1 Hydrocarbons</b>						
Benzene	µg/g	0.21	0.02	ND	ND	ND
Toluene	µg/g	0.2	0.02	ND	ND	ND
Ethylbenzene	µg/g	1.1	0.02	ND	ND	ND
p+m-Xylene	µg/g	NV	0.02	ND	ND	ND
o-Xylene	µg/g	NV	0.02	ND	ND	ND
Xylene (Total)	µg/g	3.1	0.02	ND	ND	ND
F1 (C6-C10)	µg/g	55	10	ND	ND	-
F1 (C6-C10) - BTEX	µg/g	55	10	ND	ND	-
<b>F2-F4 Hydrocarbons</b>						
F2 (C10-C16 Hydrocarbons)	µg/g	98	10	ND	ND	-
F3 (C16-C34 Hydrocarbons)	µg/g	300	10	ND	ND	-
F4 (C34-C50 Hydrocarbons)	µg/g	2800	10	ND	ND	-
Reached Baseline at C50	-	-	-	YES	YES	-
F4 Gravimetric	µg/g	-	-	-	-	-
<b>VOCs</b>						
Acetone (2-Propanone)	µg/g	16	0.5	ND	ND	ND
Benzene	µg/g	0.21	0.02	ND	ND	ND
Bromodichloromethane	µg/g	1.5	0.05	ND	ND	ND
Bromoform	µg/g	0.27	0.05	ND	ND	ND
Bromomethane	µg/g	0.05	0.05	ND	ND	ND
Carbon Tetrachloride	µg/g	0.05	0.05	ND	ND	ND
Chlorobenzene	µg/g	2.4	0.05	ND	ND	ND
Chloroform	µg/g	0.05	0.05	ND	ND	ND
Dibromochloromethane	µg/g	2.3	0.05	ND	ND	ND
1,2-Dichlorobenzene	µg/g	1.2	0.05	ND	ND	ND
1,3-Dichlorobenzene	µg/g	4.8	0.05	ND	ND	ND
1,4-Dichlorobenzene	µg/g	0.083	0.05	ND	ND	ND
Dichlorodifluoromethane (FREON 12)	µg/g	16	0.05	ND	ND	ND
1,1-Dichloroethane	µg/g	0.47	0.05	ND	ND	ND
1,2-Dichloroethane	µg/g	0.05	0.05	ND	ND	ND
1,1-Dichloroethylene	µg/g	0.05	0.05	ND	ND	ND
cis-1,2-Dichloroethylene	µg/g	1.90	0.05	ND	ND	ND
trans-1,2-Dichloroethylene	µg/g	0.084	0.05	ND	ND	ND
1,2-Dichloropropane	µg/g	0.05	0.05	ND	ND	ND
cis-1,3-Dichloropropene	µg/g	0.05	0.03	ND	ND	ND
trans-1,3-Dichloropropene	µg/g	0.05	0.04	ND	ND	ND
Ethylbenzene	µg/g	1.1	0.02	ND	ND	ND
Ethylene Dibromide	µg/g	0.05	0.05	ND	ND	ND
Hexane	µg/g	2.8	0.05	ND	ND	ND
Methylene Chloride(Dichloromethane)	µg/g	0.1	0.05	ND	ND	ND
Methyl Isobutyl Ketone	µg/g	1.7	0.5	ND	ND	ND
Methyl Ethyl Ketone (2-Butanone)	µg/g	16	0.5	ND	ND	ND
Methyl t-butyl ether (MTBE)	µg/g	0.75	0.05	ND	ND	ND
Styrene	µg/g	0.70	0.05	ND	ND	ND
1,1,1,2-Tetrachloroethane	µg/g	0.058	0.05	ND	ND	ND
1,1,1,2,2-Tetrachloroethane	µg/g	0.05	0.05	ND	ND	ND
Tetrachloroethylene	µg/g	0.28	0.05	ND	ND	ND
Toluene	µg/g	2.3	0.02	ND	ND	ND
1,1,1-Trichloroethane	µg/g	0.38	0.05	ND	ND	ND
1,1,2-Trichloroethane	µg/g	0.05	0.05	ND	ND	ND
Trichloroethylene	µg/g	0.061	0.05	ND	ND	ND
Vinyl Chloride	µg/g	0.02	0.02	ND	ND	ND
p+m-Xylene	µg/g	NV	0.02	ND	ND	ND
o-Xylene	µg/g	NV	0.02	ND	ND	ND
Xylene (Total)	µg/g	3.1	0.02	ND	ND	ND
Trichlorofluoromethane (FREON 11)	µg/g	4	0.05	ND	ND	ND

NV = No Value

ND = Not Detected

RDL = Reportable Detection Limit

Soil, Groundwater and Sediment Standards for Use Under Part XV.1 Of the Environmental Protection Act as amended April 15, 2011

RPI O.Reg 153/04 Table 2 = Table 2: Potable Ground Water - Residential/Parkland/Institutional Property Use - Coarse-Grained Materials



**Table C-3: Groundwater BTEX and PHC Analysis Results**

	Units	O.Reg 153/04 Table 2	RDL	MW1-D	MW1-S	Dup	Trip Blank
<b>BTEX &amp; F1 Hydrocarbons</b>							
Benzene	µg/L	5	0.2	ND	ND	ND	-
Toluene	µg/L	24	0.2	ND	ND	ND	-
Ethylbenzene	µg/L	2	0.2	ND	ND	ND	-
p+m-Xylene	µg/L	NV	0.2	ND	ND	ND	-
o-Xylene	µg/L	NV	0.2	ND	ND	ND	-
Xylene (Total)	µg/L	300	0.2	ND	ND	ND	-
F1 (C6-C10)	µg/L	750	25	ND	ND	ND	ND
F1 (C6-C10) - BTEX	µg/L	750	25	ND	ND	ND	ND
<b>F2-F4 Hydrocarbons</b>							
F2 (C10-C16 Hydrocarbons)	µg/L	150	100	ND	ND	ND	-
F3 (C16-C34 Hydrocarbons)	µg/L	500	100	ND	ND	ND	-
F4 (C34-C50 Hydrocarbons)	µg/L	500	100	ND	ND	ND	-
Reached Baseline at C50	-	-	-	YES	YES	YES	-
F4 Gravimetric	µg/L	-	-	-	-	-	-

NV = No Value

ND = Not Detected

RDL = Reportable Detection Limit

Soil, Groundwater and Sediment Standards for Use Under Part XV.1 Of the Environmental Protection Act as amended April 15, 2011

Criteria applicable for Table 2: Potable Ground Water - All Types of Property Use - Coarse-Grained Materials

**Table C-4: Groundwater VOCs Analysis Results**

	Units	O.Reg 153/04 Table 2	RDL	MW1-D	MW1-S	Dup	Trip Blank
<b>VOCs</b>							
Acetone (2-Propanone)	µg/L	2700	10	ND	ND	ND	ND
Benzene	µg/L	5	0.2	ND	ND	ND	ND
Bromodichloromethane	µg/L	16	0.5	ND	ND	ND	ND
Bromoform	µg/L	25	1	ND	ND	ND	ND
Bromomethane	µg/L	0.9	0.5	ND	ND	ND	ND
Carbon Tetrachloride	µg/L	0.79	0.2	ND	ND	ND	ND
Chlorobenzene	µg/L	30	0.2	ND	ND	ND	ND
Chloroform	µg/L	2.4	0.2	ND	ND	ND	ND
Dibromochloromethane	µg/L	25	0.5	ND	ND	ND	ND
1,2-Dichlorobenzene	µg/L	3	0.5	ND	ND	ND	ND
1,3-Dichlorobenzene	µg/L	59	0.5	ND	ND	ND	ND
1,4-Dichlorobenzene	µg/L	1	0.5	ND	ND	ND	ND
Dichlorodifluoromethane (FREON 12)	µg/L	590	1	ND	ND	ND	ND
1,1-Dichloroethane	µg/L	5	0.2	ND	ND	ND	ND
1,2-Dichloroethane	µg/L	1.6	0.5	ND	ND	ND	ND
1,1-Dichloroethylene	µg/L	1.6	0.2	ND	ND	ND	ND
cis-1,2-Dichloroethylene	µg/L	1.6	0.5	ND	ND	ND	ND
trans-1,2-Dichloroethylene	µg/L	1.6	0.5	ND	ND	ND	ND
1,2-Dichloropropane	µg/L	5	0.2	ND	ND	ND	ND
cis-1,3-Dichloropropene	µg/L	0.5	0.3	ND	ND	ND	ND
trans-1,3-Dichloropropene	µg/L	0.5	0.4	ND	ND	ND	ND
Ethylbenzene	µg/L	2	0.2	ND	ND	ND	ND
Ethylene Dibromide	µg/L	0.20	0.2	ND	ND	ND	ND
Hexane	µg/L	51	1	ND	ND	ND	ND
Methylene Chloride(Dichloromethane)	µg/L	50	2	ND	ND	ND	ND
Methyl Isobutyl Ketone	µg/L	640	5	ND	ND	ND	ND
Methyl Ethyl Ketone (2-Butanone)	µg/L	1800	10	ND	ND	ND	ND
Methyl t-butyl ether (MTBE)	µg/L	15	0.5	ND	ND	ND	ND
Styrene	µg/L	5	0.5	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	µg/L	1.1	0.5	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	µg/L	1.0	0.5	ND	ND	ND	ND
Tetrachloroethylene	µg/L	1.6	0.2	ND	ND	ND	ND
Toluene	µg/L	24	0.2	ND	ND	0.22	ND
1,1,1-Trichloroethane	µg/L	200	0.2	ND	ND	ND	ND
1,1,2-Trichloroethane	µg/L	4.7	0.5	ND	ND	ND	ND
Trichloroethylene	µg/L	1.6	0.2	ND	ND	ND	ND
Vinyl Chloride	µg/L	0.5	0.2	ND	ND	ND	ND
p+m-Xylene	µg/L	NV	0.2	ND	ND	ND	ND
o-Xylene	µg/L	NV	0.2	ND	ND	ND	ND
Xylene (Total)	µg/L	300	0.2	ND	ND	ND	ND
Trichlorofluoromethane (FREON 11)	µg/L	150	0.5	ND	ND	ND	ND

NV = No Value

ND = Not Detected

RDL = Reportable Detection Limit

Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act as amended April 15, 2011

Criteria applicable for Table 2: Potable Ground Water - All Types of Property Use - Coarse-Grained Materials

**Table C-5: Groundwater OC Pesticides Herbicides Analysis Results**

	Units	RPI O.Reg 153/04 Table 2	RDL	MW11-S
<b>Pesticides &amp; Herbicides</b>				
Hexachlorobutadiene	µg/L	0.44	0.009	ND
Hexachloroethane	µg/L	2.1	0.01	ND
Aldrin	µg/L	0.35	0.005	ND
α-Chlordane	µg/L	NV	0.005	ND
γ-Chlordane	µg/L	NV	0.005	ND
Chlordane (Total)	µg/L	7	0.005	ND
o,p-DDD	µg/L	NV	0.005	ND
p,p-DDD	µg/L	NV	0.005	ND
o,p-DDD + p,p-DDD	µg/L	10	0.005	ND
o,p-DDE	µg/L	NV	0.005	ND
p,p-DDE	µg/L	NV	0.005	ND
o,p-DDE + p,p-DDE	µg/L	10	0.005	ND
o,p-DDT	µg/L	NV	0.005	ND
p,p-DDT	µg/L	NV	0.005	ND
o,p-DDT + p,p-DDT	µg/L	2.8	0.005	ND
Dieldrin	µg/L	0.35	0.005	ND
Endosulfan I (alpha)	µg/L	NV	0.005	ND
Endosulfan II	µg/L	NV	0.005	ND
Total Endosulfan	µg/L	1.5	0.005	ND
Endrin	µg/L	0.48	0.005	ND
Heptachlor	µg/L	1.5	0.005	ND
Heptachlor epoxide	µg/L	0.048	0.005	ND
Hexachlorobenzene	µg/L	1	0.005	ND
Lindane	µg/L	NA	0.003	ND
Methoxychlor	µg/L	6.5	0.01	ND
Total PCB	µg/L	3	0.05	ND
Aroclor 1242	µg/L	NV	0.05	ND
Aroclor 1248	µg/L	NV	0.05	ND
Aroclor 1254	µg/L	NV	0.05	ND
Aroclor 1260	µg/L	NV	0.05	ND

ND = Non-Detect

NV = No Value

RDL = Reportable Detection Limit

Soil, Groundwater and Sediment Standards for Use Under Part XV.1 Of the Environmental Protection Act as amended April 15, 2011

RPI O.Reg 153/04 Table 2 = Table 2: Potable Ground Water - Residential/Parkland/Institutional Property Use - Coarse-Grained Materials

## Appendix D

# Laboratory Certificates of Analysis

Your Project #: L09-301  
 Site Location: MARIANNEVILLE  
 Your C.O.C. #: 32174301, 321743-01-01

**Attention: Andre Lyn**  
 Cole Engineering Group Ltd  
 70 Valleywood Dr  
 Markham, ON  
 CANADA L3R 4T5

**Report Date: 2012/05/30**

This report supersedes all previous reports with the same Maxxam job number

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B219905**  
**Received: 2012/02/10, 08:00**

Sample Matrix: Soil  
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Moisture	1	N/A	2012/02/17	CAM SOP-00445	R.Carter,1993
Moisture	3	N/A	2012/02/18	CAM SOP-00445	R.Carter,1993
OC Pesticides (Selected) & PCB (1)	3	2012/02/16	2012/02/17	CAM SOP-00307	SW846 8081, 8082
OC Pesticides (Selected) & PCB (1)	1	2012/02/17	2012/02/18	CAM SOP-00307	SW846 8081, 8082

Sample Matrix: Water  
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
OC Pesticides (Selected) & PCB (1)	1	2012/02/13	2012/02/14	CAM SOP-00307	SW846 8081,8082

### Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

(1) Chlordane ( Total) = Alpha Chlordane + Gamma Chlordane

../2

Maxxam Job #: B219905  
Report Date: 2012/05/30

Cole Engineering Group Ltd  
Client Project #: L09-301  
Site Location: MARIANNEVILLE

-2-

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager  
Email: JGoralczyk@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B219905  
 Report Date: 2012/05/30

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 OC PESTICIDES (SOIL)**

Maxxam ID		MM6584	MM6585		MM6586			MM6587		
Sampling Date		2012/02/09	2012/02/09		2012/02/09			2012/02/09		
	Units	SS1	SS2	RDL	SS3	RDL	QC Batch	DUP1	RDL	QC Batch
<b>Inorganics</b>										
Moisture	%	39	40	1.0	38	1.0	2768473	29	1.0	2767722
<b>Pesticides &amp; Herbicides</b>										
Aldrin	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
a-Chlordane	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
g-Chlordane	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Chlordane (Total)	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
o,p-DDD	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
p,p-DDD	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
o,p-DDD + p,p-DDD	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
o,p-DDE	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
p,p-DDE	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
o,p-DDE + p,p-DDE	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
o,p-DDT	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
p,p-DDT	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
o,p-DDT + p,p-DDT	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Dieldrin	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Lindane	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Endosulfan I (alpha)	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Endosulfan II	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Total Endosulfan	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Endrin	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Heptachlor	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Heptachlor epoxide	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Hexachlorobenzene	ug/g	ND	ND	0.020	ND	0.0040	2766218	ND	0.0020	2767604
Hexachlorobutadiene	ug/g	ND	ND	0.0050	ND	0.0050	2766218	ND	0.0050	2767604
Hexachloroethane	ug/g	ND	ND	0.050	ND	0.010	2766218	ND	0.0050	2767604
Methoxychlor	ug/g	ND	ND	0.050	ND	0.010	2766218	ND	0.0050	2767604
Aroclor 1242	ug/g	ND	ND	0.15	ND	0.030	2766218	ND	0.015	2767604
Aroclor 1248	ug/g	ND	ND	0.15	ND	0.030	2766218	ND	0.015	2767604
Aroclor 1254	ug/g	ND	ND	0.15	ND	0.030	2766218	ND	0.015	2767604
Aroclor 1260	ug/g	ND	ND	0.15	ND	0.030	2766218	ND	0.015	2767604
Total PCB	ug/g	ND	ND	0.30	ND	0.060	2766218	ND	0.030	2767604

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B219905  
 Report Date: 2012/05/30

Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 OC PESTICIDES (SOIL)**

Maxxam ID		MM6584	MM6585		MM6586			MM6587		
Sampling Date		2012/02/09	2012/02/09		2012/02/09			2012/02/09		
	Units	SS1	SS2	RDL	SS3	RDL	QC Batch	DUP1	RDL	QC Batch
<b>Surrogate Recovery (%)</b>										
2,4,5,6-Tetrachloro-m-xylene	%	108	108		88		2766218	83		2767604
Decachlorobiphenyl	%	79	92		83		2766218	67		2767604

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RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B219905  
 Report Date: 2012/05/30

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 OC PESTICIDES (WATER)**

Maxxam ID		MM6588		
Sampling Date		2012/02/09		
	<b>Units</b>	<b>MW115</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Pesticides &amp; Herbicides</b>				
Aldrin	ug/L	ND	0.005	2762407
Dieldrin	ug/L	ND	0.005	2762407
a-Chlordane	ug/L	ND	0.005	2762407
g-Chlordane	ug/L	ND	0.005	2762407
Chlordane (Total)	ug/L	ND	0.005	2762407
o,p-DDD	ug/L	ND	0.005	2762407
p,p-DDD	ug/L	ND	0.005	2762407
o,p-DDD + p,p-DDD	ug/L	ND	0.005	2762407
o,p-DDE	ug/L	ND	0.005	2762407
p,p-DDE	ug/L	ND	0.005	2762407
o,p-DDE + p,p-DDE	ug/L	ND	0.005	2762407
o,p-DDT	ug/L	ND	0.005	2762407
p,p-DDT	ug/L	ND	0.005	2762407
o,p-DDT + p,p-DDT	ug/L	ND	0.005	2762407
Lindane	ug/L	ND	0.003	2762407
Endosulfan I (alpha)	ug/L	ND	0.005	2762407
Endosulfan II	ug/L	ND	0.005	2762407
Total Endosulfan	ug/L	ND	0.005	2762407
Endrin	ug/L	ND	0.005	2762407
Heptachlor	ug/L	ND	0.005	2762407
Heptachlor epoxide	ug/L	ND	0.005	2762407
Hexachlorobenzene	ug/L	ND	0.005	2762407
Hexachlorobutadiene	ug/L	ND	0.009	2762407
Hexachloroethane	ug/L	ND	0.01	2762407
Methoxychlor	ug/L	ND	0.01	2762407
Aroclor 1242	ug/L	ND	0.05	2762407
Aroclor 1248	ug/L	ND	0.05	2762407
Aroclor 1254	ug/L	ND	0.05	2762407
Aroclor 1260	ug/L	ND	0.05	2762407
Total PCB	ug/L	ND	0.05	2762407
<b>Surrogate Recovery (%)</b>				
2,4,5,6-Tetrachloro-m-xylene	%	68		2762407
Decachlorobiphenyl	%	84		2762407

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B219905  
 Report Date: 2012/05/30

Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

### Test Summary

**Maxxam ID** MM6584  
**Sample ID** SS1  
**Matrix** Soil

**Collected** 2012/02/09  
**Shipped**  
**Received** 2012/02/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2768473	N/A	2012/02/18	PHILIP MAST
OC Pesticides (Selected) & PCB	GC/ECD	2766218	2012/02/16	2012/02/17	MAHMUDUL KHAN

**Maxxam ID** MM6585  
**Sample ID** SS2  
**Matrix** Soil

**Collected** 2012/02/09  
**Shipped**  
**Received** 2012/02/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2768473	N/A	2012/02/18	PHILIP MAST
OC Pesticides (Selected) & PCB	GC/ECD	2766218	2012/02/16	2012/02/17	MAHMUDUL KHAN

**Maxxam ID** MM6586  
**Sample ID** SS3  
**Matrix** Soil

**Collected** 2012/02/09  
**Shipped**  
**Received** 2012/02/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2768473	N/A	2012/02/18	PHILIP MAST
OC Pesticides (Selected) & PCB	GC/ECD	2766218	2012/02/16	2012/02/17	MAHMUDUL KHAN

**Maxxam ID** MM6587  
**Sample ID** DUP1  
**Matrix** Soil

**Collected** 2012/02/09  
**Shipped**  
**Received** 2012/02/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Moisture	BAL	2767722	N/A	2012/02/17	MIN YANG
OC Pesticides (Selected) & PCB	GC/ECD	2767604	2012/02/17	2012/02/18	DAWN ALARIE

Maxxam Job #: B219905  
Report Date: 2012/05/30

Cole Engineering Group Ltd  
Client Project #: L09-301  
Site Location: MARIANNEVILLE

### Test Summary

**Maxxam ID** MM6588  
**Sample ID** MW115  
**Matrix** Water

**Collected** 2012/02/09  
**Shipped**  
**Received** 2012/02/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
OC Pesticides (Selected) & PCB	GC/ECD	2762407	2012/02/13	2012/02/14	DAWN ALARIE

Maxxam Job #: B219905  
Report Date: 2012/05/30

Cole Engineering Group Ltd  
Client Project #: L09-301  
Site Location: MARIANNEVILLE

**GENERAL COMMENTS**

Revised Report (2012/05/30): RDL for hexachlorobutadiene have been adjusted in this report.

OC Pesticide Analysis: Detection limits were adjusted for high moisture content.  
Custody seal was present and intact.

Sample MM6584-01: OC Pesticide Analysis: Due to colour interferences, samples required dilution. Detection limits were adjusted accordingly.

Sample MM6585-01: OC Pesticide Analysis: Due to colour interferences, samples required dilution. Detection limits were adjusted accordingly.

Maxxam Job #: B219905  
 Report Date: 2012/05/30

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2762407	2,4,5,6-Tetrachloro-m-xylene	2012/02/14	58	50 - 130	60	50 - 130	74	%		
2762407	Decachlorobiphenyl	2012/02/14	85	50 - 130	78	50 - 130	88	%		
2762407	Aldrin	2012/02/14	84	50 - 130	74	50 - 130	ND, RDL=0.005	ug/L		
2762407	Dieldrin	2012/02/14	119	50 - 130	89	50 - 130	ND, RDL=0.005	ug/L		
2762407	α-Chlordane	2012/02/14	90	50 - 130	86	50 - 130	ND, RDL=0.005	ug/L		
2762407	γ-Chlordane	2012/02/14	89	50 - 130	85	50 - 130	ND, RDL=0.005	ug/L		
2762407	o,p-DDD	2012/02/14	83	50 - 130	81	50 - 130	ND, RDL=0.005	ug/L		
2762407	p,p-DDD	2012/02/14	103	50 - 130	89	50 - 130	ND, RDL=0.005	ug/L		
2762407	o,p-DDE	2012/02/14	88	50 - 130	80	50 - 130	ND, RDL=0.005	ug/L		
2762407	p,p-DDE	2012/02/14	94	50 - 130	82	50 - 130	ND, RDL=0.005	ug/L		
2762407	o,p-DDT	2012/02/14	92	50 - 130	82	50 - 130	ND, RDL=0.005	ug/L		
2762407	p,p-DDT	2012/02/14	86	50 - 130	80	50 - 130	ND, RDL=0.005	ug/L	NC	30
2762407	Lindane	2012/02/14	82	50 - 130	81	50 - 130	ND, RDL=0.003	ug/L	NC	30
2762407	Endosulfan I (alpha)	2012/02/14	84	50 - 130	87	50 - 130	ND, RDL=0.005	ug/L		
2762407	Endosulfan II	2012/02/14	88	50 - 130	81	50 - 130	ND, RDL=0.005	ug/L		
2762407	Endrin	2012/02/14	116	50 - 130	87	50 - 130	ND, RDL=0.005	ug/L		
2762407	Heptachlor	2012/02/14	107	50 - 130	76	50 - 130	ND, RDL=0.005	ug/L		
2762407	Heptachlor epoxide	2012/02/14	102	50 - 130	85	50 - 130	ND, RDL=0.005	ug/L		
2762407	Hexachlorobenzene	2012/02/14	71	50 - 130	74	50 - 130	ND, RDL=0.005	ug/L		
2762407	Hexachlorobutadiene	2012/02/14	56	50 - 130	51	50 - 130	ND, RDL=0.009	ug/L		
2762407	Hexachloroethane	2012/02/14	61	50 - 130	57	50 - 130	ND, RDL=0.01	ug/L		
2762407	Methoxychlor	2012/02/14	91	50 - 130	82	50 - 130	ND, RDL=0.01	ug/L		
2762407	Aroclor 1242	2012/02/14					ND, RDL=0.05	ug/L	NC	30
2762407	Total PCB	2012/02/14					ND, RDL=0.05	ug/L	NC	30
2762407	Chlordane (Total)	2012/02/14					ND, RDL=0.005	ug/L		
2762407	o,p-DDD + p,p-DDD	2012/02/14					ND, RDL=0.005	ug/L		
2762407	o,p-DDE + p,p-DDE	2012/02/14					ND, RDL=0.005	ug/L		
2762407	o,p-DDT + p,p-DDT	2012/02/14					ND, RDL=0.005	ug/L		
2762407	Total Endosulfan	2012/02/14					ND, RDL=0.005	ug/L		
2762407	Aroclor 1248	2012/02/14					ND, RDL=0.05	ug/L		
2762407	Aroclor 1254	2012/02/14					ND, RDL=0.05	ug/L		
2762407	Aroclor 1260	2012/02/14					ND, RDL=0.05	ug/L		
2766218	2,4,5,6-Tetrachloro-m-xylene	2012/02/17	74	50 - 130	81	50 - 130	75	%		
2766218	Decachlorobiphenyl	2012/02/17	85	50 - 130	86	50 - 130	81	%		
2766218	Aldrin	2012/02/17	91	50 - 130	93	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	α-Chlordane	2012/02/17	93	50 - 130	93	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	γ-Chlordane	2012/02/17	88	50 - 130	91	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	o,p-DDD	2012/02/17	85	50 - 130	88	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	p,p-DDD	2012/02/17	102	50 - 130	103	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	o,p-DDE	2012/02/17	89	50 - 130	94	50 - 130	ND, RDL=0.0020	ug/g	NC	40

Maxxam Job #: B219905  
 Report Date: 2012/05/30

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2766218	p,p-DDE	2012/02/17	92	50 - 130	99	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	o,p-DDT	2012/02/17	94	50 - 130	95	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	p,p-DDT	2012/02/17	89	50 - 130	100	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Dieldrin	2012/02/17	88	50 - 130	90	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Lindane	2012/02/17	77	50 - 130	78	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Endosulfan I (alpha)	2012/02/17	79	50 - 130	82	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Endosulfan II	2012/02/17	84	50 - 130	85	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Endrin	2012/02/17	98	50 - 130	95	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Heptachlor	2012/02/17	94	50 - 130	93	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Heptachlor epoxide	2012/02/17	79	50 - 130	82	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Hexachlorobenzene	2012/02/17	73	50 - 130	76	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2766218	Hexachlorobutadiene	2012/02/17	48 <sup>(1, 2)</sup>	50 - 130	71	50 - 130	ND, RDL=0.0050	ug/g	NC	40
2766218	Hexachloroethane	2012/02/17	43	50 - 130	64	50 - 130	ND, RDL=0.0050	ug/g	NC	40
2766218	Methoxychlor	2012/02/17	90	50 - 130	89	50 - 130	ND, RDL=0.0050	ug/g	NC	40
2766218	Aroclor 1242	2012/02/17					ND, RDL=0.015	ug/g	NC	40
2766218	Total PCB	2012/02/17					ND, RDL=0.015	ug/g	NC	40
2766218	Chlordane (Total)	2012/02/17					ND, RDL=0.0020	ug/g	NC	40
2766218	o,p-DDD + p,p-DDD	2012/02/17					ND, RDL=0.0020	ug/g	NC	40
2766218	o,p-DDE + p,p-DDE	2012/02/17					ND, RDL=0.0020	ug/g	NC	40
2766218	o,p-DDT + p,p-DDT	2012/02/17					ND, RDL=0.0020	ug/g	NC	40
2766218	Total Endosulfan	2012/02/17					ND, RDL=0.0020	ug/g	NC	40
2766218	Aroclor 1248	2012/02/17					ND, RDL=0.015	ug/g	NC	40
2766218	Aroclor 1254	2012/02/17					ND, RDL=0.015	ug/g	NC	40
2766218	Aroclor 1260	2012/02/17					ND, RDL=0.015	ug/g	NC	40
2767604	2,4,5,6-Tetrachloro-m-xylene	2012/02/18	110	50 - 130	86	50 - 130	82	%		
2767604	Decachlorobiphenyl	2012/02/18	112	50 - 130	86	50 - 130	89	%		
2767604	Aldrin	2012/02/18	121	50 - 130	100	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	a-Chlordane	2012/02/18	124	50 - 130	102	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	g-Chlordane	2012/02/18	120	50 - 130	92	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	o,p-DDD	2012/02/18	108	50 - 130	89	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	p,p-DDD	2012/02/18	115	50 - 130	98	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	o,p-DDE	2012/02/18	123	50 - 130	101	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	p,p-DDE	2012/02/18	124	50 - 130	100	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	o,p-DDT	2012/02/18	120	50 - 130	93	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	p,p-DDT	2012/02/18	121	50 - 130	98	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Dieldrin	2012/02/18	104	50 - 130	94	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Lindane	2012/02/18	110	50 - 130	89	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Endosulfan I (alpha)	2012/02/18	97	50 - 130	87	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Endosulfan II	2012/02/18	91	50 - 130	83	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Endrin	2012/02/18	103	50 - 130	95	50 - 130	ND, RDL=0.0020	ug/g	NC	40



Maxxam Job #: B219905  
 Report Date: 2012/05/30

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2767604	Heptachlor	2012/02/18	122	50 - 130	98	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Heptachlor epoxide	2012/02/18	104	50 - 130	100	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Hexachlorobenzene	2012/02/18	110	50 - 130	85	50 - 130	ND, RDL=0.0020	ug/g	NC	40
2767604	Hexachlorobutadiene	2012/02/18	60	50 - 130	71	50 - 130	ND, RDL=0.0050	ug/g	NC	40
2767604	Hexachloroethane	2012/02/18	46 <sup>(3)</sup>	50 - 130	69	50 - 130	ND, RDL=0.0050	ug/g	NC	40
2767604	Methoxychlor	2012/02/18	96	50 - 130	86	50 - 130	ND, RDL=0.0050	ug/g	NC	40
2767604	Aroclor 1242	2012/02/18					ND, RDL=0.015	ug/g	NC	40
2767604	Total PCB	2012/02/18					ND, RDL=0.015	ug/g	NC	40
2767604	Chlordane (Total)	2012/02/18					ND, RDL=0.0020	ug/g	NC	40
2767604	o,p-DDD + p,p-DDD	2012/02/18					ND, RDL=0.0020	ug/g	NC	40
2767604	o,p-DDE + p,p-DDE	2012/02/18					ND, RDL=0.0020	ug/g	NC	40
2767604	o,p-DDT + p,p-DDT	2012/02/18					ND, RDL=0.0020	ug/g	NC	40
2767604	Total Endosulfan	2012/02/18					ND, RDL=0.0020	ug/g	NC	40
2767604	Aroclor 1248	2012/02/18					ND, RDL=0.015	ug/g	NC	40
2767604	Aroclor 1254	2012/02/18					ND, RDL=0.015	ug/g	NC	40
2767604	Aroclor 1260	2012/02/18					ND, RDL=0.015	ug/g	NC	40
2767722	Moisture	2012/02/17							1.0	20
2768473	Moisture	2012/02/18							NC	20

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

(1) - Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) - The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.


(3) - The recovery for the flagged target analyte was below the control limit as stipulated by Ontario Regulation 153, however, this recovery is still within Maxxam's performance based limits. Results reported for this specific analyte with spike recoveries within this range are still valid but may have an associated low bias.



## Validation Signature Page

Maxxam Job #: B219905

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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

  
\_\_\_\_\_  
CHARLES ANCKER, B.Sc., M.Sc., C.Chem, Senior Analyst

  
  
\_\_\_\_\_  
EWA PRANJIC, M.Sc., C.Chem, Scientific Specialist

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: L09-301  
 Your C.O.C. #: 63564

**Attention: Andre Lyn**  
 Cole Engineering Group Ltd  
 70 Valleywood Dr  
 Markham, ON  
 CANADA L3R 4T5

Report Date: 2012/02/24

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B223680**  
**Received: 2012/02/17, 13:40**

Sample Matrix: Water  
 # Samples Received: 2

Analyses	Quantity	Date	Date	Laboratory Method	Method
		Extracted	Analyzed		Reference
1,3-Dichloropropene Sum	2	2012/02/17	2012/02/24		EPA 8260
Petroleum Hydro. CCME F1 & BTEX in Water	2	N/A	2012/02/23	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	1	2012/02/22	2012/02/22	CAM SOP-00316	CCME Hydrocarbons
Volatile Organic Compounds in Water	1	N/A	2012/02/23	CAM SOP 00226	EPA 8260 modified
Volatile Organic Compounds in Water	1	N/A	2012/02/24	CAM SOP 00226	EPA 8260 modified

### Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

./2

Maxxam Job #: B223680  
Report Date: 2012/02/24

Cole Engineering Group Ltd  
Client Project #: L09-301

-2-

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager  
Email: JGoralczyk@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B223680  
 Report Date: 2012/02/24

 Cole Engineering Group Ltd  
 Client Project #: L09-301

**O'REG 153 PETROLEUM HYDROCARBONS (WATER)**

Maxxam ID		MO3987	MO3987	MO3988		
Sampling Date		2012/02/17 09:15	2012/02/17 09:15			
	Units	MW1D	MW1D Lab-Dup	TRIP BLANK	RDL	QC Batch
<b>BTEX &amp; F1 Hydrocarbons</b>						
F1 (C6-C10)	ug/L	ND		ND	25	2771332
F1 (C6-C10) - BTEX	ug/L	ND		ND	25	2771332
<b>F2-F4 Hydrocarbons</b>						
F2 (C10-C16 Hydrocarbons)	ug/L	ND	ND		100	2770091
F3 (C16-C34 Hydrocarbons)	ug/L	ND	ND		100	2770091
F4 (C34-C50 Hydrocarbons)	ug/L	ND	ND		100	2770091
Reached Baseline at C50	ug/L	YES	YES			2770091
<b>Surrogate Recovery (%)</b>						
1,4-Difluorobenzene	%	96		98		2771332
4-Bromofluorobenzene	%	88		90		2771332
D10-Ethylbenzene	%	95		95		2771332
D4-1,2-Dichloroethane	%	112		111		2771332
o-Terphenyl	%	108	103			2770091

ND = Not detected

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B223680  
 Report Date: 2012/02/24

 Cole Engineering Group Ltd  
 Client Project #: L09-301

**O'REG 153 VOLATILE ORGANICS (WATER)**

Maxxam ID		MO3987	MO3988		
Sampling Date		2012/02/17 09:15			
	Units	MW1D	TRIP BLANK	RDL	QC Batch
<b>Calculated Parameters</b>					
1,3-Dichloropropene (cis+trans)	ug/L	ND	ND	0.50	2767285
<b>Volatile Organics</b>					
Acetone (2-Propanone)	ug/L	ND	ND	10	2769075
Benzene	ug/L	ND	ND	0.20	2769075
Bromodichloromethane	ug/L	ND	ND	0.50	2769075
Bromoform	ug/L	ND	ND	1.0	2769075
Bromomethane	ug/L	ND	ND	0.50	2769075
Carbon Tetrachloride	ug/L	ND	ND	0.20	2769075
Chlorobenzene	ug/L	ND	ND	0.20	2769075
Chloroform	ug/L	ND	ND	0.20	2769075
Dibromochloromethane	ug/L	ND	ND	0.50	2769075
1,2-Dichlorobenzene	ug/L	ND	ND	0.50	2769075
1,3-Dichlorobenzene	ug/L	ND	ND	0.50	2769075
1,4-Dichlorobenzene	ug/L	ND	ND	0.50	2769075
Dichlorodifluoromethane (FREON 12)	ug/L	ND	ND	1.0	2769075
1,1-Dichloroethane	ug/L	ND	ND	0.20	2769075
1,2-Dichloroethane	ug/L	ND	ND	0.50	2769075
1,1-Dichloroethylene	ug/L	ND	ND	0.20	2769075
cis-1,2-Dichloroethylene	ug/L	ND	ND	0.50	2769075
trans-1,2-Dichloroethylene	ug/L	ND	ND	0.50	2769075
1,2-Dichloropropane	ug/L	ND	ND	0.20	2769075
cis-1,3-Dichloropropene	ug/L	ND	ND	0.30	2769075
trans-1,3-Dichloropropene	ug/L	ND	ND	0.40	2769075
Ethylbenzene	ug/L	ND	ND	0.20	2769075
Ethylene Dibromide	ug/L	ND	ND	0.20	2769075
Hexane	ug/L	ND	ND	1.0	2769075
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	2.0	2769075
Methyl Isobutyl Ketone	ug/L	ND	ND	5.0	2769075
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	ND	10	2769075
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	0.50	2769075
Styrene	ug/L	ND	ND	0.50	2769075
1,1,1,2-Tetrachloroethane	ug/L	ND	ND	0.50	2769075
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	0.50	2769075
Tetrachloroethylene	ug/L	ND	ND	0.20	2769075

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B223680  
 Report Date: 2012/02/24

 Cole Engineering Group Ltd  
 Client Project #: L09-301

**O'REG 153 VOLATILE ORGANICS (WATER)**

Maxxam ID		MO3987	MO3988		
Sampling Date		2012/02/17 09:15			
	Units	MW1D	TRIP BLANK	RDL	QC Batch
Toluene	ug/L	ND	ND	0.20	2769075
1,1,1-Trichloroethane	ug/L	ND	ND	0.20	2769075
1,1,2-Trichloroethane	ug/L	ND	ND	0.50	2769075
Trichloroethylene	ug/L	ND	ND	0.20	2769075
Vinyl Chloride	ug/L	ND	ND	0.20	2769075
p+m-Xylene	ug/L	ND	ND	0.20	2769075
o-Xylene	ug/L	ND	ND	0.20	2769075
Xylene (Total)	ug/L	ND	ND	0.20	2769075
Trichlorofluoromethane (FREON 11)	ug/L	ND	ND	0.50	2769075
<b>Surrogate Recovery (%)</b>					
4-Bromofluorobenzene	%	99	98		2769075
D4-1,2-Dichloroethane	%	103	100		2769075
D8-Toluene	%	98	99		2769075

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B223680  
Report Date: 2012/02/24

Cole Engineering Group Ltd  
Client Project #: L09-301

### Test Summary

**Maxxam ID** MO3987  
**Sample ID** MW1D  
**Matrix** Water

**Collected** 2012/02/17  
**Shipped**  
**Received** 2012/02/17

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2767285	2012/02/24	2012/02/24	AUTOMATED STATCHK
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2771332	N/A	2012/02/23	SIMON XI
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2770091	2012/02/22	2012/02/22	DORINA POPA
Volatile Organic Compounds in Water	P&T/MS	2769075	N/A	2012/02/24	FERESHTEH SHAFIEI

**Maxxam ID** MO3987 Dup  
**Sample ID** MW1D  
**Matrix** Water

**Collected** 2012/02/17  
**Shipped**  
**Received** 2012/02/17

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2770091	2012/02/22	2012/02/22	DORINA POPA

**Maxxam ID** MO3988  
**Sample ID** TRIP BLANK  
**Matrix** Water

**Collected**  
**Shipped**  
**Received** 2012/02/17

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2767285	2012/02/24	2012/02/24	AUTOMATED STATCHK
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2771332	N/A	2012/02/23	SIMON XI
Volatile Organic Compounds in Water	P&T/MS	2769075	N/A	2012/02/23	FERESHTEH SHAFIEI

Maxxam Job #: B223680  
Report Date: 2012/02/24

Cole Engineering Group Ltd  
Client Project #: L09-301

**GENERAL COMMENTS**

Custody seal was present and intact.

Maxxam Job #: B223680  
 Report Date: 2012/02/24

 Cole Engineering Group Ltd  
 Client Project #: L09-301

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2769075	4-Bromofluorobenzene	2012/02/23	100	70 - 130	100	70 - 130	100	%		
2769075	D4-1,2-Dichloroethane	2012/02/23	100	70 - 130	102	70 - 130	98	%		
2769075	D8-Toluene	2012/02/23	101	70 - 130	101	70 - 130	99	%		
2769075	Acetone (2-Propanone)	2012/02/24	77	60 - 140	85	60 - 140	ND, RDL=10	ug/L	NC	30
2769075	Benzene	2012/02/24	83	70 - 130	89	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Bromodichloromethane	2012/02/24	87	70 - 130	96	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	Bromoform	2012/02/24	96	70 - 130	109	70 - 130	ND, RDL=1.0	ug/L	NC	30
2769075	Bromomethane	2012/02/24	89	60 - 140	95	60 - 140	ND, RDL=0.50	ug/L	NC	30
2769075	Carbon Tetrachloride	2012/02/24	95	70 - 130	102	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Chlorobenzene	2012/02/24	86	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Chloroform	2012/02/24	95	70 - 130	102	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Dibromochloromethane	2012/02/24	92	70 - 130	103	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,2-Dichlorobenzene	2012/02/24	86	70 - 130	96	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,3-Dichlorobenzene	2012/02/24	84	70 - 130	92	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,4-Dichlorobenzene	2012/02/24	84	70 - 130	93	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	Dichlorodifluoromethane (FREON 12)	2012/02/24	100	60 - 140	104	60 - 140	ND, RDL=1.0	ug/L	NC	30
2769075	1,1-Dichloroethane	2012/02/24	85	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	1,2-Dichloroethane	2012/02/24	85	70 - 130	92	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,1-Dichloroethylene	2012/02/24	91	70 - 130	97	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	cis-1,2-Dichloroethylene	2012/02/24	86	70 - 130	93	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	trans-1,2-Dichloroethylene	2012/02/24	87	70 - 130	92	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,2-Dichloropropane	2012/02/24	84	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	cis-1,3-Dichloropropene	2012/02/24	76	70 - 130	83	70 - 130	ND, RDL=0.30	ug/L	NC	30
2769075	trans-1,3-Dichloropropene	2012/02/24	76	70 - 130	83	70 - 130	ND, RDL=0.40	ug/L	NC	30
2769075	Ethylbenzene	2012/02/24	82	70 - 130	90	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Ethylene Dibromide	2012/02/24	89	70 - 130	98	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Hexane	2012/02/24	91	70 - 130	97	70 - 130	ND, RDL=1.0	ug/L	NC	30
2769075	Methylene Chloride(Dichloromethane)	2012/02/24	85	70 - 130	91	70 - 130	ND, RDL=2.0	ug/L	NC	30
2769075	Methyl Isobutyl Ketone	2012/02/24	80	70 - 130	92	70 - 130	ND, RDL=5.0	ug/L	NC	30
2769075	Methyl Ethyl Ketone (2-Butanone)	2012/02/24	82	60 - 140	91	60 - 140	ND, RDL=10	ug/L	NC	30
2769075	Methyl t-butyl ether (MTBE)	2012/02/24	88	70 - 130	95	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	Styrene	2012/02/24	84	70 - 130	94	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,1,1,2-Tetrachloroethane	2012/02/24	93	70 - 130	103	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	1,1,2,2-Tetrachloroethane	2012/02/24	84	70 - 130	96	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	Tetrachloroethylene	2012/02/24	88	70 - 130	95	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Toluene	2012/02/24	85	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	1,1,1-Trichloroethane	2012/02/24	89	70 - 130	96	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	1,1,2-Trichloroethane	2012/02/24	87	70 - 130	97	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	Trichloroethylene	2012/02/24	86	70 - 130	92	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Vinyl Chloride	2012/02/24	88	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	NC	30

Maxxam Job #: B223680  
 Report Date: 2012/02/24

 Cole Engineering Group Ltd  
 Client Project #: L09-301

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2769075	p+m-Xylene	2012/02/24	81	70 - 130	88	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	o-Xylene	2012/02/24	82	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30
2769075	Trichlorofluoromethane (FREON 11)	2012/02/24	93	70 - 130	99	70 - 130	ND, RDL=0.50	ug/L	NC	30
2769075	Xylene (Total)	2012/02/24					ND, RDL=0.20	ug/L	NC	30
2770091	o-Terphenyl	2012/02/22	101	50 - 130	102	50 - 130	102	%		
2770091	F2 (C10-C16 Hydrocarbons)	2012/02/22	91	50 - 130	92	70 - 130	ND, RDL=100	ug/L	NC	30
2770091	F3 (C16-C34 Hydrocarbons)	2012/02/22	84	50 - 130	86	70 - 130	ND, RDL=100	ug/L	NC	30
2770091	F4 (C34-C50 Hydrocarbons)	2012/02/22	78	50 - 130	80	70 - 130	ND, RDL=100	ug/L	NC	30
2771332	1,4-Difluorobenzene	2012/02/23	98	70 - 130	96	70 - 130	95	%		
2771332	4-Bromofluorobenzene	2012/02/23	104	70 - 130	102	70 - 130	98	%		
2771332	D10-Ethylbenzene	2012/02/23	105	70 - 130	106	70 - 130	97	%		
2771332	D4-1,2-Dichloroethane	2012/02/23	113	70 - 130	111	70 - 130	114	%		
2771332	F1 (C6-C10)	2012/02/23	90	70 - 130	101	70 - 130	ND, RDL=25	ug/L	NC	30
2771332	F1 (C6-C10) - BTEX	2012/02/23					ND, RDL=25	ug/L	NC	30

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

## Validation Signature Page

Maxxam Job #: B223680

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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).




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BRAD NEWMAN, Scientific Specialist



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JEEVARAJ JEEVARATNAM, Senior Analyst



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SUZANA POPOVIC, Supervisor, Hydrocarbons

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Your Project #: L09-301  
 Site Location: MARIANNEVILLE  
 Your C.O.C. #: 33001701, 330017-01-01

**Attention: Andre Lyn**  
 Cole Engineering Group Ltd  
 70 Valleywood Dr  
 Markham, ON  
 CANADA L3R 4T5

Report Date: 2012/03/21

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B237192**  
**Received: 2012/03/15, 13:40**

Sample Matrix: Soil  
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Method
		Extracted	Analyzed		Reference
1,3-Dichloropropene Sum	3	2012/03/15	2012/03/20		EPA 8260
Petroleum Hydro. CCME F1 & BTEX in Soil	2	2012/03/16	2012/03/21	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil	2	2012/03/20	2012/03/21	CAM SOP-00316	CCME CWS
Moisture	2	N/A	2012/03/19	CAM SOP-00445	R.Carter,1993
Volatile Organic Compounds in Soil	3	2012/03/16	2012/03/16	CAM SOP-00226	EPA 8260 modified

Sample Matrix: Water  
 # Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Method
		Extracted	Analyzed		Reference
1,3-Dichloropropene Sum	3	2012/03/15	2012/03/21		EPA 8260
Petroleum Hydro. CCME F1 & BTEX in Water	2	N/A	2012/03/21	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	2	2012/03/20	2012/03/20	CAM SOP-00316	CCME Hydrocarbons
Volatile Organic Compounds in Water	3	N/A	2012/03/20	CAM SOP 00226	EPA 8260 modified

### Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

- \* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
- \* Results relate only to the items tested.

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Maxxam Job #: B237192  
Report Date: 2012/03/21

Cole Engineering Group Ltd  
Client Project #: L09-301  
Site Location: MARIANNEVILLE

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Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

JOLANTA GORALCZYK, Project Manager  
Email: JGoralczyk@maxxam.ca  
Phone# (905) 817-5700

=====  
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 2

Maxxam Job #: B237192  
 Report Date: 2012/03/21

Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

### O'REG 153 PETROLEUM HYDROCARBONS (SOIL)

Maxxam ID		MV0136	MV0137		
Sampling Date		2012/03/14 10:15	2012/03/14 10:15		
	Units	BH1-4	BH1-7	RDL	QC Batch
<b>Inorganics</b>					
Moisture	%	17	23	1.0	2793426
<b>BTEX &amp; F1 Hydrocarbons</b>					
F1 (C6-C10)	ug/g	ND	ND	10	2794165
F1 (C6-C10) - BTEX	ug/g	ND	ND	10	2794165
<b>F2-F4 Hydrocarbons</b>					
F2 (C10-C16 Hydrocarbons)	ug/g	ND	ND	10	2795096
F3 (C16-C34 Hydrocarbons)	ug/g	ND	ND	10	2795096
F4 (C34-C50 Hydrocarbons)	ug/g	ND	ND	10	2795096
Reached Baseline at C50	ug/g	YES	YES		2795096
<b>Surrogate Recovery (%)</b>					
1,4-Difluorobenzene	%	97	97		2794165
4-Bromofluorobenzene	%	108	107		2794165
D10-Ethylbenzene	%	89	91		2794165
D4-1,2-Dichloroethane	%	97	96		2794165
o-Terphenyl	%	97	96		2795096

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B237192  
 Report Date: 2012/03/21

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 VOLATILE ORGANICS (SOIL)**

Maxxam ID		MV0136	MV0137	MV0140		
Sampling Date		2012/03/14 10:15	2012/03/14 10:15	2012/03/14		
	Units	BH1-4	BH1-7	TRIP BLANK	RDL	QC Batch
<b>Calculated Parameters</b>						
1,3-Dichloropropene (cis+trans)	ug/g	ND	ND	ND	0.050	2790491
<b>Volatile Organics</b>						
Acetone (2-Propanone)	ug/g	ND	ND	ND	0.50	2791620
Benzene	ug/g	ND	ND	ND	0.020	2791620
Bromodichloromethane	ug/g	ND	ND	ND	0.050	2791620
Bromoform	ug/g	ND	ND	ND	0.050	2791620
Bromomethane	ug/g	ND	ND	ND	0.050	2791620
Carbon Tetrachloride	ug/g	ND	ND	ND	0.050	2791620
Chlorobenzene	ug/g	ND	ND	ND	0.050	2791620
Chloroform	ug/g	ND	ND	ND	0.050	2791620
Dibromochloromethane	ug/g	ND	ND	ND	0.050	2791620
1,2-Dichlorobenzene	ug/g	ND	ND	ND	0.050	2791620
1,3-Dichlorobenzene	ug/g	ND	ND	ND	0.050	2791620
1,4-Dichlorobenzene	ug/g	ND	ND	ND	0.050	2791620
Dichlorodifluoromethane (FREON 12)	ug/g	ND	ND	ND	0.050	2791620
1,1-Dichloroethane	ug/g	ND	ND	ND	0.050	2791620
1,2-Dichloroethane	ug/g	ND	ND	ND	0.050	2791620
1,1-Dichloroethylene	ug/g	ND	ND	ND	0.050	2791620
cis-1,2-Dichloroethylene	ug/g	ND	ND	ND	0.050	2791620
trans-1,2-Dichloroethylene	ug/g	ND	ND	ND	0.050	2791620
1,2-Dichloropropane	ug/g	ND	ND	ND	0.050	2791620
cis-1,3-Dichloropropene	ug/g	ND	ND	ND	0.030	2791620
trans-1,3-Dichloropropene	ug/g	ND	ND	ND	0.040	2791620
Ethylbenzene	ug/g	ND	ND	ND	0.020	2791620
Ethylene Dibromide	ug/g	ND	ND	ND	0.050	2791620
Hexane	ug/g	ND	ND	ND	0.050	2791620
Methylene Chloride(Dichloromethane)	ug/g	ND	ND	ND	0.050	2791620
Methyl Isobutyl Ketone	ug/g	ND	ND	ND	0.50	2791620
Methyl Ethyl Ketone (2-Butanone)	ug/g	ND	ND	ND	0.50	2791620
Methyl t-butyl ether (MTBE)	ug/g	ND	ND	ND	0.050	2791620
Styrene	ug/g	ND	ND	ND	0.050	2791620
1,1,1,2-Tetrachloroethane	ug/g	ND	ND	ND	0.050	2791620
1,1,2,2-Tetrachloroethane	ug/g	ND	ND	ND	0.050	2791620
Tetrachloroethylene	ug/g	ND	ND	ND	0.050	2791620

ND = Not detected

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B237192  
 Report Date: 2012/03/21

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 VOLATILE ORGANICS (SOIL)**

Maxxam ID		MV0136	MV0137	MV0140		
Sampling Date		2012/03/14 10:15	2012/03/14 10:15	2012/03/14		
	Units	BH1-4	BH1-7	TRIP BLANK	RDL	QC Batch
Toluene	ug/g	ND	ND	ND	0.020	2791620
1,1,1-Trichloroethane	ug/g	ND	ND	ND	0.050	2791620
1,1,2-Trichloroethane	ug/g	ND	ND	ND	0.050	2791620
Trichloroethylene	ug/g	ND	ND	ND	0.050	2791620
Vinyl Chloride	ug/g	ND	ND	ND	0.020	2791620
p+m-Xylene	ug/g	ND	ND	ND	0.020	2791620
o-Xylene	ug/g	ND	ND	ND	0.020	2791620
Xylene (Total)	ug/g	ND	ND	ND	0.020	2791620
Trichlorofluoromethane (FREON 11)	ug/g	ND	ND	ND	0.050	2791620
<b>Surrogate Recovery (%)</b>						
4-Bromofluorobenzene	%	102	101	101		2791620
D10-o-Xylene	%	115	108	107		2791620
D4-1,2-Dichloroethane	%	89	91	92		2791620
D8-Toluene	%	94	95	96		2791620

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch



Maxxam Job #: B237192  
 Report Date: 2012/03/21

Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

### O'REG 153 PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		MV0138	MV0139		
Sampling Date		2012/03/14 11:00	2012/03/14 11:00		
	Units	MW1-S	DUP	RDL	QC Batch
<b>BTEX &amp; F1 Hydrocarbons</b>					
F1 (C6-C10)	ug/L	ND	ND	25	2794222
F1 (C6-C10) - BTEX	ug/L	ND	ND	25	2794222
<b>F2-F4 Hydrocarbons</b>					
F2 (C10-C16 Hydrocarbons)	ug/L	ND	ND	100	2794022
F3 (C16-C34 Hydrocarbons)	ug/L	ND	ND	100	2794022
F4 (C34-C50 Hydrocarbons)	ug/L	ND	ND	100	2794022
Reached Baseline at C50	ug/L	YES	YES		2794022
<b>Surrogate Recovery (%)</b>					
1,4-Difluorobenzene	%	97	101		2794222
4-Bromofluorobenzene	%	99	103		2794222
D10-Ethylbenzene	%	99	95		2794222
D4-1,2-Dichloroethane	%	103	104		2794222
o-Terphenyl	%	88	87		2794022

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B237192  
 Report Date: 2012/03/21

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 VOLATILE ORGANICS (WATER)**

Maxxam ID		MV0138	MV0139	MV0141		
Sampling Date		2012/03/14 11:00	2012/03/14 11:00	2012/03/01		
	Units	MW1-S	DUP	TRIP BLANK LOT #3162	RDL	QC Batch
<b>Calculated Parameters</b>						
1,3-Dichloropropene (cis+trans)	ug/L	ND	ND	ND	0.50	2790346
<b>Volatile Organics</b>						
Acetone (2-Propanone)	ug/L	ND	ND	ND	10	2790877
Benzene	ug/L	ND	ND	ND	0.20	2790877
Bromodichloromethane	ug/L	ND	ND	ND	0.50	2790877
Bromoform	ug/L	ND	ND	ND	1.0	2790877
Bromomethane	ug/L	ND	ND	ND	0.50	2790877
Carbon Tetrachloride	ug/L	ND	ND	ND	0.20	2790877
Chlorobenzene	ug/L	ND	ND	ND	0.20	2790877
Chloroform	ug/L	ND	ND	ND	0.20	2790877
Dibromochloromethane	ug/L	ND	ND	ND	0.50	2790877
1,2-Dichlorobenzene	ug/L	ND	ND	ND	0.50	2790877
1,3-Dichlorobenzene	ug/L	ND	ND	ND	0.50	2790877
1,4-Dichlorobenzene	ug/L	ND	ND	ND	0.50	2790877
Dichlorodifluoromethane (FREON 12)	ug/L	ND	ND	ND	1.0	2790877
1,1-Dichloroethane	ug/L	ND	ND	ND	0.20	2790877
1,2-Dichloroethane	ug/L	ND	ND	ND	0.50	2790877
1,1-Dichloroethylene	ug/L	ND	ND	ND	0.20	2790877
cis-1,2-Dichloroethylene	ug/L	ND	ND	ND	0.50	2790877
trans-1,2-Dichloroethylene	ug/L	ND	ND	ND	0.50	2790877
1,2-Dichloropropane	ug/L	ND	ND	ND	0.20	2790877
cis-1,3-Dichloropropene	ug/L	ND	ND	ND	0.30	2790877
trans-1,3-Dichloropropene	ug/L	ND	ND	ND	0.40	2790877
Ethylbenzene	ug/L	ND	ND	ND	0.20	2790877
Ethylene Dibromide	ug/L	ND	ND	ND	0.20	2790877
Hexane	ug/L	ND	ND	ND	1.0	2790877
Methylene Chloride(Dichloromethane)	ug/L	ND	ND	ND	2.0	2790877
Methyl Isobutyl Ketone	ug/L	ND	ND	ND	5.0	2790877
Methyl Ethyl Ketone (2-Butanone)	ug/L	ND	ND	ND	10	2790877
Methyl t-butyl ether (MTBE)	ug/L	ND	ND	ND	0.50	2790877
Styrene	ug/L	ND	ND	ND	0.50	2790877
1,1,1,2-Tetrachloroethane	ug/L	ND	ND	ND	0.50	2790877
1,1,2,2-Tetrachloroethane	ug/L	ND	ND	ND	0.50	2790877
Tetrachloroethylene	ug/L	ND	ND	ND	0.20	2790877

ND = Not detected

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Maxxam Job #: B237192  
 Report Date: 2012/03/21

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**O'REG 153 VOLATILE ORGANICS (WATER)**

Maxxam ID		MV0138	MV0139	MV0141		
Sampling Date		2012/03/14 11:00	2012/03/14 11:00	2012/03/01		
	Units	MW1-S	DUP	TRIP BLANK LOT #3162	RDL	QC Batch
Toluene	ug/L	ND	0.22	ND	0.20	2790877
1,1,1-Trichloroethane	ug/L	ND	ND	ND	0.20	2790877
1,1,2-Trichloroethane	ug/L	ND	ND	ND	0.50	2790877
Trichloroethylene	ug/L	ND	ND	ND	0.20	2790877
Vinyl Chloride	ug/L	ND	ND	ND	0.20	2790877
p+m-Xylene	ug/L	ND	ND	ND	0.20	2790877
o-Xylene	ug/L	ND	ND	ND	0.20	2790877
Xylene (Total)	ug/L	ND	ND	ND	0.20	2790877
Trichlorofluoromethane (FREON 11)	ug/L	ND	ND	ND	0.50	2790877
<b>Surrogate Recovery (%)</b>						
4-Bromofluorobenzene	%	96	96	96		2790877
D4-1,2-Dichloroethane	%	110	108	107		2790877
D8-Toluene	%	95	96	95		2790877

ND = Not detected  
 RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B237192  
Report Date: 2012/03/21

Cole Engineering Group Ltd  
Client Project #: L09-301  
Site Location: MARIANNEVILLE

### Test Summary

**Maxxam ID** MV0136  
**Sample ID** BH1-4  
**Matrix** Soil

**Collected** 2012/03/14  
**Shipped**  
**Received** 2012/03/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2790491	2012/03/20	2012/03/20	AUTOMATED STATCHK
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2794165	2012/03/16	2012/03/21	LINCOLN RAMDAHIN
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2795096	2012/03/20	2012/03/21	BILJANA LAZOVIC
Moisture	BAL	2793426	N/A	2012/03/19	CHAMIKA DEEYAGAHA
Volatile Organic Compounds in Soil	GC/MS	2791620	2012/03/16	2012/03/16	JAMES ZOU

**Maxxam ID** MV0137  
**Sample ID** BH1-7  
**Matrix** Soil

**Collected** 2012/03/14  
**Shipped**  
**Received** 2012/03/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2790491	2012/03/20	2012/03/20	AUTOMATED STATCHK
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	2794165	2012/03/16	2012/03/21	LINCOLN RAMDAHIN
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	2795096	2012/03/20	2012/03/21	BILJANA LAZOVIC
Moisture	BAL	2793426	N/A	2012/03/19	CHAMIKA DEEYAGAHA
Volatile Organic Compounds in Soil	GC/MS	2791620	2012/03/16	2012/03/16	JAMES ZOU

**Maxxam ID** MV0138  
**Sample ID** MW1-S  
**Matrix** Water

**Collected** 2012/03/14  
**Shipped**  
**Received** 2012/03/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2790346	2012/03/21	2012/03/21	AUTOMATED STATCHK
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2794222	N/A	2012/03/21	ABDI MOHAMUD
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2794022	2012/03/20	2012/03/20	JOLANTA KAWZOWICZ
Volatile Organic Compounds in Water	GC/MS	2790877	N/A	2012/03/20	ADRIANA ZURITA

Maxxam Job #: B237192  
Report Date: 2012/03/21

Cole Engineering Group Ltd  
Client Project #: L09-301  
Site Location: MARIANNEVILLE

### Test Summary

**Maxxam ID** MV0139  
**Sample ID** DUP  
**Matrix** Water

**Collected** 2012/03/14  
**Shipped**  
**Received** 2012/03/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2790346	2012/03/21	2012/03/21	AUTOMATED STATCHK
Petroleum Hydro. CCME F1 & BTEX in Wat	HSGC/MSFD	2794222	N/A	2012/03/21	ABDI MOHAMUD
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	2794022	2012/03/20	2012/03/20	JOLANTA KAWZOWICZ
Volatile Organic Compounds in Water	GC/MS	2790877	N/A	2012/03/20	ADRIANA ZURITA

**Maxxam ID** MV0140  
**Sample ID** TRIP BLANK  
**Matrix** Soil

**Collected** 2012/03/14  
**Shipped**  
**Received** 2012/03/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2790491	2012/03/20	2012/03/20	AUTOMATED STATCHK
Volatile Organic Compounds in Soil	GC/MS	2791620	2012/03/16	2012/03/16	JAMES ZOU

**Maxxam ID** MV0141  
**Sample ID** TRIP BLANK LOT #3162  
**Matrix** Water

**Collected** 2012/03/01  
**Shipped**  
**Received** 2012/03/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	2790346	2012/03/21	2012/03/21	AUTOMATED STATCHK
Volatile Organic Compounds in Water	GC/MS	2790877	N/A	2012/03/20	ADRIANA ZURITA



Maxxam Job #: B237192  
 Report Date: 2012/03/21

 Cole Engineering Group Ltd  
 Client Project #: L09-301  
 Site Location: MARIANNEVILLE

**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2790877	4-Bromofluorobenzene	2012/03/20	101	70 - 130	101	70 - 130	98	%		
2790877	D4-1,2-Dichloroethane	2012/03/20	106	70 - 130	106	70 - 130	108	%		
2790877	D8-Toluene	2012/03/20	100	70 - 130	101	70 - 130	96	%		
2790877	Acetone (2-Propanone)	2012/03/20	93	60 - 140	83	60 - 140	ND, RDL=10	ug/L	NC	30
2790877	Benzene	2012/03/20	92	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Bromodichloromethane	2012/03/20	102	70 - 130	100	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	Bromoform	2012/03/20	102	70 - 130	99	70 - 130	ND, RDL=1.0	ug/L	NC	30
2790877	Bromomethane	2012/03/20	102	60 - 140	103	60 - 140	ND, RDL=0.50	ug/L	NC	30
2790877	Carbon Tetrachloride	2012/03/20	104	70 - 130	104	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Chlorobenzene	2012/03/20	96	70 - 130	94	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Chloroform	2012/03/20	110	70 - 130	109	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Dibromochloromethane	2012/03/20	98	70 - 130	96	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,2-Dichlorobenzene	2012/03/20	95	70 - 130	95	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,3-Dichlorobenzene	2012/03/20	93	70 - 130	93	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,4-Dichlorobenzene	2012/03/20	94	70 - 130	94	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	Dichlorodifluoromethane (FREON 12)	2012/03/20	125	60 - 140	124	60 - 140	ND, RDL=1.0	ug/L	NC	30
2790877	1,1-Dichloroethane	2012/03/20	98	70 - 130	97	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	1,2-Dichloroethane	2012/03/20	102	70 - 130	99	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,1-Dichloroethylene	2012/03/20	104	70 - 130	104	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	cis-1,2-Dichloroethylene	2012/03/20	100	70 - 130	98	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	trans-1,2-Dichloroethylene	2012/03/20	104	70 - 130	104	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,2-Dichloropropane	2012/03/20	98	70 - 130	97	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	cis-1,3-Dichloropropene	2012/03/20	97	70 - 130	96	70 - 130	ND, RDL=0.30	ug/L	NC	30
2790877	trans-1,3-Dichloropropene	2012/03/20	92	70 - 130	92	70 - 130	ND, RDL=0.40	ug/L	NC	30
2790877	Ethylbenzene	2012/03/20	91	70 - 130	91	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Ethylene Dibromide	2012/03/20	98	70 - 130	94	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Hexane	2012/03/20	104	70 - 130	104	70 - 130	ND, RDL=1.0	ug/L	NC	30
2790877	Methylene Chloride (Dichloromethane)	2012/03/20	115	70 - 130	113	70 - 130	ND, RDL=2.0	ug/L	NC	30
2790877	Methyl Isobutyl Ketone	2012/03/20	101	70 - 130	97	70 - 130	ND, RDL=5.0	ug/L	NC	30
2790877	Methyl Ethyl Ketone (2-Butanone)	2012/03/20	101	60 - 140	93	60 - 140	ND, RDL=10	ug/L	NC	30
2790877	Methyl t-butyl ether (MTBE)	2012/03/20	102	70 - 130	100	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	Styrene	2012/03/20	95	70 - 130	97	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,1,1,2-Tetrachloroethane	2012/03/20	98	70 - 130	97	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	1,1,2,2-Tetrachloroethane	2012/03/20	98	70 - 130	95	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	Tetrachloroethylene	2012/03/20	93	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Toluene	2012/03/20	93	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	1,1,1-Trichloroethane	2012/03/20	100	70 - 130	100	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	1,1,2-Trichloroethane	2012/03/20	94	70 - 130	91	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	Trichloroethylene	2012/03/20	97	70 - 130	96	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Vinyl Chloride	2012/03/20	100	70 - 130	99	70 - 130	ND, RDL=0.20	ug/L	NC	30

Maxxam Job #: B237192  
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 Cole Engineering Group Ltd  
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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2790877	p+m-Xylene	2012/03/20	90	70 - 130	90	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	o-Xylene	2012/03/20	90	70 - 130	92	70 - 130	ND, RDL=0.20	ug/L	NC	30
2790877	Trichlorofluoromethane (FREON 11)	2012/03/20	104	70 - 130	104	70 - 130	ND, RDL=0.50	ug/L	NC	30
2790877	Xylene (Total)	2012/03/20					ND, RDL=0.20	ug/L	NC	30
2791620	4-Bromofluorobenzene	2012/03/16	102	60 - 140	103	60 - 140	102	%		
2791620	D10-o-Xylene	2012/03/16	107	60 - 130	101	60 - 130	104	%		
2791620	D4-1,2-Dichloroethane	2012/03/16	91	60 - 140	97	60 - 140	97	%		
2791620	D8-Toluene	2012/03/16	98	60 - 140	95	60 - 140	91	%		
2791620	Acetone (2-Propanone)	2012/03/16	69	60 - 140	73	60 - 140	ND, RDL=0.50	ug/g	NC	50
2791620	Benzene	2012/03/16	92	60 - 140	92	60 - 130	ND, RDL=0.020	ug/g	NC	50
2791620	Bromodichloromethane	2012/03/16	87	60 - 140	90	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Bromoform	2012/03/16	89	60 - 140	98	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Bromomethane	2012/03/16	98	60 - 140	99	60 - 140	ND, RDL=0.050	ug/g	NC	50
2791620	Carbon Tetrachloride	2012/03/16	100	60 - 140	97	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Chlorobenzene	2012/03/16	95	60 - 140	96	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Chloroform	2012/03/16	110	60 - 140	111	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Dibromochloromethane	2012/03/16	90	60 - 140	95	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,2-Dichlorobenzene	2012/03/16	93	60 - 140	95	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,3-Dichlorobenzene	2012/03/16	94	60 - 140	93	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,4-Dichlorobenzene	2012/03/16	94	60 - 140	94	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Dichlorodifluoromethane (FREON 12)	2012/03/16	107	60 - 140	103	60 - 140	ND, RDL=0.050	ug/g	NC	50
2791620	1,1-Dichloroethane	2012/03/16	90	60 - 140	90	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,2-Dichloroethane	2012/03/16	88	60 - 140	94	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,1-Dichloroethylene	2012/03/16	96	60 - 140	94	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	cis-1,2-Dichloroethylene	2012/03/16	89	60 - 140	91	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	trans-1,2-Dichloroethylene	2012/03/16	92	60 - 140	91	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,2-Dichloropropane	2012/03/16	87	60 - 140	89	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	cis-1,3-Dichloropropene	2012/03/16	79	60 - 140	82	60 - 130	ND, RDL=0.030	ug/g	NC	50
2791620	trans-1,3-Dichloropropene	2012/03/16	74	60 - 140	76	60 - 130	ND, RDL=0.040	ug/g	NC	50
2791620	Ethylbenzene	2012/03/16	90	60 - 140	88	60 - 130	ND, RDL=0.020	ug/g	NC	50
2791620	Ethylene Dibromide	2012/03/16	91	60 - 140	98	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Hexane	2012/03/16	96	60 - 140	93	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Methylene Chloride (Dichloromethane)	2012/03/16	90	60 - 140	93	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Methyl Isobutyl Ketone	2012/03/16	67	60 - 140	78	60 - 130	ND, RDL=0.50	ug/g	NC	50
2791620	Methyl Ethyl Ketone (2-Butanone)	2012/03/16	70	60 - 140	78	60 - 140	ND, RDL=0.50	ug/g	NC	50
2791620	Methyl t-butyl ether (MTBE)	2012/03/16	93	60 - 140	94	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Styrene	2012/03/16	89	60 - 140	89	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,1,1,2-Tetrachloroethane	2012/03/16	95	60 - 140	96	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,1,1,2,2-Tetrachloroethane	2012/03/16	79	60 - 140	90	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Tetrachloroethylene	2012/03/16	103	60 - 140	100	60 - 130	ND, RDL=0.050	ug/g	NC	50

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 Cole Engineering Group Ltd  
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**QUALITY ASSURANCE REPORT**

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
2791620	Toluene	2012/03/16	95	60 - 140	93	60 - 130	ND, RDL=0.020	ug/g	NC	50
2791620	1,1,1-Trichloroethane	2012/03/16	95	60 - 140	93	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	1,1,2-Trichloroethane	2012/03/16	92	60 - 140	98	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Trichloroethylene	2012/03/16	99	60 - 140	98	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Vinyl Chloride	2012/03/16	91	60 - 140	89	60 - 130	ND, RDL=0.020	ug/g	NC	50
2791620	p+m-Xylene	2012/03/16	91	60 - 140	90	60 - 130	ND, RDL=0.020	ug/g	NC	50
2791620	o-Xylene	2012/03/16	90	60 - 140	88	60 - 130	ND, RDL=0.020	ug/g	NC	50
2791620	Trichlorofluoromethane (FREON 11)	2012/03/16	103	60 - 140	99	60 - 130	ND, RDL=0.050	ug/g	NC	50
2791620	Xylene (Total)	2012/03/16					ND, RDL=0.020	ug/g	NC	50
2793426	Moisture	2012/03/19							NC	20
2794022	o-Terphenyl	2012/03/20	89	50 - 130	104	50 - 130	106	%		
2794022	F2 (C10-C16 Hydrocarbons)	2012/03/20	77	50 - 130	87	70 - 130	ND, RDL=100	ug/L	NC	30
2794022	F3 (C16-C34 Hydrocarbons)	2012/03/20	77	50 - 130	94	70 - 130	ND, RDL=100	ug/L	NC	30
2794022	F4 (C34-C50 Hydrocarbons)	2012/03/20	76	50 - 130	96	70 - 130	ND, RDL=100	ug/L	NC	30
2794165	1,4-Difluorobenzene	2012/03/21	98	60 - 140	97	60 - 140	98	%		
2794165	4-Bromofluorobenzene	2012/03/21	112	60 - 140	110	60 - 140	109	%		
2794165	D10-Ethylbenzene	2012/03/21	89	60 - 140	87	60 - 140	86	%		
2794165	D4-1,2-Dichloroethane	2012/03/21	95	60 - 140	96	60 - 140	96	%		
2794165	F1 (C6-C10)	2012/03/21	93	60 - 140	101	60 - 140	ND, RDL=10	ug/g	NC	50
2794165	F1 (C6-C10) - BTEX	2012/03/21					ND, RDL=10	ug/g	NC	50
2794222	1,4-Difluorobenzene	2012/03/20	98	70 - 130	99	70 - 130	100	%		
2794222	4-Bromofluorobenzene	2012/03/20	106	70 - 130	110	70 - 130	103	%		
2794222	D10-Ethylbenzene	2012/03/20	96	70 - 130	99	70 - 130	101	%		
2794222	D4-1,2-Dichloroethane	2012/03/20	103	70 - 130	101	70 - 130	103	%		
2794222	F1 (C6-C10)	2012/03/20	99	70 - 130	94	70 - 130	ND, RDL=25	ug/L		
2794222	F1 (C6-C10) - BTEX	2012/03/20					ND, RDL=25	ug/L		
2795096	o-Terphenyl	2012/03/21	91	50 - 130	92	50 - 130	99	%		
2795096	F2 (C10-C16 Hydrocarbons)	2012/03/21	107	50 - 130	102	70 - 130	ND, RDL=10	ug/g	NC	30
2795096	F3 (C16-C34 Hydrocarbons)	2012/03/21	107	50 - 130	103	70 - 130	ND, RDL=10	ug/g	NC	30
2795096	F4 (C34-C50 Hydrocarbons)	2012/03/21	97	50 - 130	93	70 - 130	ND, RDL=10	ug/g	NC	30

N/A = Not Applicable

RDL = Reportable Detection Limit

RPD = Relative Percent Difference

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

## Validation Signature Page

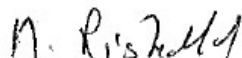
Maxxam Job #: B237192

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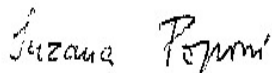
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).


EWA PRANJIC, M.Sc., C.Chem, Scientific Specialist



MEDHAT RISKALLAH, Manager, Hydrocarbon Department



SUZANA POPOVIC, Supervisor, Hydrocarbons

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Your Project #: L09-301  
Your C.O.C. #: 35010401, 350104-01-01

**Attention: Andre Lyn**  
Cole Engineering Group Ltd  
70 Valleywood Dr  
Markham, ON  
CANADA L3R 4T5

Report Date: 2012/07/30

## CERTIFICATE OF ANALYSIS

**MAXXAM JOB #: B2B2235**  
**Received: 2012/07/25, 14:30**

Sample Matrix: Soil  
# Samples Received: 2

Analyses	Quantity	Date		Laboratory Method	Method Reference
		Extracted	Analyzed		
pH CaCl2 EXTRACT	2	2012/07/27	2012/07/27	CAM SOP-00413	SM 4500H+ B

### Remarks:

Maxxam Analytics has performed all analytical testing herein in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Reporting results to two significant figures at the RDL is to permit statistical evaluation and is not intended to be an indication of analytical precision.

The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following the 'Alberta Environment Draft Addenda to the CWS-PHC, Appendix 6, Validation of Alternate Methods'. Documentation is available upon request. Maxxam has made the following improvements to the CWS-PHC reference benchmark method: (i) Headspace for F1; and, (ii) Mechanical extraction for F2-F4. Note: F4G cannot be added to the C6 to C50 hydrocarbons. The extraction date for samples field preserved with methanol for F1 and Volatile Organic Compounds is considered to be the date sampled.

Maxxam Analytics is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04. Maxxam Analytics is limited in liability to the actual cost of analysis unless otherwise agreed in writing. There is no other warranty expressed or implied. Samples will be retained at Maxxam Analytics for three weeks from receipt of data or as per contract.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.  
\* Results relate only to the items tested.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Jolanta Goralczyk, Project Manager  
Email: JGoralczyk@maxxam.ca  
Phone# (905) 817-5700

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1



Maxxam Job #: B2B2235  
 Report Date: 2012/07/30

Cole Engineering Group Ltd  
 Client Project #: L09-301

**RESULTS OF ANALYSES OF SOIL**

Maxxam ID		OG7503	OG7504		
Sampling Date		2012/07/24	2012/07/24		
	<b>Units</b>	<b>BH1-2</b>	<b>BH1-3</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Inorganics</b>					
Available (CaCl <sub>2</sub> ) pH	pH	7.73	7.69		2921681

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RDL = Reportable Detection Limit  
 QC Batch = Quality Control Batch

Maxxam Job #: B2B2235  
 Report Date: 2012/07/30

Cole Engineering Group Ltd  
 Client Project #: L09-301

### Test Summary

**Maxxam ID** OG7503  
**Sample ID** BH1-2  
**Matrix** Soil

**Collected** 2012/07/24  
**Shipped**  
**Received** 2012/07/25

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
pH CaCl2 EXTRACT		2921681	2012/07/27	2012/07/27	Xuanhong Qiu

**Maxxam ID** OG7504  
**Sample ID** BH1-3  
**Matrix** Soil

**Collected** 2012/07/24  
**Shipped**  
**Received** 2012/07/25

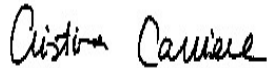
Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
pH CaCl2 EXTRACT		2921681	2012/07/27	2012/07/27	Xuanhong Qiu

**Validation Signature Page**

**Maxxam Job #: B2B2235**

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The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



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Cristina Carriere, Scientific Services

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.