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FINAL PHASE II ENVIRONMENTAL SITE ASSESSMENT

Allandale Station Lands, Barrie, Ontario

Submitted to:
City of Barrie
70 Collier Street
P.O. Box 400
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Report Number: 09-1170-6024

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REPORT



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Executive Summary

Golder Associates Ltd. ("Golder") was retained by The Corporation of the City of Barrie ("the City"), to carry out a Phase II Environmental Site Assessment ("ESA") on the property known as the Allandale Station Lands in Barrie, Ontario (the "Site"). The Site is bounded to the south by Canadian National Railway ("CNR"), with Gowan Street beyond, to the west by Essa Road with commercial properties beyond, to the north by Tiffin Street and Lakeshore Drive, and to the east by GO Train rail lines.

The work was carried out in general accordance with Golder's proposal dated November 13, 2009. It is understood that these investigations were required in support of the sale of the Site. Golder also understands that the land use in the vicinity of the Site may be altered in the future to include parkland; however, the zoning is not anticipated to change. A Phase I ESA was completed concurrently with this work program at the request of the City (Golder, 2010). This report is provided under separate cover.

The scope of work for the Phase II ESA involved the completion of an electromagnetic ("EM") survey (i.e. EM31 and EM61 surveys), the excavation of 17 test pits, drilling of five (5) boreholes, installation of five (5) monitoring wells, the decommissioning of one (1) previously installed monitoring well, collection of soil and groundwater samples and submission of selected samples for laboratory analysis, and the preparation of this report which documents the field investigation methods and the findings of the study.

The following debris was also encountered during the test pitting and drilling work programs:

- A non-active wire was encountered at test pit TP6 (0.6 m below grade);
- A clay pipe (likely a former sewer pipe) was encountered at test pit TP7 (0.6 m below grade);
- Metal and wire was present in the fill located at test pit TP10 (upper 0.5 m);
- Asphalt was uncovered at test pit TP12 (between 0.1 m and 1.9 m below grade) and a 0.3 m diameter concrete pipe was also encountered at a depth of 1.75 m below grade at this location; and,
- Ballast, metal, wire, coal, and a rail tie were encountered at test pit TP16 (upper 2 m).

No hydrocarbon-related staining or odours were noted in the test pits. Headspace readings in the soil samples were less than 25 ppm.

Groundwater elevations ranged from 220.04 m above sea level (masl) in monitoring well MW5 to 221.86 masl in monitoring well MW4 on January 15, 2010 and from 219.97 masl in monitoring well MW5 to 221.79 masl in monitoring well MW4 on February 24, 2010. The interpreted shallow horizontal groundwater flow direction is to the northeast toward Kempenfelt Bay; however, it is anticipated that buried underground utilities are causing a groundwater sink in the vicinity of monitoring well MW5 (located in the north portion of the Site).

The following exceedances of the MOE Table 2 SCS (industrial/commercial/community land use) were reported:

- The concentration of mercury in soil sample TP16-1.5 was 11.5 µg/g, slightly higher than the MOE Table 2 SCS of 10 µg/g;



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

- The concentration of chromium in the groundwater sample collected from monitoring well MW1 was 108 µg/L during the January 15, 2010 groundwater sampling event, over twice the MOE Table 2 SCS of 50 µg/L; however, had reduced to 2.68 µg/L by February 24, 2010;
- The concentration of chromium in the groundwater sample collected from monitoring well MW4 was 21.9 µg/L during the January 15, 2010 groundwater sampling event; however, had increased to 75.5 µg/L by February 24, 2010, which exceeded the MOE Table 2 SCS of 50 µg/L;
- The concentrations of sodium in groundwater samples collected from monitoring wells MW1, MW2, MW3 (and its duplicate, DUP1), and/or MW4 (and its duplicate, DUP2) ranged from 253 mg/L to 651 mg/L on January 15, 2010 and from 244 mg/L to 675 mg/L on February 24, 2010, higher than the MOE Table 2 SCS of 200 mg/L; and,
- The concentrations of chloride in groundwater samples collected from monitoring wells MW1, MW2, MW3 (and its duplicate, DUP1), and/or MW4 (and its duplicate, DUP2) ranged from 422 mg/L to 1,060 mg/L on January 15, 2010 and from 447 mg/L to 1,150 mg/L on February 24, 2010, higher than the MOE Table 2 SCS of 250 mg/L

When compared to the MOE Table 2 SCS (residential/parkland/institutional land use), the following additional exceedances were reported:

- The reported electrical conductivity ("EC") in soil sample TP1-0.4 was 0.874 mS/cm, which exceeded the lower MOE Table 2 SCS of 0.70 mS/cm; and,
- The concentrations of lead in soil samples TP2-0.4, TP8-0.1, and TP16-1.5 ranged from 212 µg/g to 328 µg/g, which exceeded the lower MOE Table 2 SCS of 200 µg/g.

The MOE issued an amendment to the "*Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*" (i.e. O.Reg.153/04, amended with O.Reg.511/09) on December 29, 2009. There will be an 18 month transition period prior to the amendments coming into full effect on July 11, 2010. Until that time, the current standards are appropriate for use.

To better document conditions on the Site, the following items are recommended:

- Complete additional test pits, within the berm running along the northern property boundary, to better qualify and quantify the mercury exceedance reported in soil sample TP16-1.5;
- Based on the variable chromium results on-Site, carry out additional monitoring prior to Site redevelopment and reassess the issue at that time;
- Determine whether future land use will include a more stringent use, such as parkland;
- If a RSC is required for the property (due to a portion of the Site being utilized as parkland in the future), notify the MOE, in writing, between July 1, 2010 and December 31, 2010 of your intent and include their authorization with your RSC submission. Soil which exceeds the Table 2 SCS, and any waste materials encountered during excavation, may require off-Site disposal as waste at an MOE approved waste disposal facility. A qualified environmental consultant should be on-Site during construction in these areas to supervise and determine the appropriate removal and disposal of this soil; and,
- Decommission the on-Site monitoring wells in accordance with O. Reg. 903 when no longer required.



Table of Contents

1.0 INTRODUCTION.....	1
1.1 Purpose and Scope of Work	2
2.0 FIELD INVESTIGATION METHODS.....	2
2.1 Health and Safety.....	2
2.2 Electromagnetic Survey.....	3
2.3 Test Pit Excavation	3
2.4 Borehole Advancement	3
2.5 Soil Sampling	3
2.6 Monitoring Well Installation, Groundwater Sampling, and Monitoring Well Decommissioning	8
2.7 Analytical Program	10
3.0 PHYSICAL CHARACTERISTICS.....	11
3.1 Utilities and Water Supply	11
3.2 Site Specific Geologic Conditions	11
3.3 Site Hydrogeology.....	12
4.0 CHEMICAL ANALYTICAL FINDINGS.....	13
4.1 Applicable Site Condition Standards.....	13
4.2 Analytical Results	14
5.0 SUMMARY AND DISCUSSION.....	15
6.0 RECOMMENDATIONS	16
7.0 LIMITATIONS.....	17
8.0 CLOSURE	18
9.0 REFERENCES.....	19

TABLES

Within Text

Table 2.1 – Summary of Analysed Soil Samples.....	4
Table 2.2 – Summary of Analysed Groundwater Samples.....	8
Table 3.1 – Summary of Monitoring Well Details.....	11



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

Following Text

Table 1 – Soil Analytical Results – Metals and Inorganics

Table 2 – Soil Analytical Results – VOCs and Petroleum Hydrocarbons

Table 3 – Soil Analytical Results – PAHs

Table 4 – Groundwater Analytical Results - VOCs and Petroleum Hydrocarbons

Table 5 – Groundwater Analytical Results – Metals, Inorganics, and PAHs

FIGURES

Figure 1 – Regional Location Plan

Figure 2 – Site Location Plan

Figure 3 – Water Table

APPENDICES

APPENDIX A

Electromagnetic Survey Results

APPENDIX B

Record of Test Pit Sheets

APPENDIX C

Record of Borehole Log Sheets

APPENDIX D

Results of Grain Size Analysis

APPENDIX E

Laboratory Certificates of Analysis - Soil

APPENDIX F

Laboratory Certificates of Analysis - Groundwater



1.0 INTRODUCTION

Golder Associates Ltd. ("Golder") was retained by The Corporation of the City of Barrie ("the City"), to carry out a Phase II Environmental Site Assessment ("ESA") on the property known as the Allandale Station Lands in Barrie, Ontario (the "Site"). The Site is bounded to the south by the Canadian National Railway ("CNR"), with Gowan Street beyond, to the west by Essa Road with commercial properties beyond, to the north by Tiffin Street and Lakeshore Drive, and to the east by GO Train rail lines. The location of the Site is shown on Figure 1, following the text of the report. Written authorization to proceed with this investigation was received from the City on December 17, 2009.

The work was carried out in general accordance with Golder's proposal dated November 13, 2009. It is understood that these investigations were required in support of the sale of the Site. Golder also understands that the land use in the vicinity of the Site may be altered in the future to include parkland; however, the zoning is not anticipated to change.

A Phase I ESA was completed concurrently with this work program at the request of the City (Golder, 2010). This report is provided under separate cover; however, a summary of issues of potential environmental concern for the Site identified during the Phase I ESA is provided below:

- Former presence of railway lines, including the use of rail ballasts and the placement of fill. Contaminants of concern include metals and inorganics and PAHs relating to the rail ballast, rail ties, and coal ash within the berm, and in the surficial fill;
- Previously identified gasoline UST in the vicinity of the south-central portion of the Site, the former fuel oil AST to the southwest of the office building, and the former fuel oil AST on the north side of the former lawn bowling clubhouse. The concrete pad, with bollards, to the west of the office building may have previously housed an AST. Contaminants of concern include petroleum hydrocarbon fractions F1 to F4 ("PHC F1 to F4"), benzene, toluene, ethylbenzene, and xylenes ("BTEX"), and PAHs;
- A previous exceedance of Total Extractable Hydrocarbons ("TEH") in soil sample BH96-6 SS5, at a depth ranging between 3.1 m to 3.5 m below grade from the vicinity of the former AST, southwest of the office building (TECL, 1996);
- The potential presence of PCB-containing fluorescent light ballasts, asbestos, mould, and lead-based paint within the buildings. UFFI was not noted within the buildings during the site reconnaissance;
- The presence of metal pipes on the exterior of the office buildings; however, these are likely associated with the former boiler, and to the east of the former passenger depot (use unknown; however, may also be associated with the former boiler); and,
- Vehicle maintenance (metals and inorganics, PHC F1 to F4, VOCs), USTs, gas stations (PHC F1 to F4, BTEX), and/or dry cleaners (VOCs) located on properties to the southwest since at least 1961. These properties are upgradient of the Site.

The locations of boreholes completed during previous investigations are provided in Figure 2.



1.1 Purpose and Scope of Work

The purpose of the work program was to assess:

- The environmental quality of fill present on Site, including analysis of metals, inorganics, and PAHs;
- Impacts in the vicinity of the previously identified ASTs and USTs as reported in a Thurber Environmental Consultants Ltd. ("TECL") report (TECL, 1996), including analysis of metals, inorganics, PAHs, petroleum hydrocarbon fractions F1 to F4 ("PHC F1 to F4"), and VOCs. Previous reports indicated that with the exception of one soil sample, non-detectable levels of BTEX, VOCs and total petroleum hydrocarbon ("TPH") parameters were measured in all analysed soil and groundwater samples. Concentrations of TEH above the Level II Criteria for Total Petroleum Hydrocarbons from the Interim Guidelines for the Assessment and Management of Petroleum Contaminated Sites in Ontario (August 1993), which were applicable at the time, were measured in a soil sample from the vicinity of the former AST (i.e. southwest of the office building);
- Impacts in the vicinity of metal pipes located adjacent to the buildings and to the east of the buildings; and,
- Impacts relating to vehicle maintenance, gas stations, and former dry cleaners on adjacent properties to the southwest.

The scope of work for the Phase II ESA involved the following:

- Completion of an electromagnetic ("EM") survey (i.e. EM31 and EM61 surveys);
- Excavation of seventeen (17) test pits throughout the Site;
- Drilling of five (5) boreholes;
- Installation of five (5) monitoring wells and the decommissioning of one (1) previously installed monitoring well;
- Collection of soil and groundwater samples and submission of selected samples for laboratory analysis; and,
- Preparation of this report which documents the field investigation methods and the findings of the study.

Section 2.0 outlines the investigation methods, Section 3.0 outlines the physical characteristics of the Site, and Section 4.0 outlines the results of the analytical findings. A summary and discussion is provided in Section 5.0 and recommendations are provided in Section 6.0. Study limitations and appropriate uses of this report are given in Section 7.0. A closing statement is provided in Section 8.0, and references are provided in Section 9.0.

2.0 FIELD INVESTIGATION METHODS

The following sections describe the field investigation methods employed during the work program carried out at the Site. The field work was completed between December 21, 2009 and January 15, 2010. The field work described herein was carried out under the supervision of members of Golder's Environmental Division staff.

2.1 Health and Safety

Prior to initiating the field work, Golder developed and implemented study area-specific protocols to protect the health and safety of its employees and subcontractors through the preparation of a Site-specific Health and Safety Plan. An assessment of potential health and safety hazards within the study area and those associated



with the proposed work was completed each day of the field program. A health and safety tailgate meeting was held with Golder's subcontractors each day prior to commencement of the field work.

Golder coordinated utility clearances with the local utility companies prior to the initiation of the field work. As well, a private locator (Cable Master Inc.) was retained to assess for possible buried services in the area of the proposed borehole locations.

2.2 Electromagnetic Survey

Prior to the commencement of the test pit and borehole drilling programs, two electromagnetic ("EM") surveys (i.e. EM31 and EM61 surveys) were carried out on the property to assess the presence of buried underground storage tanks and/or locations of potentially impacted soil. The results of these surveys were utilized to assist in locating test pits and boreholes throughout the Site. The EM31 survey results indicated two potential discrete buried metallic anomalies near the northeast corner of the surveyed area, that could potentially have been buried USTs.

The EM61 survey is sensitive to the presence of metal within the subsurface. With the exception of surface metal, the EM61 survey did not indicate the presence of any buried USTs in the vicinity of the buildings; however, did indicate a number of buried metallic conduits in the vicinity of the buildings. The complete report is provided in Appendix A.

2.3 Test Pit Excavation

Morris Shelswell & Sons Excavating & Grading Ltd. ("Shelswell") of Hawkestone, Ontario provided the services of a SK 210 track mounted excavator to excavate 17 test pits on January 4 and 5, 2010. The test pit locations are shown on Figure 2. The test pits were completed across the Site to investigate general soil conditions, the quality of fill, the impacts relating to the previously identified ASTs and USTs, and impacts relating to the adjacent land use to the southwest. The test pits were advanced to the water table, if possible (i.e. the test pits ranged in depth from approximately 2.0 metres below ground surface ["mbgs"] to 4.2 mbgs). The soil and groundwater conditions in the test pits were logged in the field by a technologist from our staff. All test pits were loosely backfilled and compacted with the bucket of the excavator upon completion of the excavation.

2.4 Borehole Advancement

Golder retained the services of Canadian Soil Drilling ("Canadian") of Midhurst, Ontario for borehole drilling and monitoring well installation, which were completed on January 7 and 8, 2010. Canadian is licensed as a well contractor by the MOE. The boreholes were advanced and soil samples were obtained at regular depth intervals using a CME 75 track mounted auger rig and split spoon soil sampling equipment. Five (5) boreholes were advanced (BH1 through BH5) to depths ranging from 4.6 m (15 feet) to 5.3 m (17.5 feet) below grade. The limited volume of soil cuttings generated during the drilling of the boreholes was placed beside the boreholes.

2.5 Soil Sampling

Soil samples were obtained at regular depth intervals in the boreholes and from representative stratigraphic units in the test pits and were logged in the field noting subsurface conditions and visual evidence of contamination (if any). A portion of each soil sample was placed in a sealed plastic bag, and, if analysed, laboratory supplied sample jars. Bagged portions of the samples were subsequently screened for combustible vapours using a Gastech Inc. Gastechtor model 1238ME ("Gastechtor"), operated in the methane elimination mode and



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

calibrated to hexane gas standards. Headspace readings were taken in the plastic soil sample bags' headspace shortly after sample collection. Conditions encountered in the test pits and boreholes are summarized on the Record of Test Pit and Record of Borehole sheets provided in Appendices B and C, respectively.

Soil samples selected for chemical analysis were immediately placed in coolers with ice and submitted to AGAT Laboratories Ltd. ("AGAT") under chain-of-custody. The selection of samples for laboratory analysis was based on the identified issues of potential environmental concern, visual and olfactory observations (i.e. odour or staining) during test pitting and drilling, and headspace readings. Table 2.1 provides a summary of the soil samples submitted to AGAT for analysis.

Table 2.1: Summary of Analysed Soil Samples

Location	Sample I.D.	Sample Depth (mbgs)	Issue of Environmental Concern	Gastechtor Reading (ppm)	Requested Analysis
TP1	TP1-0.4	0.40 – 0.55	Potential fill placement	<25	Metals and Inorganics, PAHs
	TP1-3.8	3.65 – 3.80	Water table sample, downgradient of former lawn bowling clubhouse with fuel oil AST	<25	VOCs, PHC
TP2	TP2-0.4	0.40 – 0.55	Potential fill placement	<25	Metals and Inorganics, PAHs, BTEX, PHC
	TP2-3.2	3.20 – 3.35	Water table sample, downgradient of adjacent commercial properties	<25	VOCs, PHC
TP3	TP3-0.5	0.50 – 0.65	Potential fill placement for former rail lines	<25	Metals and Inorganics, PAHs
	TP3-2.75	2.60 – 2.75	Water table sample, downgradient of adjacent commercial properties	<25	VOCs, PHC

Notes:

ppm = parts per million by volume

PHC = petroleum hydrocarbon fractions F1 to F4

nr = not recorded (insufficient sample volume)

VOCs = volatile organic compounds

PAHs = polynuclear aromatic hydrocarbons



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

Location	Sample I.D.	Sample Depth (mbgs)	Issue of Environmental Concern	Gastechtor Reading (ppm)	Requested Analysis
TP4	TP4-1.1 Field Rep., DUP1	1.10 – 1.25	Potential fill placement	<25	Metals and Inorganics, PAHs
	TP4-3.3	3.30 – 3.45	Water table sample, downgradient of adjacent commercial properties	<25	VOCs, PHC
TP5	TP5-0.5	0.50 – 0.65	Potential fill placement	<25	Metals and Inorganics, PAHs
	TP5-4.0	4.00 – 4.15	Water table sample, vicinity of former gasoline UST	<25	VOCs, PHC
TP6	TP6-0.6	0.60 – 0.75	Potential fill placement, site coverage	<25	Metals and Inorganics, PAHs, BTEX, PHC
	TP6-3.8	3.80 – 3.95	Water table sample, Site coverage	<25	VOCs, PHC
TP7	TP7-1.0	1.00 – 1.15	Potential fill placement	<25	Metals and Inorganics, PAHs
	TP7-3.5	3.35 – 3.50	Location of previous exceedance (TECL, 1996)	<25	VOCs, PHC
TP8	TP8-0.1	0.10 – 0.25	Potential fill placement and coverage along the south property line	<25	Metals and Inorganics, PAHs
	TP8-2.5	2.50 – 2.65	In the vicinity of a buried utility (i.e. preferential pathway)	<25	VOCs, PHC

Notes:

ppm = parts per million by volume

PHC = petroleum hydrocarbon fractions F1 to F4

nr = not recorded (insufficient sample volume)

VOCs = volatile organic compounds

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FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

Location	Sample I.D.	Sample Depth (mbgs)	Issue of Environmental Concern	Gastechtor Reading (ppm)	Requested Analysis
TP9	TP9-0.25	0.25 – 0.40	Potential fill placement in the vicinity of an EM survey anomaly. Scrap metal was located on the ground adjacent to the test pit	<25	Metals and Inorganics, PAHs
	TP9-4.0	3.85 - 4.00	Water table sample, Site coverage	<25	VOCs, PHC
TP10	TP10-1.0	1.00 – 1.15	Potential fill placement, downgradient of metal pipe (unknown use)	<25	Metals and Inorganics, PAHs
	TP10-3.0	3.00 – 3.15	Water table sample, downgradient of metal pipe	<25	VOCs, PHC
TP11	TP11-0.5	0.50 – 0.65	Potential fill placement, Site coverage	<25	Metals and Inorganics, PAHs
	TP11-3.4	3.25 – 3.40	Water table sample, Site coverage	<25	VOCs, PHC
TP12	TP12-2.75	2.60 – 2.75	Water table sample beneath berm running along the north side of the Site.	<25	VOCs, PHC
TP13	TP13-0.25	0.25 – 0.40	Potential fill placement, Site coverage	<25	Metals and Inorganics, PAHs,
	TP13-3.8	3.80 – 3.90	Water table, Site coverage	<25	VOC, PHC

Notes:

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PHC = petroleum hydrocarbon fractions F1 to F4

nr = not recorded (insufficient sample volume)

VOCs = volatile organic compounds

PAHs = polynuclear aromatic hydrocarbons



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

Location	Sample I.D.	Sample Depth (mbgs)	Issue of Environmental Concern	Gastechtor Reading (ppm)	Requested Analysis
TP14	TP14-0.5	0.50 – 0.65	Potential fill placement, Site coverage	<25	Metals and Inorganics, PAHs
	TP14-1.5	1.50 – 1.60	Site and stratigraphic unit coverage	<25	VOC, PHC
TP15	TP15-0.75 Field Rep., DUP3	0.75 – 0.90	Potential fill placement, Site coverage along south fence line	<25	Metals and Inorganics, PAHs
TP16	TP16-1.0	1.00 – 1.15	Unknown fill quality	<25	Metals and Inorganics, PAHs
	TP16-1.5	1.50 – 1.65	Worst case fill sample (based on field observations)	<25	VOC, PHC, Metals and Inorganics, PAHs
TP17	TP17-0.75	0.75 – 0.90	Potential fill placement, north of station buildings	<25	Metals and Inorganics, PAHs
	TP17-4.0 Field Rep., DUP2	3.85 – 4.00	Water table sample, Site coverage downgradient of station buildings	<25	VOC, PHC
BH1	BH1-7.5-9.5	2.29 – 2.90	Potential fill placement in the vicinity of the station buildings	nr	Metals and Inorganics, PAHs
	BH1-12.5-14.5	3.81 – 4.42	Water table sample, vicinity of the station buildings	nr	VOC, PHC
BH2	BH2-2.5-4.5	0.76 – 1.37	Potential fill placement, Site coverage	nr	Metals and Inorganics, PAHs
	BH2-12.5-14.5	3.81 – 4.42	Water table sample, Site coverage	nr	VOC, PHC

Notes:

ppm = parts per million by volume

PHC = petroleum hydrocarbon fractions F1 to F4

nr = not recorded (insufficient sample volume)

VOCs = volatile organic compounds

PAHs = polynuclear aromatic hydrocarbons



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

Location	Sample I.D.	Sample Depth (mbgs)	Issue of Environmental Concern	Gastechtor Reading (ppm)	Requested Analysis
BH3	BH3-7.5-9.5	2.29 – 2.90	Potential fill placement in the vicinity of the berm	nr	Metals and Inorganics, PAHs
	BH3-12.5-14.5	3.81 – 4.42	Water table sample, vicinity of the berm	nr	VOC, PHC
BH4	BH4-7.5-9.5	2.29 – 2.90	Potential fill placement, vicinity of former lawn bowling club	nr	Metals and Inorganics, PAHs
	BH4-12.5-14.5	3.81 – 4.42	Water table sample, vicinity of former lawn bowling club	nr	VOC, PHC
BH5	BH5-6'	1.82 – 2.29	Fill quality, north portion of the Site	nr	Metals and Inorganics, PAHs
	BH5-10'-12'	3.05 – 3.66	Water table sample, north property line	nr	VOC, PHC

Notes:

ppm = parts per million by volume

PHC = petroleum hydrocarbon fractions F1 to F4

nr = not recorded (insufficient sample volume)

VOCs = volatile organic compounds

PAHs = polynuclear aromatic hydrocarbons

2.6 Monitoring Well Installation, Groundwater Sampling, and Monitoring Well Decommissioning

Five (5) boreholes, BH1 to BH5, were completed as groundwater monitoring wells and relabelled as MW1 to MW5, respectively, on January 7 and 8, 2010. Each monitoring well installation consisted of a single monitoring well constructed with a nominal 50 mm (2 inch) diameter PVC plastic solid riser pipe fitted with a nominal 50 mm diameter threaded PVC screen, 3.0 m in length. The pipe was pre-washed and delivered to the Site in factory sealed plastic bags. The well screens were installed so as to attempt to intersect the anticipated groundwater table. The annulus surrounding the screened portion of the well and an approximately 0.15 m portion of the riser pipe above the slotted pipe was backfilled with silica filter sand; however, native material caved in during installation below the water table in monitoring wells MW1 through MW4 and therefore, the sand pack in these wells may consist mainly of the native sand encountered on-Site. Monitoring well MW5 was installed with a sand pack to the full depth of the screen due to an increased silt content (and stability) in this area. Each monitoring well was completed with a 4" steel stick-up protective well casing set in concrete. Bentonite was placed from the top of the sand pack up to the base of the concrete around the well casing. Details of the monitoring well installations are provided on the Record of Borehole sheets enclosed in Appendix C.

The monitoring wells were surveyed on January 14, 2010 by CDN Land Surveyors Inc., of Barrie, Ontario. The elevations of the ground surface in the vicinity of the wells, the top of the measuring pipe, and the top of the



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

casing were measured relative to an absolute elevation from one of the City's second order benchmarks (i.e. to a geodetic benchmark).

The groundwater levels were measured in the monitoring wells on January 15, 2010 and again on February 24, 2010 using an electronic water level tape. The depth to groundwater from the original January 15, 2010 sampling event is indicated on the Record of Borehole sheets enclosed in Appendix C. Water levels ranged from 3.12 mbgs (MW3) to 3.74 mbgs (MW1) on January 15, 2010 and from 3.18 mbgs (MW3) to 3.74 mbgs (MW1) on February 24, 2010.

The monitoring wells were equipped with dedicated low density polyethylene (LDPE) tubing and a foot valve (Watterra system) for subsequent well purging and water quality sampling. Prior to purging the wells on January 15, 2010, they were developed by surging and purging the wells using dedicated Watterra surge blocks and pumping the wells for approximately 10 minutes using an hydraulic lift pump. Upon completion of development, the wells were left to recover for approximately 1 hour. Subsequently, a minimum of approximately three (3) well water volumes were purged from the wells prior to groundwater sample collection. Groundwater samples were collected on January 15, 2010. Additional groundwater samples were collected on February 24, 2010 (see Section 2.7 below). A minimum of three well volumes were purged from the monitoring wells on February 24, 2010. Purged groundwater was distributed onto the ground surface in the vicinity of the monitoring wells. The collected groundwater samples were placed in coolers with ice and submitted to AGAT under chain-of-custody. Table 2.2 provides a summary of the groundwater samples submitted for laboratory analysis.

Table 2.2: Summary of Analysed Groundwater Samples

Well Number and I.D.	Date Sampled	Gastechtor Reading in Well Headspace (ppm)	Final Field pH	Final Field Temp. (°C)	Final Field Cond. (mS/cm)	Total Volume Purged (L)	Analysis Requested
MW1	Jan. 15/10	<25	7.76	9.2	3621	12	VOCs, PHC, metals and inorganics, PAHs
	Feb. 24/10	nm	7.25	9.7	3876	10	Metals and inorganics
MW2	Jan. 15/10	<25	7.32	10.6	2188	13	VOCs, PHC, metals and inorganics, PAHs
	Feb. 24/10	nm	7.53	8.8	2074	10	Metals and inorganics
MW3 Field Duplicate, DUP1	Jan. 15/10	<25	7.26	9.2	1757	10	VOCs, PHC, metals and inorganics, PAHs
	Feb. 24/10	nm	7.70	8.4	1777	12	Metals and inorganics



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

Well Number and I.D.	Date Sampled	Gastechtor Reading in Well Headspace (ppm)	Final Field pH	Final Field Temp. (°C)	Final Field Cond. (mS/cm)	Total Volume Purged (L)	Analysis Requested
MW4 Field Duplicate, DUP2	Jan. 15/10	<25	7.47	8.3	>3999	11	VOCs, PHC, metals and inorganics, PAHs
	Feb. 24/10	nm	7.63	7.5	3643	10	Metals and inorganics
MW5	Jan. 15/10	<25	7.57	8.6	659	10.5	VOCs, PHC, metals and inorganics, PAHs
	Feb. 24/10	nm	8.46	7.2	674	12	Metals and inorganics

Notes:

ppm = parts per million by volume

nm = not measured

PHC = petroleum hydrocarbon fractions F1 to F4

VOCs = volatile organic compounds

PAHs = polynuclear aromatic hydrocarbons

A previously installed monitoring well, likely BH96-6 (TECL, 1996) based on its location, was uncovered during the excavation of test pit TP7, located southwest of the on-Site office building. Soil sample BH96-6 SS5, collected at a depth ranging between 3.1 m to 3.5 m below grade in this borehole previously exceeded the applicable criteria for TEH. This monitoring well was decommissioned by Canadian on January 8, 2010.

2.7 Analytical Program

Golder retained the services of AGAT Laboratories ("AGAT") of Mississauga, Ontario for the chemical analysis of soil and groundwater samples. AGAT is accredited by the Standards Council of Canada/Canadian Association of Environmental Analytical Laboratories ("CAEAL") program. Analytical methods are reported by AGAT on the Laboratory Certificates of Analysis provided in Appendices E and F. The standard analytical methods and procedures used, as well as internal laboratory method blanks, duplicates and surrogate recoveries for organic analyses are also provided on the AGAT Laboratory Certificates of Analysis provided in Appendices E and F.

A minimum of one (1) soil sample was submitted from each test pit for laboratory analysis of metals and inorganics, VOCs, PHC F1 to F4, and/or PAHs. A grain size analysis was completed by Golder on one (1) representative soil sample from the native sand at the Site (see Appendix D).

Groundwater samples were collected from the monitoring wells on January 15, 2010 and submitted for laboratory analysis of metals and inorganics, VOCs, PHC F1 to F4, and/or PAHs. Based on the results of that sampling round (i.e. exceedances of chromium, sodium, and/or chloride in selected monitoring wells), an additional groundwater sample was collected from the monitoring wells on February 24, 2010 and submitted for laboratory analysis of metals and inorganics.

AGAT has an in-house quality assurance/quality control (QA/QC) program to govern sample analysis. Standard QA/QC protocols include the analysis of method blanks, matrix spikes and 10% replicates for every sample



batch. In addition to the quality control employed by AGAT, the following QA/QC samples were also submitted during the work program:

- Three (3) blind soil replicate samples (DUP1, a replicate of TP4-1.1, and DUP3, a replicate of TP15-0.75, were submitted for analysis of metals, inorganics, and PAHs, and DUP2, a replicate of TP17-4.0, was submitted for VOCs and PHC F1 to F4);
- One (1) groundwater duplicate sample (DUP1, a duplicate of monitoring well MW3) was submitted for analysis of metals, inorganics, VOCs, PHC F1 to F4, and PAHs during the January 15, 2010 groundwater sampling event and one (1) groundwater duplicate sample (DUP2, a duplicate of monitoring well MW4) was submitted for analysis of metals and inorganics during the February 24, 2010 groundwater sampling event;
- One (1) blind field blank sample (labelled as Field Blank) was submitted for analysis of metals, inorganics, VOCs, PHC F1 to F4, and PAHs during the January 15, 2010 groundwater sampling event and one (1) blind field blank sample (also labelled as Field Blank) was submitted for analysis of metals and inorganics during the February 24, 2010 groundwater sampling event; and,
- One (1) trip blank sample (labelled as Trip Blank) was submitted for analysis of metals, inorganics, VOCs, PHC F1 to F4, and PAHs during the January 15, 2010 groundwater sampling event and one (1) trip blank sample (also labelled as Trip Blank) was submitted for analysis of metals and inorganics during the February 24, 2010 groundwater sampling event.

3.0 PHYSICAL CHARACTERISTICS

3.1 Utilities and Water Supply

The Site is not serviced and, according to the City, has not been serviced with municipal water and sewers since 2002.

3.2 Site Specific Geologic Conditions

Details of the conditions encountered in the test pits and boreholes are presented on the Record of Test Pit sheets and Record of Borehole sheets provided in Appendices B and C, respectively. Subsurface conditions encountered are specific to the test pit and borehole locations and will vary between and beyond test pit, borehole, and sampling locations.

Based on water well records provided for the area in the vicinity of the Site, the overburden consists of thick layers of alternating sand and finer grained materials, overlying limestone bedrock. The soil conditions encountered at the test pit and borehole locations generally consisted of surficial fill underlain by fine sand. The area to the north of the buildings had increased silt content. A grain size analysis was completed on one sample from the representative fine sand encountered throughout the Site (i.e. soil sample TP6-2.0). The results indicated that the sample consisted mainly (i.e. approximately 90%) of fine grained sand, with a trace amount of silt (see Appendix D for the grain size distribution).

The following debris was also encountered in the fill during the test pitting and drilling work programs:

- A non-active wire was encountered at test pit TP6 (0.6 m below grade);
- A clay pipe (likely a former sewer pipe) was encountered at test pit TP7 (0.6 m below grade);



- Metal and wire was present in the fill located at test pit TP10 (upper 0.5 m);
- Asphalt was uncovered at test pit TP12 (between 0.1 m and 1.9 m below grade) and a 0.3 m diameter concrete pipe was also encountered at a depth of 1.75 m below grade at this location; and,
- Ballast, metal, wire, coal, and a rail tie were encountered at test pit TP16 (upper 2 m).

No hydrocarbon-related staining or odours were noted in the test pits. Headspace readings in the soil samples were less than 25 ppm.

Based on information obtained from the current test pits, boreholes, and grain size analysis, more than two-thirds of the study area locations tested consist mainly of native sand, which consists of more than 50 percent by mass, of particles that are 75 µm or larger in mean diameter, and therefore, based on O.Reg.153/04, the study area soil texture would likely be classified as coarse grained for the purpose of applying the Site conditions standards set out in O. Reg. 153/04.

3.3 Site Hydrogeology

The depth to groundwater in the monitoring wells, as measured on January 15, 2010, ranged from 3.12 mbgs (MW3) to 3.74 mbgs (MW1) with groundwater elevations ranging from 220.04 m above sea level ("masl") in monitoring well MW5 to 221.86 masl in monitoring well MW4. The depth to groundwater in the monitoring wells, as measured on February 24, 2010, ranged from 3.18 mbgs (MW3) to 3.74 mbgs (MW1) with groundwater elevations ranging from 219.97 masl in monitoring well MW5 to 221.79 masl in monitoring well MW4. Based on the topography, regional groundwater flow is likely to be northeast toward Kempenfelt Bay. A summary of monitoring well data obtained during the January 15 and February 24, 2010 groundwater sampling events is provided in Tables 3.1 and 3.2, respectively. No sheen or odours were noted in groundwater purged from the monitoring wells. The interpreted shallow horizontal groundwater flow direction is to the northeast toward Kempenfelt Bay; however, it is possible that buried underground utilities are causing a groundwater sink in the vicinity of monitoring well MW5 (see Figure 3).

Table 3.1: Summary of Monitoring Well Details – January 15, 2010

Well	Monitoring Pipe Elev. (masl)	Ground Surface Elev. (masl)	Top of Screen Elev. (masl)	Bottom of Well Elevation (masl)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
MW1	224.95	224.09	221.81	218.76	3.74	220.35
MW2	225.15	224.30	222.47	219.42	3.35	220.95
MW3	224.66	223.73	221.90	218.85	3.12	220.61
MW4	226.06	225.18	223.35	220.30	3.33	221.86
MW5	224.45	223.45	221.32	218.27	3.41	220.04

mbgs = metres below ground surface
masl = metres above sea level



Table 3.2: Summary of Monitoring Well Details – February 24, 2010

Well	Monitoring Pipe Elev. (masl)	Ground Surface Elev. (masl)	Top of Screen Elev. (masl)	Bottom of Well Elevation (masl)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
MW1	224.95	224.09	221.81	218.76	3.74	220.35
MW2	225.15	224.30	222.47	219.42	3.41	220.89
MW3	224.66	223.73	221.90	218.85	3.18	220.55
MW4	226.06	225.18	223.35	220.30	3.40	221.79
MW5	224.45	223.45	221.32	218.27	3.48	219.97

mbgs = metres below ground surface
masl = metres above sea level

4.0 CHEMICAL ANALYTICAL FINDINGS

4.1 Applicable Site Condition Standards

The analytical results for soil were compared to the full depth site condition standards for commercial/industrial/community land use, coarse textured soil, listed in Table 2 (potable groundwater situation) of the "Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", dated March 4, 2004 (i.e. MOE Table 2 SCS).

The MOE Table 2 SCS are considered applicable to the site based on the following rationale:

- The City obtains its municipal water supply from 14 deep wells constructed into a confined overburden aquifer. The current operational wells are all constructed in the deepest of four aquifers identified in the area. The City maintains a network of sentinel monitoring wells to monitor groundwater quality in the vicinity of Wells 12 and 15 located along Lakeshore Drive to the north of the Site. Even though potable water for the Site and surrounding areas is supplied by a municipal drinking water system, portions of the Site are located within the City's two year capture zone for Municipal Well 12 located to the north of the Site.
- The locations of the test pits and boreholes are not inferred to be located in an area of natural significance, are not less than 30 m from a water body, soil pH is greater than 5 and less than 9, and the depth to bedrock in the vicinity of the study area is greater than 2 mbgs.
- The Site is currently used for commercial purposes and it is our understanding that the zoning designation will not change; however, according to the City's Environmental Operations Department, a portion of the Site is planned for use as parkland during future development. Therefore, the full depth site condition standards for residential/parkland/institutional land use, coarse textured soil, listed in Table 2, are also provided for information purposes in the soil analytical table (i.e. Tables 1 through 3, attached).

The MOE issued an amendment to the "Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" (i.e. O.Reg.153/04, amended with O.Reg.511/09) on December 29, 2009. There will be an 18 month transition period prior to the amendments coming into full effect on July 11, 2010. Until that time, the current standards are appropriate for use; however, if a Record of Site Condition ("RSC") is required for the Site, the MOE must be notified in writing between July 1, 2010 and December 31, 2010, that the assessment for the property has already been initiated and to allow the current regulations to be utilized during the preparation of the RSC. The receipt of written authorization from the MOE must then be attached to the RSC upon submission.



4.2 Analytical Results

The soil and groundwater analytical results, and associated MOE Table 2 site condition standards, are provided in Tables 1 to 5 (attached).

The test pitting activities were completed on January 4 and 5, 2010 and borehole drilling was completed on January 7 and 8, 2010. As stated in Section 1.1 above, seventeen (17) test pits and five boreholes/monitoring wells, were completed to assess the environmental quality of: fill potential located throughout the Site; impacted soil identified previously by TECL (TECL, 1996); and, lands downgradient of commercial properties located to the south and southwest. Groundwater monitoring and sampling was completed on January 15, 2010. The test pit and borehole soil samples and the groundwater samples were submitted for laboratory analysis of VOCs, PHC F1 to F4, PAHs, and/or metals, and inorganics.

The following exceedances of the MOE Table 2 SCS (industrial/commercial/community land use) were reported:

- The concentration of mercury in soil sample TP16-1.5 (collected from fill within the berm along the northern property boundary) was 11.5 µg/g, slightly higher than the MOE Table 2 SCS of 10 µg/g;
- The concentration of chromium in the groundwater sample collected from monitoring well MW1 was 108 µg/L during the January 15, 2010 groundwater sampling event, over twice the MOE Table 2 SCS of 50 µg/L; however, had reduced to 2.68 µg/L by February 24, 2010;
- The concentration of chromium in the groundwater sample collected from monitoring well MW4 was 21.9 µg/L during the January 15, 2010 groundwater sampling event; however, had increased to 75.5 µg/L by February 24, 2010, which exceeded the MOE Table 2 SCS of 50 µg/L;
- The concentrations of sodium in groundwater samples collected from monitoring wells MW1, MW2, MW3 (and its duplicate, DUP1), and/or MW4 (and its duplicate, DUP2) ranged from 253 mg/L to 651 mg/L on January 15, 2010 and from 244 mg/L to 675 mg/L on February 24, 2010, higher than the MOE Table 2 SCS of 200 mg/L; and,
- The concentrations of chloride in groundwater samples collected from monitoring wells MW1, MW2, MW3 (and its duplicate, DUP1), and/or MW4 (and its duplicate, DUP2) ranged from 422 mg/L to 1,060 mg/L on January 15, 2010 and from 447 mg/L to 1,150 mg/L on February 24, 2010, higher than the MOE Table 2 SCS of 250 mg/L.

When compared to the MOE Table 2 SCS (residential/parkland/institutional land use), the following additional exceedances were reported:

- The reported electrical conductivity ("EC") in soil sample TP1-0.4 was 0.874 mS/cm, which exceeded the lower residential/parkland/institutional MOE Table 2 SCS of 0.70 mS/cm; and,
- The concentrations of lead in soil samples TP2-0.4, TP8-0.1, and TP16-1.5 ranged from 212 µg/g to 328 µg/g, which exceeded the lower residential/parkland/institutional MOE Table 2 SCS of 200 µg/g.

When the test pit and groundwater results were compared to the revised MOE Table 2 SCS (MOE, 2009) for industrial/commercial/community land use, which come into effect on July 1, 2011, the following additional information is of note:



- The concentrations of lead in soil samples TP2-0.4, TP8-0.1, TP13-0.25, and TP16-1.5 ranged from 135 µg/g to 328 µg/g, which exceed the revised MOE Table 2 SCS of 120 µg/g;
- The concentrations of acenaphthylene and benzo(a)pyrene in soil sample TP13-0.25 were 0.16 µg/g and 0.41 µg/g, respectively. These concentrations exceed the revised MOE Table 2 SCS of 0.15 µg/g and 0.3 µg/g, respectively; and,
- The concentrations of sodium and chloride in groundwater samples collected from monitoring wells MW2, MW3 (and its duplicate, DUP1) would no longer exceed the revised MOE Table 2 SCS of 490 mg/L and 790 mg/L, respectively.

Relative percent difference ("RPD") calculations are completed on samples where both the original and replicate/duplicate concentrations are greater than five (5) times the laboratory detection limits. RPD calculations for replicate soil samples were within the alert limit of 100%. RPD calculations for the duplicate groundwater sample were within the alert limit of 50%; however, it should be noted that the chromium values were notably different in the replicate groundwater samples collected from monitoring well MW4 on February 24, 2010 (i.e. 75.5 µg/L in MW4 and 1.48 µg/L in DUP2) and in monitoring well MW1 between the two sampling events (i.e. 108 µg/L on January 15, 2010 and 2.68 µg/L on February 24, 2010). The lab confirmed that the results appeared representative of actual chromium concentrations, which indicates that this parameter is highly variable within the Site.

Trace concentrations of sodium were reported in both field blanks (i.e. 0.14 µg/L on January 15, 2010 and 0.09 µg/L on February 24, 2010) and a slightly detectable concentration of chloride (0.10 µg/L) was reported in the February 24, 2010 field blank; however, these values are less than five times the laboratory reportable detection limit ("RDL") and may be indicative of carry-over from the groundwater samples. These results are not anticipated to significantly alter the findings of our investigations.

Based on the above, the associated analytical results generally appear to be representative and reproducible.

5.0 SUMMARY AND DISCUSSION

- During the excavation of the test pit located within the berm running along the northern property boundary, ballast, metal, wire, coal ash, and a rail tie were encountered. The concentration of mercury exceeded the industrial/commercial/community MOE Table 2 SCS in soil sample TP16-1.5. These results may indicate that additional exceedances may exist throughout the fill within this berm. In addition to the buried debris, a buried 2" metal pipe running east-west was also encountered within berm. The use of this pipe is unknown. Additional investigations would be required to investigate the extent of impacts relating to the berm. Waste materials in fill, including ash, charcoal, brick, wood, metals, and asphalt, if encountered or excavated, will be required to be disposed of at an MOE approved disposal facility;
- Impacts relating to the former presence of on-Site ASTs, and potentially USTs, including VOCs, PHC F1 to F4 and PAHs were not encountered during the work program. Test pit TP7, which was completed in the location of the former exceedance of soil sample BH96-6 SS5, collected at a depth ranging between 3.1 m to 3.5 m below grade (TECL, 1996), did not exceed the current industrial/commercial/community MOE Table 2 SCS;



FINAL PHASE II ESA, ALLANDALE STATION LANDS, BARRIE, ONTARIO

- Impacts associated with commercial properties located upgradient (i.e. to the south and southwest) of the Site were not encountered in the test pits located along the southern property line. The exceedances of chromium in the groundwater samples collected from monitoring wells MW1 and MW4 (located southeast of the buildings and in the vicinity of the former lawn bowling property, respectively) may be associated with off-Site activities; however, the source of these exceedances cannot be determined with any certainty based on the information provided to Golder during the Phase I ESA. Additional monitoring is recommended to better characterize these impacts; as, based on the information obtained during the Phase II ESA, the chromium concentrations on-Site appear to fluctuate and the QA/QC results suggest some unreliability of the data;
- EC, sodium, and chloride impact is indicative of salt impact possibly related to de-icing salt. It is likely that there is existing EC impact related to road salt application in the vicinity of the surrounding roadways and impact related to de-icing salt on public highways is exempt under Ontario Regulation 153/04. The source of the impact has not been identified; however, in the Phase I ESA, no historical bulk storage of salt on Site was identified;
- If the Site is to be used for more sensitive land use in the future (i.e. for parkland use), the elevated electrical conductivity value reported in test pit soil sample TP1-0.4 is likely related to road salt application (consistent with the elevated sodium and chloride values reported in monitoring well MW4 located 25 m south of test pit TP1) and is included in the regulation for the protection of plant life. The presence of the elevated EC does not, in our opinion, represent a risk to workers and users of the Site. The concentrations of lead in exceedance of the residential/parkland/institutional MOE Table 2 SCS, in test pit soil samples TP2-0.4 (located on the west side of the Site, adjacent to Essa Road), TP8-0.1 (located along the south fence line, southeast of the on-Site buildings), and TP16-1.5 (located within the berm to the east of the on-Site buildings) is of concern for users of more sensitive land uses. These exceedances occurred within a large area of the Site and would require further investigations and/or removal prior to these portions of the Site being transformed to parkland use; and,
- If a RSC is required, these impacts to soil and groundwater would have to be addressed through further investigation, remediation, and/or risk assessment, as appropriate.

6.0 RECOMMENDATIONS

To better document conditions on the Site, the following items are recommended:

- Complete additional test pits, within the berm running along the northern property boundary, to better qualify and quantify the mercury exceedance reported in soil sample TP16-1.5;
- Based on the variable chromium results on-Site, carry out additional monitoring prior to Site redevelopment and reassess the issue at that time;
- Determine whether future land use will include a more stringent use, such as parkland;
- If a RSC is required for the property (due to a portion of the Site being utilized as parkland in the future), notify the MOE, in writing, between July 1, 2010 and December 31, 2010 of your intent and include their authorization with your RSC submission. Soil which exceeds the Table 2 SCS, and any waste materials encountered during excavation, may require off-Site disposal as waste at an MOE approved waste disposal



facility. A qualified environmental consultant should be on-Site during construction in these areas to supervise and determine the appropriate removal and disposal of this soil; and,

- Decommission the on-Site monitoring wells in accordance with O. Reg. 903 when no longer required.

7.0 LIMITATIONS

This report was prepared for the exclusive use of the City and has been prepared as part of environmental due diligence activities and is not intended to be utilized as supporting documentation for a Record of Site Condition under Ontario Regulation 153/04. If a Record of Site Condition is required for the Site and this report is to be used as part of the supporting documentation, it must be reviewed and updated by Golder. Additional Environmental Site Assessment activities may be required to comply with Ontario Regulation 153/04.

Golder's professional services for this assignment addressed only the geo-environmental (chemical) aspects of the subsurface conditions at this Site. The geotechnical (physical) aspects, including engineering recommendations for the design and construction of building foundations, pavements, underground servicing and the like are outside the terms of reference for this report and have not been investigated or addressed.

This report is based on data and information collected during the subsurface environmental investigation conducted by Golder and is based solely on Site conditions encountered at the time of the field work (i.e. January 4 through 15, 2010), as described in this report.

In evaluating the Site, Golder has relied in good faith on information provided by others and evaluated only conditions at a limited number of test locations. Only limited chemical analyses of soil samples were carried out. It should be noted that the results of an investigation of this nature should, in no way, be construed as a warranty that the Site is free from any and all contamination from past or current practices.

We accept no responsibility for any deficiency, misstatements or inaccuracies contained in this report as a result of omission, misinterpretations or fraudulent acts of the persons interviewed. Golder accepts no responsibility for any reduction in property value, either real or perceived, as a result of the reporting of factual information herein.

This assessment was carried out using existing historical information as available from various agencies and no assurance is made regarding the accuracy or completeness of this information.

If additional information is obtained during future work at the Site, including excavations, borings, or other studies, and/or if conditions exposed during construction are different from those encountered in this assessment, Golder should be requested to re-evaluate the conclusions presented in this report and provide amendments as required.



8.0 CLOSURE

We trust that this report meets with your current requirements. Please do not hesitate to call should you have any questions regarding this report.

Yours truly,

GOLDER ASSOCIATES LTD.

Christi Groves, B.Sc.
Environmental Scientist

Shawn Lytle, P. Geo.
Managing Principal



CLG/SDL/plc

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n:\active\2009\09-1170-6024 city of barrie ea site assessment\report\phase ii esa\final report\1003311_phase ii esa_09-1170-6024_revised draft.docx



9.0 REFERENCES

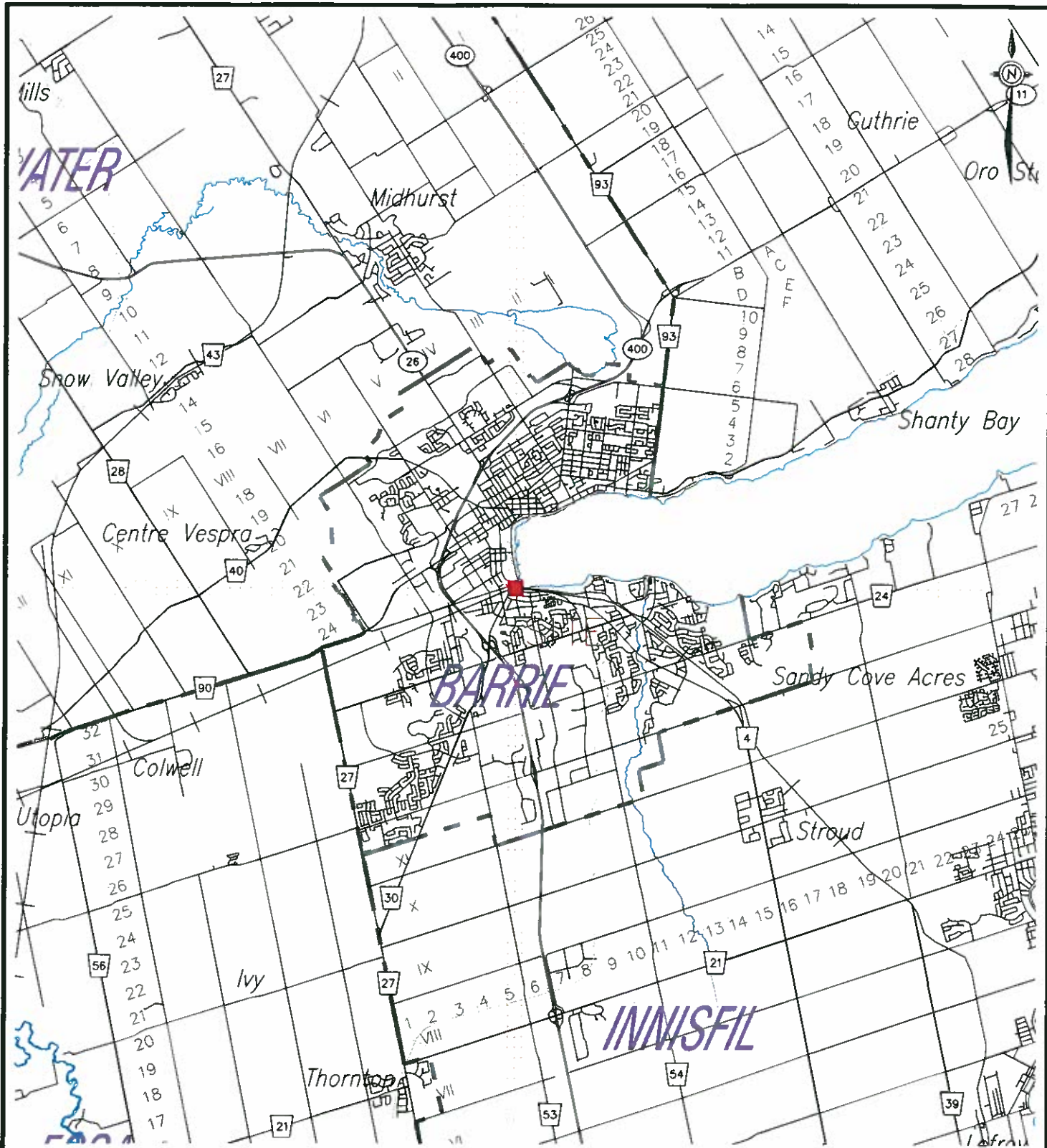
Golder Associates Ltd., 2010. "Phase I Environmental Site Assessment, Allandale Station Lands, Barrie, Ontario". Report completed for the City of Barrie and dated February 18, 2010.

Thurber Environmental Consultants Ltd. ("TECL"), 1996. *"Phase II Environmental Site Assessment, CNREM Properties PIN 42220 and 46017, Allandale Station and CNRA Bowling Club, Barrie, Ontario"*. The report was prepared for CN REM on June 20, 1996.



FIGURES

PLOT DATE: January 26, 2010
 FILENAME: T:\Projects\2009\09-1170-6024 (Barrie, Allandale EA)\AA-0911706024AAREG.dwg



NOTES:

1. DATUM IS NAD UTM 83 ZONE 17

REFERENCES:

1. MAPPING BASED ON COUNTY OF SIMCOE MUNICIPAL BASE

km



SCALE 1:125000



SCALE	AS SHOWN
DATE	15 JAN 2010
DESIGN	
CAD	J REGIER
CHECK	
REVIEW	

TITLE

REGIONAL LOCATION MAP

FILE No. 0911706024AAREG.dwg : F1

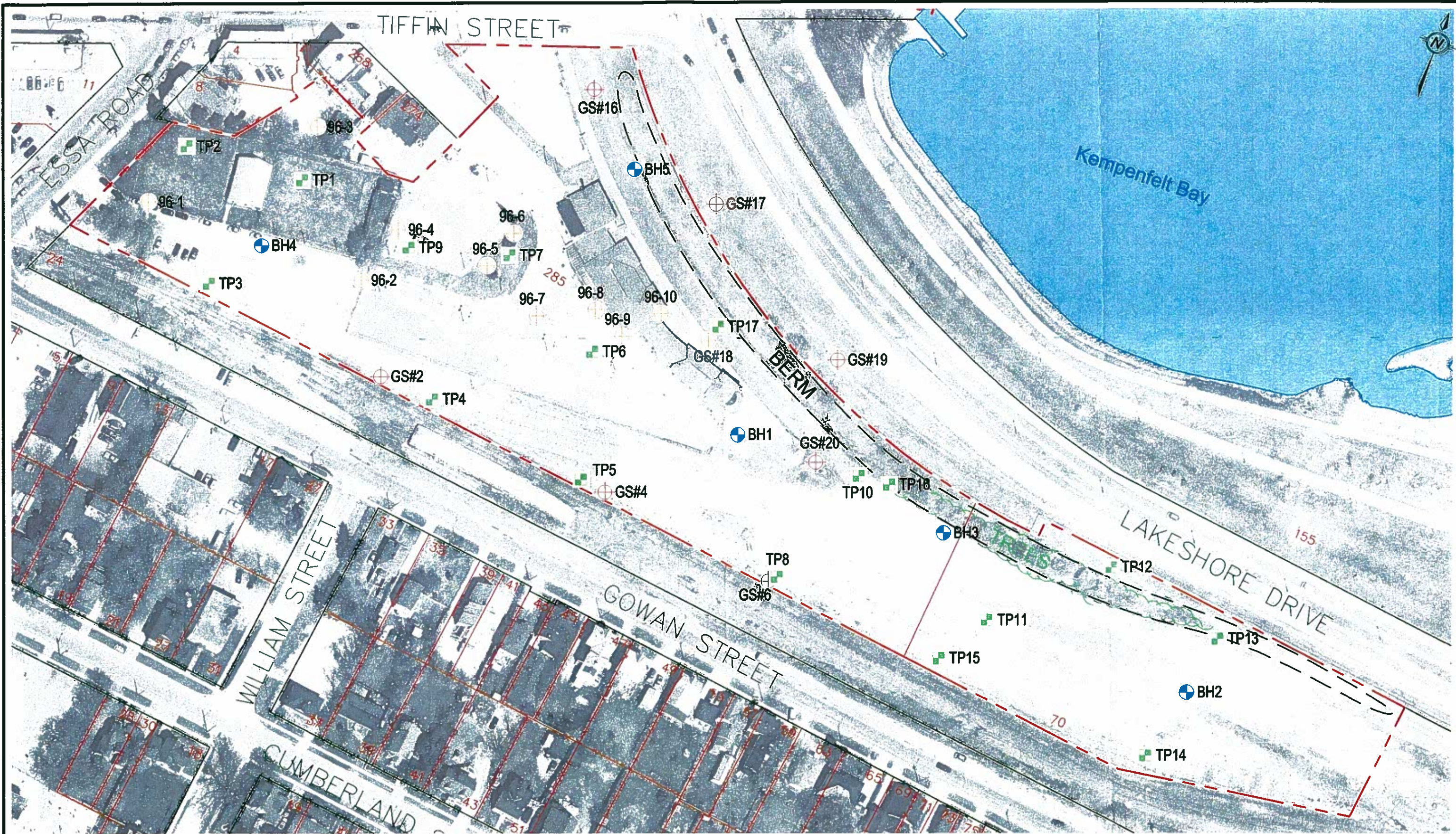
PROJECT No. 09-1170-6024 REV.

**ALLANDALE STATION
 PHASE II ESA**

FIGURE

1

LOT DATE: February 1, 2010
FILENAME: T:\Projects\2009\09-1170-6024 (Barrie, Allandale EA)\AB\0911706024ABSITE.dwg

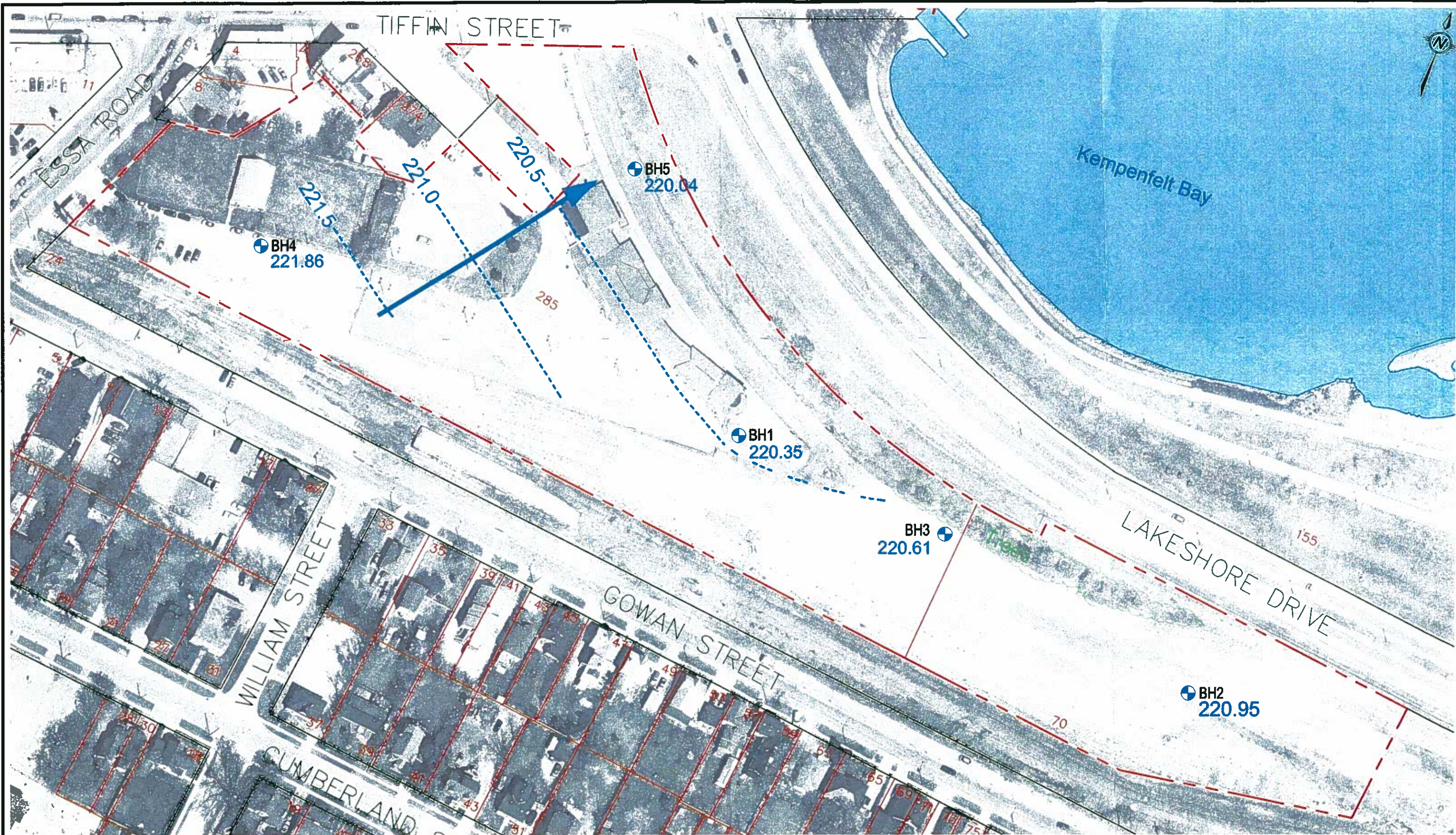


- BOREHOLE / MONITORING WELL LOCATION (APPROXIMATE)
- TEST PIT LOCATION (APPROXIMATE)
- GEOSPEC BOREHOLE LOCATION (APPROXIMATE)
- THURBER BOREHOLE LOCATION (APPROXIMATE)

NOTES:
Projection UTM NAD 83 Zone 17
City of Barrie 2007
Test Pit and Borehole Locations Surveyed by CDN

0 5 10 25 50
SCALE 1:1250 metres

 Barrie, Ontario, Canada		SCALE	AS SHOWN	TITLE
		DATE	01 FEB 2010	
FILE No. 0911706024ABSITE.dwg		DESIGN		SITE LOCATION MAP
PROJECT No. 09-1170-6024		CAD	J REGIER	
REV		CHECK		
		REVIEW		
				
				ALLANDALE STATION PHASE II ESA
				FIGURE 2



LOT DATE: February 1, 2010
FILENAME: T:\Projects\2009\09-1170-6024 (Barrie, Allandale EA)\AB-10911706024ABSWL.dwg

-  BOREHOLE MONITOR PIPE
-  221.35 STATIC LEVEL JANUARY 15, 2010
-  GROUNDWATER CONTOUR (masl)
-  INFERRED GROUNDWATER FLOW DIRECTION

NOTES:
Projection UTM NAD 83 Zone 17
City of Barrie Municipal Mapping 2007
Test Pit and Borehole Locations Surveyed by CDN

0 5 10 25 50
SCALE 1:1250 metres

 Golder Associates Barrie, Ontario, Canada	SCALE	AS SHOWN	GROUNDWATER ELEVATIONS			
	DATE	01 FEB 2010				
	DESIGN					
	CAD	J REGIER				
	CHECK					
FILE No.	0911706024ABSWL.dwg	REV.		 The City of BARRIE	ALLANDALE STATION PHASE II ESA	FIGURE 3
PROJECT No.	09-1170-6024	REV.				



TABLES

Table 1
Soil Analytical Results
Metals and Inorganics
Allandale Station Lands,
Barrie, Ontario

Sample I.D.	TP1-0.40 TP1	TP2-0.40 TP2	TP3-0.5 TP3	TP4-1.1 TP4	DUP1 TP4	TP5-0.5 TP5	TP6-0.6 TP6	TP7-1.0 TP7	TP8-0.10 TP8
Test Pit/Borehole Number									
Sampling Depth (m)	0.40 - 0.55	0.40 - 0.48	0.50 - 0.65	1.10 - 1.25	1.10 - 1.25	0.50 - 0.65	0.60 - 0.75	1.00 - 1.15	0.10 - 0.15
Gastechtor Reading (ppm)	<25	<25	<25	<25	<25	<25	<25	<25	<25
Sampling Date	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/comm) Standard	MOE Table 2 (res/park/hst) Standard	Field Replicate of TP4-1.1				
Metals									
Antimony	µg/g	1.6	40	13	<1.6	<1.6	<1.6	<1.6	5.8
Arsenic	µg/g	0.6	40	20	<0.6	<0.6	2.6	<0.6	10
Barium	µg/g	0.3	1500	750	11.9	12.3	58	5.8	45.6
Beryllium	µg/g	0.4	1.2	1.2	<0.4	<0.4	<0.4	<0.4	0.4
Boron (Hot Water Extractable)	µg/g	0.10	2.0	1.5	0.27	0.26	0.24	<0.10	0.43
Cadmium	µg/g	0.4	12	12	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	µg/g	0.6	750	750	11.8	6.7	6.7	3.2	11.3
Cobalt	µg/g	0.3	80	40	5.4	1.6	2.2	1.0	5.9
Copper	µg/g	0.3	225	225	33.0	2.2	33.0	2.3	111
Lead	µg/g	0.5	1000	200	34.6	1.5	101	1.0	215
Molybdenum	µg/g	0.5	40	40	2.0	<0.5	<0.5	<0.5	1.3
Nickel	µg/g	0.6	150	150	12.4	2.9	5.0	2.0	21.2
Selenium	µg/g	0.8	10	10	1.8	<0.8	<0.8	<0.8	0.8
Silver	µg/g	0.4	40	20	<0.4	<0.4	<0.4	<0.4	<0.4
Thallium	µg/g	0.4	32	4.1	<0.4	<0.4	<0.4	<0.4	<0.4
Vanadium	µg/g	0.4	200	200	19.3	14.5	9.5	5.9	13.1
Zinc	µg/g	0.4	600	600	19.2	9.5	73.7	5.5	171
Chromium, Hexavalent	µg/g	0.40	8	8.0	<0.40	<0.40	<0.40	<0.40	<0.40
Cyanide, Free	µg/g	1.0	100	100	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury	µg/g	0.011	10	10	0.075	0.021	0.390	<0.011	0.207
Inorganics									
Electrical Conductivity (2:1)	mS/cm	0.002	1.4	0.70					
Sodium Adsorption Ratio (2:1)	N/A	na	12	5.0	0.081	0.073	0.146	0.067	0.202
pH, 2:1 CaCl2 Extraction	pH Units	na	NV	NV	0.109	0.109	0.081	0.704	0.082

Notes:

1. Gastechtor Reading - measured in ppm (parts per million by volume)

2. mS/cm = MicroSiemens per Centimeter

3. µg/g = Microgram per Gram

4. RDL = Laboratory Reportable Detection Limit

5. na = not applicable

6. nr = not recorded (insufficient sample volume)

7. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1
 Environment Protection Act, March 9, 2004" full depth generic site condition standards for
 industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater
 condition, coarse textured soil

8. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition
 (industrial/commercial/community) standard

9. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site
 condition standard

Table 1
Soil Analytical Results
Metals and Inorganics
Allandale Station Lands,
Barrie, Ontario

Sample I.D.	TP9-0.25	TP10-1.0	TP11-0.5	TP13-0.25	TP14-0.5	TP15-0.75	DUP3	TP16-1.0	TP16-1.5
Test Pit/Borehole Number	TP9	TP10	TP11	TP13	TP14	TP15	TP15	TP16	TP16
Sampling Depth (m)	0.25 - 0.40	1.00 - 1.15	0.50 - 0.65	0.25 - 0.40	0.50 - 0.65	0.75 - 0.90	0.75 - 0.90	1.00 - 1.15	1.50 - 1.65
Gastechlor Reading (ppm)	<25	<25	<25	<25	<25	<25	<25	<25	<25
Sampling Date	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10
Parameter	Units	RDL	MOE Table 2 (Ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard	Field Replicate of TP15-0.75				
Metals									
Antimony	µg/g	1.6	40	13	<1.6	<1.6	2.8	<1.6	8.2
Arsenic	µg/g	0.6	40	20	<0.6	<0.6	2.5	1.5	11.6
Barium	µg/g	0.3	1500	750	10.6	40.6	23.6	47.0	347
Beryllium	µg/g	0.4	1.2	1.2	<0.4	<0.4	<0.4	<0.4	0.7
Boron (Hot Water Extractable)	µg/g	0.10	2.0	1.5	0.42	0.29	0.25	0.12	0.76
Cadmium	µg/g	0.4	12	12	<0.4	<0.4	<0.4	<0.4	1.6
Chromium	µg/g	0.6	750	750	5.1	10.4	7.5	6.6	20.0
Cobalt	µg/g	0.3	80	40	2.2	12.5	2.9	2.8	6.1
Copper	µg/g	0.3	225	225	4.1	117	87.2	86.4	168
Lead	µg/g	0.5	1000	200	2.2	135	108	77.8	328
Molybdenum	µg/g	0.5	40	40	<0.5	0.9	<0.5	<0.5	3.8
Nickel	µg/g	0.6	150	150	2.3	85.0	24.9	8.1	10.9
Selenium	µg/g	0.8	10	10	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g	0.4	40	20	<0.4	<0.4	<0.4	<0.4	<0.4
Thallium	µg/g	0.4	32	4.1	<0.4	<0.4	<0.4	<0.4	0.4
Vanadium	µg/g	0.4	200	200	9.2	11.4	9.9	11.6	16.7
Zinc	µg/g	0.4	600	600	7.1	103	73.6	63.8	259
Chromium, Hexavalent	µg/g	0.40	8	8.0	<0.40	<0.40	<0.40	<0.40	<0.40
Cyanide, Free	µg/g	1.0	100	100	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury	µg/g	0.011	10	10	<0.011	0.168	0.063	0.048	11.5
Inorganics									
Electrical Conductivity (2:1)	mS/cm	0.002	1.4	0.70	0.096	0.206	0.110	0.110	0.468
Sodium Adsorption Ratio (2:1)	N/A	na	12	5.0	0.633	0.191	0.075	0.079	0.136
pH, 2:1 CaCl2 Extraction	pH Units	na	NV	NV	7.09	7.40	7.38	7.36	7.46

Notes:

1. Gastechlor Reading - measured in ppm (parts per million by volume)
2. mS/cm = MicroSiemens per Centimeter
3. µg/g = Microgram per Gram
4. RDL = Laboratory Reportable Detection Limit
5. na = not applicable
6. nr = not recorded (insufficient sample volume)
7. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV 1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
8. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (Industrial/commercial/community) standard
9. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 1
Soil Analytical Results
Metals and Inorganics
Allandale Station Lands,
Barrie, Ontario

Sample I.D.	TP17-0.75	BH1-7.5-9.5	BH2-2.5-4.5	BH3-7.5-9.5	BH4-7.5-9.5	BH5-6'
Test Pit/Borehole Number	TP17	BH1	BH2	BH3	BH4	BH5
Sampling Depth (m)	0.75 - 0.90	2.29 - 2.90	0.76 - 1.37	2.29 - 2.90	2.29 - 2.90	1.82 - 2.29
Gastechtor Reading (ppm)	<25	nr	nr	nr	nr	nr
Sampling Date	5-Jan-10	7-Jan-10	7-Jan-10	7-Jan-10	8-Jan-10	8-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard		
Metals						
Antimony	µg/g	1.6	40	13		
Arsenic	µg/g	0.6	40	20		
Barium	µg/g	0.3	1500	750		
Beryllium	µg/g	0.4	1.2	1.2		
Boron (Hot Water Extractable)	µg/g	0.10	2.0	1.5		
Cadmium	µg/g	0.4	12	12		
Chromium	µg/g	0.6	750	750		
Cobalt	µg/g	0.3	80	40		
Copper	µg/g	0.3	225	225		
Lead	µg/g	0.5	1000	200		
Molybdenum	µg/g	0.5	40	40		
Nickel	µg/g	0.6	150	150		
Selenium	µg/g	0.8	10	10		
Silver	µg/g	0.4	40	20		
Thallium	µg/g	0.4	32	4.1		
Vanadium	µg/g	0.4	200	200		
Zinc	µg/g	0.4	600	600		
Chromium, Hexavalent	µg/g	0.40	8	8.0		
Cyanide, Free	µg/g	1.0	100	100		
Mercury	µg/g	0.011	10	10		
Inorganics						
Electrical Conductivity (2:1)	mS/cm	0.002	1.4	0.70		
Sodium Adsorption Ratio (2:1)	N/A	na	12	5.0		
pH, 2:1 CaCl2 Extraction	pH Units	na	NV	NV		

Notes:

- Gastechtor Reading - measured in ppm (parts per million by volume)
- mS/cm = MicroSiemens per Centimeter
- µg/g = Microgram per Gram
- RDL = Laboratory Reportable Detection Limit
- na = not applicable
- nr = not recorded (insufficient sample volume)
- Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
- Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
- Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
- Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil

Table 2
Soil Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Sample I.D.					TP1-3.8	TP2-0.40	TP2-3.2	TP3-2.75	TP4-3.3
Test Pit/Borehole Number					TP1	TP2	TP2	TP3	TP4
Sampling Depth (m)					3.65 - 3.80	0.40 - 0.55	3.20 - 3.35	2.60 - 2.75	3.30 - 3.45
Gastechtor Reading (ppm)					<25	<25	<25	<25	<25
Sampling Date					4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard					
VOCs									
Acetone	µg/g	0.130	3.5	3.5	<0.130	-	<0.130	<0.130	<0.130
Benzene	µg/g	0.002	0.24	0.24	<0.002	<0.10	<0.002	<0.002	<0.002
Bromodichloromethane	µg/g	0.003	0.12	0.12	<0.003	-	<0.003	<0.003	<0.003
Bromoform	µg/g	0.002	0.11	0.11	<0.002	-	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.002	0.061	0.061	<0.002	-	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.002	0.1	0.10	<0.002	-	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	0.002	2.4	2.4	<0.002	-	<0.002	<0.002	<0.002
Chloroethane	µg/g	0.005	NV	NV	<0.005	-	<0.005	<0.005	<0.005
Chloroform	µg/g	0.002	0.13	0.13	<0.002	-	<0.002	<0.002	<0.002
Chloromethane	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
Dibromochloromethane	µg/g	0.003	0.09	0.09	<0.003	-	<0.003	<0.003	<0.003
1,2-Dichlorobenzene	µg/g	0.002	0.88	0.88	<0.002	-	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	0.002	30	30	<0.002	-	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.002	0.32	0.32	<0.002	-	<0.002	<0.002	<0.002
1,1-Dichloroethane	µg/g	0.002	3.0	3.0	<0.002	-	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.002	0.022	0.022	<0.002	-	<0.002	<0.002	<0.002
1,1-Dichloroethylene	µg/g	0.002	0.0024	0.0024	<0.002	-	<0.002	<0.002	<0.002
CIS 1,2-Dichloroethylene	µg/g	0.002	2.3	2.3	<0.002	-	<0.002	<0.002	<0.002
TRANS-1,2-Dichloroethylene	µg/g	0.003	4.1	4.1	<0.003	-	<0.003	<0.003	<0.003
1,2-Dichloropropane	µg/g	0.002	0.019	0.019	<0.002	-	<0.002	<0.002	<0.002
CIS-1,3-Dichloropropene	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
TRANS-1,3-Dichloropropene	µg/g	0.003	NV	NV	<0.003	-	<0.003	<0.003	<0.003
(CIS+TRANS)-1,3-Dichloropropene	µg/g	0.002	0.0066	0.0066	<0.002	-	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	0.002	0.28	0.28	<0.002	<0.05	<0.002	<0.002	<0.002
Ethylene Dibromide	µg/g	0.002	0.0056	0.0056	<0.002	-	<0.002	<0.002	<0.002
2-Hexanone	µg/g	0.470	NV	NV	<0.470	-	<0.470	<0.470	<0.470
Methylene Chloride	µg/g	0.010	1.1	1.1	<0.010	-	<0.010	<0.010	<0.010
Methyl Ethyl Ketone	µg/g	0.047	0.27	0.27	<0.047	-	<0.047	<0.047	<0.047
Methyl Isobutyl Ketone	µg/g	0.041	0.48	0.48	<0.041	-	<0.041	<0.041	<0.041
Methyl tert-butyl Ether	µg/g	0.004	5.7	5.7	<0.004	-	<0.004	<0.004	<0.004
Styrene	µg/g	0.002	1.2	1.2	<0.002	-	<0.002	<0.002	<0.002
Toluene	µg/g	0.002	2.1	2.1	<0.002	<0.08	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.002	0.019	0.019	<0.002	-	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	µg/g	0.004	0.01	0.01	<0.004	-	<0.004	<0.004	<0.004
Tetrachloroethane	µg/g	0.002	0.45	0.45	<0.002	-	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	0.007	30	30	<0.007	-	<0.007	<0.007	<0.007
1,1,1-Trichloroethane	µg/g	0.002	26	26	<0.002	-	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	µg/g	0.002	0.28	0.28	<0.002	-	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.004	1.1	1.1	<0.004	-	<0.004	<0.004	<0.004
Trichlorofluoromethane	µg/g	0.004	NV	NV	<0.004	-	<0.004	<0.004	<0.004
Vinyl Chloride	µg/g	0.002	0.003	0.003	<0.002	-	<0.002	<0.002	<0.002
m & p-Xylene	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
o-Xylene	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
Xylenes (Total)	µg/g	0.002	25	25	<0.002	<0.07	<0.002	<0.002	<0.002
Petroleum Hydrocarbons									
C6 - C10 (PHC F1 minus BTEX)	µg/g	5	230	30	<5	<5	<5	<5	<5
C>10 - C16 (PHC F2)	µg/g	10	150	150	<10	<10	<10	<10	<10
C16 - C34 (PHC F3)	µg/g	50	1700	400	<50	64	<50	<50	<50
C>34 - C50 (PHC F4)	µg/g	50	3300	2800	<50	53	<50	<50	<50

Notes:

1. Gastechtor Reading - measured in ppm (parts per million by volume)

2. µg/g = Microgram per Gram

3. RDL = Laboratory Reportable Detection Limit

4. NV = no value

5. - = not analysed

6. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil

7. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard

8. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Golder Associates

 Prepared by: *CL*
 Checked by: *SMF*

Table 2
Soil Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Sample I.D.					TP5-4.0	TP6-0.6	TP6-3.8	TP7-3.5	TP8-2.5
Test Pit/Borehole Number					TP5	TP6	TP6	TP7	TP8
Sampling Depth (m)					4.00 - 4.15	0.60 - 0.75	3.80 - 3.95	3.35 - 3.50	2.50 - 2.65
Gastechtor Reading (ppm)					<25	<25	<25	<25	<25
Sampling Date					4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard					
VOCs									
Acetone	µg/g	0.130	3.5	3.5	<0.130	-	<0.130	<0.130	<0.130
Benzene	µg/g	0.002	0.24	0.24	<0.002	<0.10	<0.002	<0.002	<0.002
Bromodichloromethane	µg/g	0.003	0.12	0.12	<0.003	-	<0.003	<0.003	<0.003
Bromoforn	µg/g	0.002	0.11	0.11	<0.002	-	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.002	0.061	0.061	<0.002	-	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.002	0.1	0.10	<0.002	-	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	0.002	2.4	2.4	<0.002	-	<0.002	<0.002	<0.002
Chloroethane	µg/g	0.005	NV	NV	<0.005	-	<0.005	<0.005	<0.005
Chloroform	µg/g	0.002	0.13	0.13	<0.002	-	<0.002	<0.002	<0.002
Chloromethane	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
Dibromochloromethane	µg/g	0.003	0.09	0.09	<0.003	-	<0.003	<0.003	<0.003
1,2-Dichlorobenzene	µg/g	0.002	0.88	0.88	<0.002	-	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	0.002	30	30	<0.002	-	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.002	0.32	0.32	<0.002	-	<0.002	<0.002	<0.002
1,1-Dichloroethane	µg/g	0.002	3.0	3.0	<0.002	-	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.002	0.022	0.022	<0.002	-	<0.002	<0.002	<0.002
1,1-Dichloroethylene	µg/g	0.002	0.0024	0.0024	<0.002	-	<0.002	<0.002	<0.002
CIS 1,2-Dichloroethylene	µg/g	0.002	2.3	2.3	<0.002	-	<0.002	<0.002	<0.002
TRANS-1,2-Dichloroethylene	µg/g	0.003	4.1	4.1	<0.003	-	<0.003	<0.003	<0.003
1,2-Dichloropropane	µg/g	0.002	0.019	0.019	<0.002	-	<0.002	<0.002	<0.002
CIS-1,3-Dichloropropene	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
TRANS-1,3-Dichloropropene	µg/g	0.003	NV	NV	<0.003	-	<0.003	<0.003	<0.003
(CIS+TRANS)-1,3-Dichloropropene	µg/g	0.002	0.0066	0.0066	<0.002	-	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	0.002	0.28	0.28	<0.002	<0.05	<0.002	<0.002	<0.002
Ethylene Dibromide	µg/g	0.002	0.0056	0.0056	<0.002	-	<0.002	<0.002	<0.002
2-Hexanone	µg/g	0.470	NV	NV	<0.470	-	<0.470	<0.470	<0.470
Methylene Chloride	µg/g	0.010	1.1	1.1	<0.010	-	<0.010	<0.010	<0.010
Methyl Ethyl Ketone	µg/g	0.047	0.27	0.27	<0.047	-	<0.047	<0.047	<0.047
Methyl Isobutyl Ketone	µg/g	0.041	0.48	0.48	<0.041	-	<0.041	<0.041	<0.041
Methyl tert-butyl Ether	µg/g	0.004	5.7	5.7	<0.004	-	<0.004	<0.004	<0.004
Styrene	µg/g	0.002	1.2	1.2	<0.002	-	<0.002	<0.002	<0.002
Toluene	µg/g	0.002	2.1	2.1	<0.002	<0.08	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.002	0.019	0.019	<0.002	-	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	µg/g	0.004	0.01	0.01	<0.004	-	<0.004	<0.004	<0.004
Tetrachloroethene	µg/g	0.002	0.45	0.45	<0.002	-	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	0.007	30	30	<0.007	-	<0.007	<0.007	<0.007
1,1,1-Trichloroethane	µg/g	0.002	26	26	<0.002	-	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	µg/g	0.002	0.28	0.28	<0.002	-	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.004	1.1	1.1	<0.004	-	<0.004	<0.004	<0.004
Trichlorofluoromethane	µg/g	0.004	NV	NV	<0.004	-	<0.004	<0.004	<0.004
Vinyl Chloride	µg/g	0.002	0.003	0.003	<0.002	-	<0.002	<0.002	<0.002
m & p-Xylene	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
o-Xylene	µg/g	0.002	NV	NV	<0.002	-	<0.002	<0.002	<0.002
Xylenes (Total)	µg/g	0.002	25	25	<0.002	<0.07	<0.002	<0.002	<0.002
Petroleum Hydrocarbons									
C6 - C10 (PHC F1 minus BTEX)	µg/g	5	230	30	<5	<5	<5	<5	<5
C>10 - C16 (PHC F2)	µg/g	10	150	150	<10	<10	<10	<10	<10
C>16 - C34 (PHC F3)	µg/g	50	1700	400	<50	74	<50	<50	<50
C>34 - C50 (PHC F4)	µg/g	50	3300	2800	<50	76	<50	<50	<50

Notes:

- Gastechtor Reading - measured in ppm (parts per million by volume)
- µg/g = Microgram per Gram
- RDL = Laboratory Reportable Detection Limit
- NV = no value
- = not analysed
- Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
- Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard
- Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 2
Soil Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Sample ID.					TP9-4.0	TP10-3.0	TP11-3.4	TP12-2.75	TP13-3.8
Test Pit/Borehole Number					TP9	TP10	TP11	TP12	TP13
Sampling Depth (m)					3.85 - 4.00	3.00 - 3.15	3.25 - 3.40	2.60 - 2.75	3.80 - 3.90
Gastechtor Reading (ppm)					<25	<25	<25	<25	<25
Sampling Date					5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard					
VOCs									
Acetone	µg/g	0.130	3.5	3.5	<0.130	<0.130	<0.130	<0.130	<0.130
Benzene	µg/g	0.002	0.24	0.24	<0.002	<0.002	<0.002	<0.002	<0.002
Bromodichloromethane	µg/g	0.003	0.12	0.12	<0.003	<0.003	<0.003	<0.003	<0.003
Bromoform	µg/g	0.002	0.11	0.11	<0.002	<0.002	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.002	0.061	0.061	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.002	0.1	0.10	<0.002	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	0.002	2.4	2.4	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroethane	µg/g	0.005	NV	NV	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroform	µg/g	0.002	0.13	0.13	<0.002	<0.002	<0.002	<0.002	<0.002
Chloromethane	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
Dibromochloromethane	µg/g	0.003	0.09	0.09	<0.003	<0.003	<0.003	<0.003	<0.003
1,2-Dichlorobenzene	µg/g	0.002	0.88	0.88	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	0.002	30	30	<0.002	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.002	0.32	0.32	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethane	µg/g	0.002	3.0	3.0	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.002	0.022	0.022	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethylene	µg/g	0.002	0.0024	0.0024	<0.002	<0.002	<0.002	<0.002	<0.002
CIS 1,2-Dichloroethylene	µg/g	0.002	2.3	2.3	<0.002	<0.002	<0.002	<0.002	<0.002
TRANS-1,2-Dichloroethylene	µg/g	0.003	4.1	4.1	<0.003	<0.003	<0.003	<0.003	<0.003
1,2-Dichloropropane	µg/g	0.002	0.019	0.019	<0.002	<0.002	<0.002	<0.002	<0.002
CIS-1,3-Dichloropropene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
TRANS-1,3-Dichloropropene	µg/g	0.003	NV	NV	<0.003	<0.003	<0.003	<0.003	<0.003
(CIS+TRANS)-1,3-Dichloropropene	µg/g	0.002	0.0066	0.0066	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	0.002	0.28	0.28	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylene Dibromide	µg/g	0.002	0.0056	0.0056	<0.002	<0.002	<0.002	<0.002	<0.002
2-Hexanone	µg/g	0.470	NV	NV	<0.470	<0.470	<0.470	<0.470	<0.470
Methylene Chloride	µg/g	0.010	1.1	1.1	<0.010	<0.010	<0.010	<0.010	<0.010
Methyl Ethyl Ketone	µg/g	0.047	0.27	0.27	<0.047	<0.047	<0.047	<0.047	<0.047
Methyl Isobutyl Ketone	µg/g	0.041	0.48	0.48	<0.041	<0.041	<0.041	<0.041	<0.041
Methyl tert-butyl Ether	µg/g	0.004	5.7	5.7	<0.004	<0.004	<0.004	<0.004	<0.004
Styrene	µg/g	0.002	1.2	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
Toluene	µg/g	0.002	2.1	2.1	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.002	0.019	0.019	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	µg/g	0.004	0.01	0.01	<0.004	<0.004	<0.004	<0.004	<0.004
Tetrachloroethene	µg/g	0.002	0.45	0.45	<0.002	<0.002	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	0.007	30	30	<0.007	<0.007	<0.007	<0.007	<0.007
1,1,1-Trichloroethane	µg/g	0.002	26	26	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	µg/g	0.002	0.28	0.28	<0.002	<0.002	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.004	1.1	1.1	<0.004	<0.004	<0.004	<0.004	<0.004
Trichlorofluoromethane	µg/g	0.004	NV	NV	<0.004	<0.004	<0.004	<0.004	<0.004
Vinyl Chloride	µg/g	0.002	0.003	0.003	<0.002	<0.002	<0.002	<0.002	<0.002
m & p-Xylene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
o-Xylene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
Xylenes (Total)	µg/g	0.002	25	25	<0.002	<0.002	<0.002	<0.002	<0.002
Petroleum Hydrocarbons									
C6 - C10 (PHC F1 minus BTEX)	µg/g	5	230	30	<5	<5	<5	<5	<5
C>10 - C16 (PHC F2)	µg/g	10	150	150	<10	<10	<10	<10	<10
C>16 - C34 (PHC F3)	µg/g	50	1700	400	<50	<50	<50	<50	<50
C>34 - C50 (PHC F4)	µg/g	50	3300	2800	<50	<50	<50	<50	<50

Notes:

1. Gastechtor Reading - measured in ppm (parts per million by volume)

2. µg/g = Microgram per Gram

3. RDL = Laboratory Reportable Detection Limit

4. NV = no value

5. - = not analysed

6. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil

7. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard

8. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Golder Associates

Prepared by: GCS
 Checked by: SMF

Table 2
Soil Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Sample I.D.					TP14-1.5	TP16-1.5	TP17-4.0	DUP2	BH1-12.5-14.5
Test Pit/Borehole Number					TP14	TP16	TP17	TP17	BH1
Sampling Depth (m)					1.50 - 1.60	1.50 - 1.65	3.85 - 4.00	3.85 - 4.00	3.81 - 4.42
Gastechlor Reading (ppm)					<25	<25	<25	<25	nr
Sampling Date					5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	7-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard				Field Replicate of TP17-4.0	
VOCs									
Acetone	µg/g	0.130	3.5	3.5	<0.130	<0.130	<0.130	<0.130	<0.130
Benzene	µg/g	0.002	0.24	0.24	<0.002	<0.002	<0.002	<0.002	<0.002
Bromodichloromethane	µg/g	0.003	0.12	0.12	<0.003	<0.003	<0.003	<0.003	<0.003
Bromoform	µg/g	0.002	0.11	0.11	<0.002	<0.002	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.002	0.061	0.061	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.002	0.1	0.10	<0.002	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	0.002	2.4	2.4	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroethane	µg/g	0.005	NV	NV	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroform	µg/g	0.002	0.13	0.13	<0.002	<0.002	<0.002	<0.002	<0.002
Chloromethane	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
Dibromochloromethane	µg/g	0.003	0.09	0.09	<0.003	<0.003	<0.003	<0.003	<0.003
1,2-Dichlorobenzene	µg/g	0.002	0.88	0.88	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	0.002	30	30	<0.002	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.002	0.32	0.32	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethane	µg/g	0.002	3.0	3.0	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.002	0.022	0.022	<0.002	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethylene	µg/g	0.002	0.0024	0.0024	<0.002	<0.002	<0.002	<0.002	<0.002
CIS 1,2-Dichloroethylene	µg/g	0.002	2.3	2.3	<0.002	<0.002	<0.002	<0.002	<0.002
TRANS-1,2-Dichloroethylene	µg/g	0.003	4.1	4.1	<0.003	<0.003	<0.003	<0.003	<0.003
1,2-Dichloropropane	µg/g	0.002	0.019	0.019	<0.002	<0.002	<0.002	<0.002	<0.002
CIS-1,3-Dichloropropene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
TRANS-1,3-Dichloropropene	µg/g	0.003	NV	NV	<0.003	<0.003	<0.003	<0.003	<0.003
(CIS+TRANS)-1,3-Dichloropropene	µg/g	0.002	0.0066	0.0066	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	0.002	0.28	0.28	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylene Dibromide	µg/g	0.002	0.0056	0.0056	<0.002	<0.002	<0.002	<0.002	<0.002
2-Hexanone	µg/g	0.470	NV	NV	<0.470	<0.470	<0.470	<0.470	<0.470
Methylene Chloride	µg/g	0.010	1.1	1.1	<0.010	<0.010	<0.010	<0.010	<0.010
Methyl Ethyl Ketone	µg/g	0.047	0.27	0.27	<0.047	<0.047	<0.047	<0.047	<0.047
Methyl Isobutyl Ketone	µg/g	0.041	0.48	0.48	<0.041	<0.041	<0.041	<0.041	<0.041
Methyl tert-butyl Ether	µg/g	0.004	5.7	5.7	<0.004	<0.004	<0.004	<0.004	<0.004
Styrene	µg/g	0.002	1.2	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
Toluene	µg/g	0.002	2.1	2.1	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.002	0.019	0.019	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	µg/g	0.004	0.01	0.01	<0.004	<0.004	<0.004	<0.004	<0.004
Tetrachloroethene	µg/g	0.002	0.45	0.45	<0.002	<0.002	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	0.007	30	30	<0.007	<0.007	<0.007	<0.007	<0.007
1,1,1-Trichloroethane	µg/g	0.002	26	26	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	µg/g	0.002	0.28	0.28	<0.002	<0.002	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.004	1.1	1.1	<0.004	<0.004	<0.004	<0.004	<0.004
Trichlorofluoromethane	µg/g	0.004	NV	NV	<0.004	<0.004	<0.004	<0.004	<0.004
Vinyl Chloride	µg/g	0.002	0.003	0.003	<0.002	<0.002	<0.002	<0.002	<0.002
m & p-Xylene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
o-Xylene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002	<0.002
Xylenes (Total)	µg/g	0.002	25	25	<0.002	<0.002	<0.002	<0.002	<0.002
Petroleum Hydrocarbons									
C6 - C10 (PHC F1 minus BTEX)	µg/g	5	230	30	<5	<5	<5	<5	<5
C>10 - C16 (PHC F2)	µg/g	10	150	150	<10	<10	<10	<10	<10
C>16 - C34 (PHC F3)	µg/g	50	1700	400	<50	260	<50	<50	<50
C>34 - C50 (PHC F4)	µg/g	50	3300	2800	<50	140	<50	<50	<50

Notes:

- Gastechlor Reading - measured in ppm (parts per million by volume)
- µg/g = Microgram per Gram
- RDL = Laboratory Reportable Detection Limit
- NV = no value
- = not analysed
- Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
- Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard
- Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 2
Soil Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Sample I.D.					BH2-12.5-14.5	BH3-12.5-14.5	BH4-12.5-14.5	BH5-10'-12'
Test Pit/Borehole Number					BH2	BH3	BH4	BH5
Sampling Depth (m)					3.81 - 4.42	3.81 - 4.42	3.81 - 4.42	3.05 - 3.66
Gastechtor Reading (ppm)					nr	nr	<25	nr
Sampling Date					7-Jan-10	7-Jan-10	8-Jan-10	8-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard				
VOCs								
Acetone	µg/g	0.130	3.5	3.5	<0.130	<0.130	<0.130	<0.130
Benzene	µg/g	0.002	0.24	0.24	<0.002	<0.002	<0.002	<0.002
Bromodichloromethane	µg/g	0.003	0.12	0.12	<0.003	<0.003	<0.003	<0.003
Bromoform	µg/g	0.002	0.11	0.11	<0.002	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.002	0.061	0.061	<0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.002	0.1	0.10	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	0.002	2.4	2.4	<0.002	<0.002	<0.002	<0.002
Chloroethane	µg/g	0.005	NV	NV	<0.005	<0.005	<0.005	<0.005
Chloroform	µg/g	0.002	0.13	0.13	<0.002	<0.002	<0.002	<0.002
Chloromethane	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002
Dibromochloromethane	µg/g	0.003	0.09	0.09	<0.003	<0.003	<0.003	<0.003
1,2-Dichlorobenzene	µg/g	0.002	0.88	0.88	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	0.002	30	30	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.002	0.32	0.32	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethane	µg/g	0.002	3.0	3.0	<0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.002	0.022	0.022	<0.002	<0.002	<0.002	<0.002
1,1-Dichloroethylene	µg/g	0.002	0.0024	0.0024	<0.002	<0.002	<0.002	<0.002
CIS 1,2-Dichloroethylene	µg/g	0.002	2.3	2.3	<0.002	<0.002	<0.002	<0.002
TRANS-1,2-Dichloroethylene	µg/g	0.003	4.1	4.1	<0.003	<0.003	<0.003	<0.003
1,2-Dichloropropane	µg/g	0.002	0.019	0.019	<0.002	<0.002	<0.002	<0.002
CIS-1,3-Dichloropropene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002
TRANS-1,3-Dichloropropene	µg/g	0.003	NV	NV	<0.003	<0.003	<0.003	<0.003
(CIS+TRANS)-1,3-Dichloropropene	µg/g	0.002	0.0066	0.0066	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	0.002	0.28	0.28	<0.002	<0.002	<0.002	<0.002
Ethylene Dibromide	µg/g	0.002	0.0056	0.0056	<0.002	<0.002	<0.002	<0.002
2-Hexanone	µg/g	0.470	NV	NV	<0.470	<0.470	<0.470	<0.470
Methylene Chloride	µg/g	0.010	1.1	1.1	<0.010	<0.010	<0.010	<0.010
Methyl Ethyl Ketone	µg/g	0.047	0.27	0.27	<0.047	<0.047	<0.047	<0.047
Methyl Isobutyl Ketone	µg/g	0.041	0.48	0.48	<0.041	<0.041	<0.041	<0.041
Methyl tert-butyl Ether	µg/g	0.004	5.7	5.7	<0.004	<0.004	<0.004	<0.004
Styrene	µg/g	0.002	1.2	1.2	<0.002	<0.002	<0.002	<0.002
Toluene	µg/g	0.002	2.1	2.1	<0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.002	0.019	0.019	<0.002	<0.002	<0.002	<0.002
1,1,2,2-Tetrachloroethane	µg/g	0.004	0.01	0.01	<0.004	<0.004	<0.004	<0.004
Tetrachloroethene	µg/g	0.002	0.45	0.45	<0.002	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	0.007	30	30	<0.007	<0.007	<0.007	<0.007
1,1,1-Trichloroethane	µg/g	0.002	26	26	<0.002	<0.002	<0.002	<0.002
1,1,2-Trichloroethane	µg/g	0.002	0.28	0.28	<0.002	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.004	1.1	1.1	<0.004	<0.004	<0.004	<0.004
Trichlorofluoromethane	µg/g	0.004	NV	NV	<0.004	<0.004	<0.004	<0.004
Vinyl Chloride	µg/g	0.002	0.003	0.003	<0.002	<0.002	<0.002	<0.002
m & p-Xylene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002
o-Xylene	µg/g	0.002	NV	NV	<0.002	<0.002	<0.002	<0.002
Xylenes (Total)	µg/g	0.002	25	25	<0.002	<0.002	<0.002	<0.002
Petroleum Hydrocarbons								
C6 - C10 (PHC F1 minus BTEX)	µg/g	5	230	30	<5	<5	<5	<5
C>10 - C16 (PHC F2)	µg/g	10	150	150	<10	<10	<10	<10
C>16 - C34 (PHC F3)	µg/g	50	1700	400	<50	<50	<50	<50
C>34 - C50 (PHC F4)	µg/g	50	3300	2800	<50	<50	<50	<50

Notes:

1. Gastechtor Reading - measured in ppm (parts per million by volume)
2. µg/g = Microgram per Gram
3. RDL = Laboratory Reportable Detection Limit
4. NV = no value
5. - = not analysed
6. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
7. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard
8. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 3
Soil Analytical Results
PAHs
Allandale Station Lands,
Barrie, Ontario

Sample I.D.	TP1-0.40	TP2-0.40	TP3-0.5	TP4-1.1	DUP1	TP5-0.5	TP6-0.6	TP7-1.0
Test Pit/Borehole Number	TP1	TP2	TP3	TP4	TP4	TP5	TP6	TP7
Sampling Depth (m)	0.40 - 0.55	0.40 - 0.48	0.50 - 0.65	1.10 - 1.25	1.10 - 1.25	0.50 - 0.65	0.60 - 0.75	1.00 - 1.15
Gastechlor Reading (ppm)	<25	<25	<25	<25	<25	<25	<25	<25
Sampling Date	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10	4-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/hst) Standard	Field Replicate of TP4-1.1			
Naphthalene	µg/g	0.03	4.6	4.6	<0.03	0.06	0.07	<0.03
Acenaphthylene	µg/g	0.02	130	100	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/g	0.03	15	15	<0.03	<0.03	<0.03	<0.03
Fluorene	µg/g	0.02	340	340	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g	0.02	40	40	0.06	0.06	0.09	<0.02
Anthracene	µg/g	0.02	28	28	<0.02	<0.02	<0.02	<0.02
Fluoranthene	µg/g	0.02	40	40	<0.02	<0.02	0.11	<0.02
Pyrene	µg/g	0.02	250	250	0.13	0.09	0.07	<0.02
Benzo(a)anthracene	µg/g	0.02	6.6	6.6	0.13	<0.02	0.05	<0.02
Chrysene	µg/g	0.02	17	12	0.12	<0.02	0.07	<0.02
Benzo(b)fluoranthene	µg/g	0.02	18	12	0.06	<0.02	0.08	<0.02
Benzo(k)fluoranthene	µg/g	0.02	18	12	0.03	<0.02	0.06	<0.02
Benzo(a)pyrene	µg/g	0.02	1.9	1.2	0.08	<0.02	0.03	<0.02
Indeno(1,2,3-cd)pyrene	µg/g	0.02	19	12	0.06	<0.02	0.04	<0.02
Dibenz(a,h)anthracene	µg/g	0.02	1.9	1.2	0.02	<0.02	<0.02	<0.02
Benzo(g,h,i)perylene	µg/g	0.02	40	40	0.08	<0.02	0.07	<0.02

Notes:

1. Gastechlor Reading - measured in ppm (parts per million by volume)
2. µg/g = Microgram per Gram
3. RDL = Laboratory Reportable Detection Limit
4. nr = not recorded (insufficient sample volume)
5. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
6. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard
7. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 3
Soil Analytical Results
PAHs
Allandale Station Lands,
Barrie, Ontario

Sample I.D.	TP8-0.10	TP9-0.25	TP10-1.0	TP11-0.5	TP13-0.25	TP14-0.5	TP15-0.75	DUP3
Test Pit/Borehole Number	TP8	TP9	TP10	TP11	TP13	TP14	TP15	TP15
Sampling Depth (m)	0.10 - 0.25	0.25 - 0.40	1.00 - 1.15	0.50 - 0.65	0.25 - 0.40	0.50 - 0.65	0.75 - 0.90	0.75 - 0.90
Gastechtor Reading (ppm)	<25	<25	<25	<25	<25	<25	<25	<25
Sampling Date	4-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10	5-Jan-10
Parameter	Units	RDL	MOE Table 2 (ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard	Field Replicate of TP15-0.75			
Naphthalene	µg/g	0.03	4.6	4.6	<0.03	0.25	0.10	0.10
Acenaphthylene	µg/g	0.02	130	100	<0.02	0.07	0.03	0.02
Acenaphthene	µg/g	0.03	15	15	<0.03	<0.03	<0.03	<0.03
Fluorene	µg/g	0.02	340	340	<0.02	0.02	<0.02	<0.02
Phenanthrene	µg/g	0.02	40	40	<0.02	0.50	0.36	0.14
Anthracene	µg/g	0.02	28	28	<0.02	0.16	0.08	0.03
Fluoranthene	µg/g	0.02	40	40	<0.02	0.68	0.35	0.13
Pyrene	µg/g	0.02	250	250	<0.02	0.72	0.37	0.12
Benzofluoranthene	µg/g	0.02	6.6	6.6	<0.02	0.48	0.26	0.09
Chrysene	µg/g	0.02	17	12	<0.02	0.63	0.33	0.12
Benzofluoranthene	µg/g	0.02	18	12	<0.02	0.65	0.38	0.12
Benzofluoranthene	µg/g	0.02	18	12	<0.02	0.30	0.12	0.04
Benzofluoranthene	µg/g	0.02	1.9	1.2	<0.02	0.41	0.19	0.06
Indeno(1,2,3-cd)pyrene	µg/g	0.02	19	12	<0.02	0.35	0.08	0.06
Dibenzofluoranthene	µg/g	0.02	1.9	1.2	<0.02	0.10	0.04	0.02
Benzofluoranthene	µg/g	0.02	40	40	<0.02	0.42	0.21	0.07

Notes:

1. Gastechtor Reading - measured in ppm (parts per million by volume)
2. µg/g = Microgram per Gram
3. RDL = Laboratory Reportable Detection Limit
4. nr = not recorded (insufficient sample volume)
5. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environmental Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
6. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard
7. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 3
Soil Analytical Results
PAHs
Allandale Station Lands,
Barrie, Ontario

Sample I.D.	TP16-1.0	TP16-1.5	TP17-0.75	BH17-5.9.5	BH2-2.5-4.5	BH3-7.5-9.5	BH4-7.5-9.5	BH5-6'
Test Pit/Borehole Number	TP16	TP16	TP16	TP16	TP16	TP16	TP16	TP16
Sampling Depth (m)	1.00 - 1.15	1.50 - 1.65	0.75 - 0.90	2.29 - 2.90	0.76 - 1.37	2.29 - 2.90	2.29 - 2.90	1.82 - 2.29
Gastechlor Reading (ppm)	<25	<25	<25	nr	nr	nr	nr	nr
Sampling Date	5-Jan-10	5-Jan-10	5-Jan-10	7-Jan-10	7-Jan-10	7-Jan-10	8-Jan-10	8-Jan-10
Parameter	Units	RDL	MOE Table 2 (Ind/com/comm) Standard	MOE Table 2 (res/park/inst) Standard				
Naphthalene	µg/g	0.03	4.6	4.6	<0.03	0.28	<0.03	<0.03
Acenaphthylene	µg/g	0.02	130	100	<0.02	0.04	<0.02	<0.02
Acenaphthene	µg/g	0.03	15	15	<0.03	0.03	<0.03	<0.03
Fluorene	µg/g	0.02	340	340	<0.02	0.07	<0.02	<0.02
Phenanthrene	µg/g	0.02	40	40	<0.02	0.85	<0.02	<0.02
Anthracene	µg/g	0.02	28	28	<0.02	0.23	<0.02	<0.02
Fluoranthene	µg/g	0.02	40	40	<0.02	1.5	<0.02	<0.02
Pyrene	µg/g	0.02	250	250	<0.02	1.3	<0.02	<0.02
Benzo(a)anthracene	µg/g	0.02	6.6	6.6	<0.02	0.93	<0.02	<0.02
Chrysene	µg/g	0.02	17	12	<0.02	0.82	<0.02	<0.02
Benzo(b)fluoranthene	µg/g	0.02	18	12	<0.02	0.67	<0.02	<0.02
Benzo(k)fluoranthene	µg/g	0.02	18	12	<0.02	0.33	<0.02	<0.02
Benzo(a)pyrene	µg/g	0.02	1.9	1.2	<0.02	0.60	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	µg/g	0.02	19	12	<0.02	0.36	<0.02	<0.02
Dibenzo(a,h)anthracene	µg/g	0.02	1.9	1.2	<0.02	0.10	<0.02	<0.02
Benzo(g,h,i)perylene	µg/g	0.02	40	40	<0.02	0.33	<0.02	<0.02

Notes:

1. Gastechlor Reading - measured in ppm (parts per million by volume)
2. µg/g = Microgram per Gram
3. RDL = Laboratory Reportable Detection Limit
4. nr = not recorded (insufficient sample volume)
5. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for industrial/commercial/community or residential/parkland/institutional land use in a potable groundwater condition, coarse textured soil
6. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition (industrial/commercial/community) standard
7. Bold type and italicized indicates an exceedance of the MOE Table 2 (residential/parkland/institutional) site condition standard

Table 4
Groundwater Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Monitoring Well Location				MW1	MW2	MW3	DUP1	MW4
Sampling Date				15-Jan-10	15-Jan-10	15-Jan-10	15-Jan-10	15-Jan-10
Gastechlor Reading (ppm)				<25	<25	<25	<25	<25
Parameter	Units	RDL	MOE Table 2 Standard				Field Duplicate of MW3	
VOC								
Chloromethane	µg/L	0.40	NV	<0.40	<0.40	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	0.17	0.5	<0.17	<0.17	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.20	3.7	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroethane	µg/L	0.20	NV	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L	0.40	NV	<0.40	<0.40	<0.40	<0.40	<0.40
Acetone	µg/L	1.0	3000	<1.0	<1.0	<1.0	<1.0	<1.0
1,1 Dichloroethene	µg/L	0.30	0.66	<0.30	<0.30	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	0.30	50	<0.30	<0.30	<0.30	<0.30	<0.30
trans- 1,2-dichloroethylene	µg/L	0.20	100	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	0.20	700	<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	0.30	70	<0.30	<0.30	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	1.0	350	<1.0	<1.0	<1.0	<1.0	<1.0
cis- 1,2-Dichloroethylene	µg/L	0.20	70	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
1,2 - Dichloroethane	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	0.30	200	<0.30	<0.30	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
Benzene	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	0.20	50	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	µg/L	0.20	NV	<0.20	<0.20	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L	1.0	350	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L	0.30	NV	<0.30	<0.30	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	0.20	24	<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	µg/L	0.30	NV	<0.30	<0.30	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L	0.10	5.0	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	0.20	1.0	<0.20	<0.20	<0.20	<0.20	<0.20
Tetrachloroethene	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	0.10	5.0	<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	0.10	30	<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	0.10	2.4	<0.10	<0.10	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	0.20	NV	<0.20	<0.20	<0.20	<0.20	<0.20
Bromoform	µg/L	0.10	5.0	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	0.10	100	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	0.10	1.0	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L	0.10	NV	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	0.10	630	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	0.10	1.0	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	0.10	3.0	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L	0.30	70	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L	0.30	1.4	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L	0.20	300	<0.20	<0.20	<0.20	<0.20	<0.20
Petroleum Hydrocarbons								
C6 - C10 (PHC F1 minus BTEX)	µg/L	100	NV	<100	<100	<100	<100	<100
C>10 - C16 (F2)	µg/L	100	NV	<100	<100	<100	<100	<100
C6 - C16 (PHC F1 + PHC F2)	µg/L	100	1000	<100	<100	<100	<100	<100
C>16 - C34 (F3)	µg/L	100	NV	<100	<100	<100	<100	<100
C>34 - C50 (PHC F4)	µg/L	100	NV	<100	<100	<100	<100	<100
C>16 - C50 (PHC F3 + PHC F4)	µg/L	100	1000	<100	<100	<100	<100	<100

Notes:

1. na = not applicable
2. Gastechlor Reading - measured in parts per million (ppm) by volume, unless noted
3. NV = No value
4. µg/L = Microgram per Litre
5. RDL = Laboratory Reportable Detection Limit
6. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for all land use, coarse textured soil
7. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard

Table 4
Groundwater Analytical Results
VOCs and Petroleum Hydrocarbons
Allandale Station Lands,
Barrie, Ontario

Monitoring Well Location				MW5	Field Blank	Trip Blank
Sampling Date				15-Jan-10	15-Jan-10	na
Gastechtor Reading (ppm)				<25	na	na
Parameter	Units	RDL	MOE Table 2 Standard			
VOC						
Chloromethane	µg/L	0.40	NV	<0.40	<0.40	<0.40
Vinyl Chloride	µg/L	0.17	0.5	<0.17	<0.17	<0.17
Bromomethane	µg/L	0.20	3.7	<0.20	<0.20	<0.20
Chloroethane	µg/L	0.20	NV	<0.20	<0.20	<0.20
Trichlorofluoromethane	µg/L	0.40	NV	<0.40	<0.40	<0.40
Acetone	µg/L	1.0	3000	<1.0	<1.0	<1.0
1,1-Dichloroethene	µg/L	0.30	0.66	<0.30	<0.30	<0.30
Methylene Chloride	µg/L	0.30	50	<0.30	<0.30	<0.30
trans-1,2-dichloroethylene	µg/L	0.20	100	<0.20	<0.20	<0.20
Methyl tert-butyl ether	µg/L	0.20	700	<0.20	<0.20	<0.20
1,1-Dichloroethane	µg/L	0.30	70	<0.30	<0.30	<0.30
Methyl Ethyl Ketone	µg/L	1.0	350	<1.0	<1.0	<1.0
cis-1,2-Dichloroethylene	µg/L	0.20	70	<0.20	<0.20	<0.20
Chloroform	µg/L	0.20	5.0	<0.20	<0.20	<0.20
1,2-Dichloroethane	µg/L	0.20	5.0	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	µg/L	0.30	200	<0.30	<0.30	<0.30
Carbon Tetrachloride	µg/L	0.20	5.0	<0.20	<0.20	<0.20
Benzene	µg/L	0.20	5.0	<0.20	<0.20	<0.20
1,2-Dichloropropane	µg/L	0.20	5.0	<0.20	<0.20	<0.20
Trichloroethylene	µg/L	0.20	50	<0.20	<0.20	<0.20
Bromodichloromethane	µg/L	0.20	5.0	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	µg/L	0.20	NV	<0.20	<0.20	<0.20
Methyl Isobutyl Ketone	µg/L	1.0	350	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	µg/L	0.30	NV	<0.30	<0.30	<0.30
1,1,2-Trichloroethane	µg/L	0.20	5.0	<0.20	<0.20	<0.20
Toluene	µg/L	0.20	24	<0.20	<0.20	<0.20
2-Hexanone	µg/L	0.30	NV	<0.30	<0.30	<0.30
Dibromochloromethane	µg/L	0.10	5.0	<0.10	<0.10	<0.10
Ethylene Dibromide	µg/L	0.20	1.0	<0.20	<0.20	<0.20
Tetrachloroethene	µg/L	0.20	5.0	<0.20	<0.20	<0.20
1,1,1,2-Tetrachloroethane	µg/L	0.10	5.0	<0.10	<0.10	<0.10
Chlorobenzene	µg/L	0.10	30	<0.10	<0.10	<0.10
Ethylbenzene	µg/L	0.10	2.4	<0.10	<0.10	<0.10
m & p-Xylene	µg/L	0.20	NV	<0.20	<0.20	<0.20
Bromoform	µg/L	0.10	5.0	<0.10	<0.10	<0.10
Styrene	µg/L	0.10	100	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	0.10	1.0	<0.10	<0.10	<0.10
o-Xylene	µg/L	0.10	NV	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	0.10	630	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	0.10	1.0	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	0.10	3.0	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L	0.30	70	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L	0.30	1.4	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L	0.20	300	<0.20	<0.20	<0.20
Petroleum Hydrocarbons						
C6 - C10 (PHC F1 minus BTEX)	µg/L	100	NV	<100	<100	<100
C>10 - C16 (F2)	µg/L	100	NV	<100	<100	<100
C6 - C16 (PHC F1 + PHC F2)	µg/L	100	1000	<100	<100	<100
C>16 - C34 (F3)	µg/L	100	NV	<100	<100	<100
C>34 - C50 (PHC F4)	µg/L	100	NV	<100	<100	<100
C>16 - C50 (PHC F3 + PHC F4)	µg/L	100	1000	<100	<100	<100

Notes:

1. na = not applicable
2. Gastechtor Reading - measured in parts per million (ppm) by volume, unless noted
3. NV = No value
4. µg/L = Microgram per Litre
5. RDL = Laboratory Reportable Detection Limit
6. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for all land use, coarse textured soil
7. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard

Table 5
Groundwater Analytical Results
Metals, Inorganics, and PAHs
Allandale Station Lands,
Barrie, Ontario

Monitoring Well Location				MW1		MW2	
Sampling Date				15-Jan-10	24-Feb-10	15-Jan-10	24-Feb-10
Gastechtor Reading (ppm)				<25	nm	<25	nm
Parameter	Units	RDL	MOE Table 2 Standard				
Metals & Inorganics							
Antimony	µg/L	1.00	6.0	<1.00	<1.00	<1.00	<1.00
Arsenic	µg/L	0.60	25	2.70	1.34	1.99	1.02
Barium	µg/L	0.50	1000	303	370	153	136
Beryllium	µg/L	1.00	4.0	<1.00	<1.00	<1.00	<1.00
Boron	µg/L	10.0	5000	50.6	33.9	46.2	30.7
Cadmium	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20
Chromium	µg/L	0.60	50	108	2.68	15.7	25.9
Cobalt	µg/L	0.50	100	<0.50	<0.50	<0.50	<0.50
Copper	µg/L	0.80	23	3.77	3.49	1.80	1.54
Lead	µg/L	0.50	10	<0.50	<0.50	<0.50	1.15
Molybdenum	µg/L	0.50	7300	4.00	3.57	<0.50	<0.50
Nickel	µg/L	0.60	100	3.29	<0.60	3.95	<0.60
Selenium	µg/L	0.80	10	5.19	2.07	2.64	2.00
Silver	µg/L	0.20	1.2	<0.20	<0.20	<0.20	<0.20
Thallium	µg/L	0.30	2.0	<0.30	<0.30	<0.30	<0.30
Vanadium	µg/L	0.40	200	1.03	1.93	3.13	2.70
Zinc	µg/L	5.00	1100	<5.00	7.11	<5.00	<5.00
Mercury	µg/L	0.10	0.12	<0.10	<0.10	<0.10	<0.10
Sodium	mg/L	0.05	200	651	675	312	281
Free Cyanide	µg/L	10	52	<10	<10	<10	<10
Chromium VI	µg/L	5.0	50	<5.0	<5.0	<5.0	<5.0
Chloride	mg/L	0.10	250	1050	1150	524	491
Nitrate as N	mg/L	0.05	10	4.36	6.24	5.55	5.86
Nitrite as N	mg/L	0.05	1	<0.50	<0.05	<0.10	<0.05
pH	N/A	N/A	NV	8.02	7.99	7.92	7.94
Electrical Conductivity	uS/cm	2	NV	3960	3900	2250	2010
PAHs							
Naphthalene	µg/L	0.12	21	<0.12	-	<0.12	-
Acenaphthylene	µg/L	0.11	310	<0.11	-	<0.11	-
Acenaphthene	µg/L	0.10	20	<0.10	-	<0.10	-
Fluorene	µg/L	0.09	280	<0.09	-	<0.09	-
Phenanthrene	µg/L	0.11	63	<0.11	-	<0.11	-
Anthracene	µg/L	0.05	12	<0.05	-	<0.05	-
Fluoranthene	µg/L	0.12	130	<0.12	-	<0.12	-
Pyrene	µg/L	0.05	40	<0.05	-	<0.05	-
Benzo(a)anthracene	µg/L	0.08	0.2	<0.08	-	<0.08	-
Chrysene	µg/L	0.05	0.5	<0.05	-	<0.05	-
Benzo(b)fluoranthene	µg/L	0.05	0.2	<0.05	-	<0.05	-
Benzo(k)fluoranthene	µg/L	0.05	0.2	<0.05	-	<0.05	-
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	-	<0.01	-
Indeno(1,2,3-cd)pyrene	µg/L	0.03	0.2	<0.03	-	<0.03	-
Dibenzo(a,h)anthracene	µg/L	0.09	0.2	<0.09	-	<0.09	-
Benzo(g,h,i)perylene	µg/L	0.06	0.2	<0.06	-	<0.06	-

Notes:

1. na = not applicable
2. nm = not measured
3. Gastechtor Reading - measured in parts per million (ppm) by volume, unless noted
4. NV = No value
5. µg/L = Microgram per Litre
6. RDL = Laboratory Reportable Detection Limit
7. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for all land use, coarse textured soil
8. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard

Table 5
Groundwater Analytical Results
Metals, Inorganics, and PAHs
Allandale Station Lands,
Barrie, Ontario

Monitoring Well Location				MW3		
Sampling Date				15-Jan-10	15-Jan-10	24-Feb-10
Gastechtor Reading (ppm)				<25	<25	nm
Parameter	Units	RDL	MOE Table 2 Standard		Field Duplicate of MW3	
Metals & Inorganics						
Antimony	µg/L	1.00	6.0	<1.00	<1.00	<1.00
Arsenic	µg/L	0.60	25	1.25	1.34	1.40
Barium	µg/L	0.50	1000	107	97.2	125
Beryllium	µg/L	1.00	4.0	<1.00	<1.00	<1.00
Boron	µg/L	10.0	5000	36.0	32.7	27.8
Cadmium	µg/L	0.20	5.0	<0.20	<0.20	0.27
Chromium	µg/L	0.60	50	24.4	13.9	2.07
Cobalt	µg/L	0.50	100	<0.50	<0.50	<0.50
Copper	µg/L	0.80	23	2.46	2.12	2.59
Lead	µg/L	0.50	10	<0.50	<0.50	<0.50
Molybdenum	µg/L	0.50	7300	1.94	1.62	1.52
Nickel	µg/L	0.60	100	1.71	2.81	<0.60
Selenium	µg/L	0.80	10	2.80	2.28	1.21
Silver	µg/L	0.20	1.2	<0.20	<0.20	<0.20
Thallium	µg/L	0.30	2.0	<0.30	<0.30	<0.30
Vanadium	µg/L	0.40	200	2.27	2.86	2.41
Zinc	µg/L	5.00	1100	<5.00	<5.00	21.4
Mercury	µg/L	0.10	0.12	<0.10	<0.10	<0.10
Sodium	mg/L	0.05	200	253	268	244
Free Cyanide	µg/L	10	52	<10	<10	<10
Chromium VI	µg/L	5.0	50	<5.0	<5.0	<5.0
Chloride	mg/L	0.10	250	422	449	447
Nitrate as N	mg/L	0.05	10	5.49	5.26	5.62
Nitrite as N	mg/L	0.05	1	<0.10	<0.05	<0.05
pH	N/A	N/A	NV	7.93	7.93	7.89
Electrical Conductivity	uS/cm	2	NV	1850	1950	1800
PAHs						
Naphthalene	µg/L	0.12	21	<0.12	<0.12	-
Acenaphthylene	µg/L	0.11	310	<0.11	<0.11	-
Acenaphthene	µg/L	0.10	20	<0.10	<0.10	-
Fluorene	µg/L	0.09	280	<0.09	<0.09	-
Phenanthrene	µg/L	0.11	63	<0.11	<0.11	-
Anthracene	µg/L	0.05	12	<0.05	<0.05	-
Fluoranthene	µg/L	0.12	130	<0.12	<0.12	-
Pyrene	µg/L	0.05	40	<0.05	<0.05	-
Benzo(a)anthracene	µg/L	0.08	0.2	<0.08	<0.08	-
Chrysene	µg/L	0.05	0.5	<0.05	<0.05	-
Benzo(b)fluoranthene	µg/L	0.05	0.2	<0.05	<0.05	-
Benzo(k)fluoranthene	µg/L	0.05	0.2	<0.05	<0.05	-
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01	-
Indeno(1,2,3-cd)pyrene	µg/L	0.03	0.2	<0.03	<0.03	-
Dibenzo(a,h)anthracene	µg/L	0.09	0.2	<0.09	<0.09	-
Benzo(g,h,i)perylene	µg/L	0.06	0.2	<0.06	<0.06	-

Notes:

1. na = not applicable
2. nm = not measured
3. Gastechtor Reading - measured in parts per million (ppm) by volume, unless noted
4. NV = No value
5. µg/L = Microgram per Litre
6. RDL = Laboratory Reportable Detection Limit
7. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for all land use, coarse textured soil
8. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard

Table 5
Groundwater Analytical Results
Metals, Inorganics, and PAHs
Allandale Station Lands,
Barrie, Ontario

Monitoring Well Location				MW4			MW5	
Sampling Date				15-Jan-10	24-Feb-10	24-Feb-10	15-Jan-10	24-Feb-10
Gastechtor Reading (ppm)				<25	nm	nm	<25	nm
Parameter	Units	RDL	MOE Table 2 Standard			Field Duplicate of MW4		
Metals & Inorganics								
Antimony	µg/L	1.00	6.0	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic	µg/L	0.60	25	5.17	1.65	2.05	0.79	0.67
Barium	µg/L	0.50	1000	461	266	261	26.8	16.5
Beryllium	µg/L	1.00	4.0	<1.00	<1.00	<1.00	<1.00	<1.00
Boron	µg/L	10.0	5000	36.3	32.3	31.5	30.3	22.0
Cadmium	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20	<0.20
Chromium	µg/L	0.60	50	21.9	75.5	1.48	9.28	3.30
Cobalt	µg/L	0.50	100	<0.50	<0.50	<0.50	<0.50	<0.50
Copper	µg/L	0.80	23	2.75	2.39	2.62	1.62	1.86
Lead	µg/L	0.50	10	<0.50	<0.50	<0.50	<0.50	<0.50
Molybdenum	µg/L	0.50	7300	0.70	1.02	1.16	3.03	1.89
Nickel	µg/L	0.60	100	3.45	<0.60	<0.60	0.76	<0.60
Selenium	µg/L	0.80	10	5.12	3.92	4.11	1.61	<0.80
Silver	µg/L	0.20	1.2	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	µg/L	0.30	2.0	<0.30	<0.30	<0.30	<0.30	<0.30
Vanadium	µg/L	0.40	200	5.07	2.58	2.77	1.33	2.21
Zinc	µg/L	5.00	1100	7.21	<5.00	<5.00	<5.00	<5.00
Mercury	µg/L	0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium	mg/L	0.05	200	607	646	633	109	122
Free Cyanide	µg/L	10	52	<10	<10	<10	<10	<10
Chromium VI	µg/L	5.0	50	<5.0	<5.0	<5.0	<5.0	<5.0
Chloride	mg/L	0.10	250	1060	965	986	112	131
Nitrate as N	mg/L	0.05	10	4.78	5.14	6.86	1.95	1.95
Nitrite as N	mg/L	0.05	1	<0.50	<0.05	<0.05	<0.05	<0.05
pH	N/A	N/A	NV	7.92	7.99	7.92	8.27	8.23
Electrical Conductivity	uS/cm	2	NV	4100	3510	3460	686	656
PAHs								
Naphthalene	µg/L	0.12	21	<0.12	-	-	0.12	-
Acenaphthylene	µg/L	0.11	310	<0.11	-	-	<0.11	-
Acenaphthene	µg/L	0.10	20	<0.10	-	-	<0.10	-
Fluorene	µg/L	0.09	280	<0.09	-	-	<0.09	-
Phenanthrene	µg/L	0.11	63	<0.11	-	-	<0.11	-
Anthracene	µg/L	0.05	12	<0.05	-	-	<0.05	-
Fluoranthene	µg/L	0.12	130	<0.12	-	-	<0.12	-
Pyrene	µg/L	0.05	40	<0.05	-	-	<0.05	-
Benzo(a)anthracene	µg/L	0.08	0.2	<0.08	-	-	<0.08	-
Chrysene	µg/L	0.05	0.5	<0.05	-	-	<0.05	-
Benzo(b)fluoranthene	µg/L	0.05	0.2	<0.05	-	-	<0.05	-
Benzo(k)fluoranthene	µg/L	0.05	0.2	<0.05	-	-	<0.05	-
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	-	-	<0.01	-
Indeno(1,2,3-cd)pyrene	µg/L	0.03	0.2	<0.03	-	-	<0.03	-
Dibenzo(a,h)anthracene	µg/L	0.09	0.2	<0.09	-	-	<0.09	-
Benzo(g,h,i)perylene	µg/L	0.06	0.2	<0.06	-	-	<0.06	-

Notes:

1. na = not applicable
2. nm = not measured
3. Gastechtor Reading - measured in parts per million (ppm) by volume, unless noted
4. NV = No value
5. µg/L = Microgram per Litre
6. RDL = Laboratory Reportable Detection Limit
7. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for all land use, coarse textured soil
8. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard

Table 5
Groundwater Analytical Results
Metals, Inorganics, and PAHs
Allandale Station Lands,
Barrie, Ontario

Monitoring Well Location				Field Blank		Trip Blank	
Sampling Date				15-Jan-10	24-Feb-10	Jan-10	Feb-10
Gastechtor Reading (ppm)				na	na	na	na
Parameter	Units	RDL	MOE Table 2 Standard				
Metals & Inorganics							
Antimony	µg/L	1.00	6.0	<1.00	<1.00	<1.00	<1.00
Arsenic	µg/L	0.60	25	<0.60	<0.60	<0.60	<0.60
Barium	µg/L	0.50	1000	<0.50	<0.50	<0.50	<0.50
Beryllium	µg/L	1.00	4.0	<1.00	<1.00	<1.00	<1.00
Boron	µg/L	10.0	5000	<10.0	<10.0	<10.0	<10.0
Cadmium	µg/L	0.20	5.0	<0.20	<0.20	<0.20	<0.20
Chromium	µg/L	0.60	50	<0.60	<0.60	<0.60	<0.60
Cobalt	µg/L	0.50	100	<0.50	<0.50	<0.50	<0.50
Copper	µg/L	0.80	23	<0.80	<0.80	<0.80	<0.80
Lead	µg/L	0.50	10	<0.50	<0.50	<0.50	<0.50
Molybdenum	µg/L	0.50	7300	<0.50	<0.50	<0.50	<0.50
Nickel	µg/L	0.60	100	<0.60	<0.60	<0.60	<0.60
Selenium	µg/L	0.80	10	<0.80	<0.80	<0.80	<0.80
Silver	µg/L	0.20	1.2	<0.20	<0.20	<0.20	<0.20
Thallium	µg/L	0.30	2.0	<0.30	<0.30	<0.30	<0.30
Vanadium	µg/L	0.40	200	<0.40	<0.40	<0.40	0.55
Zinc	µg/L	5.00	1100	<5.00	<5.00	<5.00	<5.00
Mercury	µg/L	0.10	0.12	<0.10	<0.10	<0.10	<0.10
Sodium	mg/L	0.05	200	0.14	0.09	<0.05	0.13
Free Cyanide	µg/L	10	52	<10	<10	<10	<10
Chromium VI	µg/L	5.0	50	<5.0	<5.0	<5.0	<5.0
Chloride	mg/L	0.10	250	<0.10	0.10	<0.10	<0.10
Nitrate as N	mg/L	0.05	10	<0.05	<0.05	<0.05	<0.05
Nitrite as N	mg/L	0.05	1	<0.05	<0.05	<0.05	<0.05
pH	N/A	N/A	NV	6.46	6.50	5.58	6.15
Electrical Conductivity	uS/cm	2	NV	<2	<2	<2	<2
PAHs							
Naphthalene	µg/L	0.12	21	<0.12	-	<0.12	-
Acenaphthylene	µg/L	0.11	310	<0.11	-	<0.11	-
Acenaphthene	µg/L	0.10	20	<0.10	-	<0.10	-
Fluorene	µg/L	0.09	280	<0.09	-	<0.09	-
Phenanthrene	µg/L	0.11	63	<0.11	-	<0.11	-
Anthracene	µg/L	0.05	12	<0.05	-	<0.05	-
Fluoranthene	µg/L	0.12	130	<0.12	-	<0.12	-
Pyrene	µg/L	0.05	40	<0.05	-	<0.05	-
Benzo(a)anthracene	µg/L	0.08	0.2	<0.08	-	<0.08	-
Chrysene	µg/L	0.05	0.5	<0.05	-	<0.05	-
Benzo(b)fluoranthene	µg/L	0.05	0.2	<0.05	-	<0.05	-
Benzo(k)fluoranthene	µg/L	0.05	0.2	<0.05	-	<0.05	-
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	-	<0.01	-
Indeno(1,2,3-cd)pyrene	µg/L	0.03	0.2	<0.03	-	<0.03	-
Dibenzo(a,h)anthracene	µg/L	0.09	0.2	<0.09	-	<0.09	-
Benzo(g,h,i)perylene	µg/L	0.06	0.2	<0.06	-	<0.06	-

Notes:

1. na = not applicable
2. nm = not measured
3. Gastechtor Reading - measured in parts per million (ppm) by volume, unless noted
4. NV = No value
5. µg/L = Microgram per Litre
6. RDL = Laboratory Reportable Detection Limit
7. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, March 9, 2004" full depth generic site condition standards for all land use, coarse textured soil
8. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard



APPENDIX A

Electromagnetic Survey Results

DATE January 29, 2010**PROJECT No.** 09-1170-6024**TO** Christi Groves
Golder Associates Ltd.**CC****FROM** Wayne Mulder, Christopher Phillips**EMAIL** wmulder@golder.com;
cphillips@golder.com**GEOPHYSICAL SURVEY – ALLANDALE STATION LANDS, BARRIE, ONTARIO**

Golder Associates Ltd. ("Golder") was retained by The City of Barrie ("the City"), to carry out a Phase II Environmental Site Assessment ("ESA") on the property known as the Allandale Station Lands in Barrie, Ontario (the "Site"). The Site is bounded to the south by Canadian National Railway ("CNR"), with Gowan Street beyond, to the west by Essa Road with commercial properties beyond, to the north by Tiffin Street and Lakeshore Drive, and to the east by GO Train rail lines. As part of the ESA a geophysical survey was conducted to identify potential underground storage tanks ("USTs") and the possible presence of contaminated groundwater. The geophysical survey was conducted using electromagnetic methods.

This technical memorandum presents the results of the geophysical survey performed at the site.

Methodology**EM31**

The GEONICS® EM31 is an electromagnetic induction device well suited to mapping terrain conductivity and response indicative of buried metal.

With the electromagnetic induction technique, an alternating current is passed through a wire coil (the transmitter) producing a time-varying magnetic field. This field in turn induces current to flow in any nearby conductor, the ground included. These induced currents produce a secondary time-varying magnetic field, which is sensed together with the primary field at a receiver coil. The instrument is one-person operable with the transmitter and receiver coils mounted at either end of a 3.7 metre long boom (see plate below). The quadrature and in-phase components of the secondary field are measured relative to the primary field.

Quadrature Response (Apparent Conductivity)

The quadrature component for the EM31 was primarily designed to be sensitive to materials that have a low induction number, such as earth materials, or poorly conducting metallic targets. Typically, the quadrature response is referred to as the apparent conductivity response. The EM31, quadrature response is calibrated to give a measure of the bulk apparent conductivity of the subsurface for a roughly hemispherical volume of radius 5 to 6 metres, centred at the measurement point.



Apparent conductivity is a measure of the bulk apparent conductivity of the subsurface, which is primarily a function of interconnected porosity, clay content, moisture content and the dissolved ion concentration in the pore fluid. Temperature, phase state of the pore water, and the amount and composition of any suspended colloids in the pore water also contribute to conductivity but to a lesser degree. An increase in any of these properties would result in an elevated apparent conductivity. Background is estimated as the response from uncontaminated native materials free from the influence of buried or surface metal. Quadrature response is dominated by large positive or negative readings (relative to background) in the near presence of metal conductors, depending on their size, orientation and distribution. Under these conditions, the instrument cannot make a valid measurement of apparent conductivity and the reading can only be considered as an indication of the near presence of highly conductive materials or soils. Instrument output is in millisiemens per metre (mS/m) which are units of apparent conductivity.

In the absence of buried or surface metal objects, metallic debris or salt impacted groundwater, the EM31 responds to the underlying stratigraphy. A change in clay content in the subsurface significantly alters instrument response because clay particles have a relatively large number of ions adsorbed to their surface. When clays are saturated, these adsorbed ions can become partially dissociated and available for ionic conductivity. Since clay particles have a relatively large surface area, variations in the amounts of clay present can influence the bulk apparent conductivity. Hence, it may be possible to estimate the thickness of fill over a clay substrate where a greater thickness of fill would result in a lower instrument reading.

In-phase Response

The measured in-phase component is most sensitive to targets that have a high induction number and are good conductors (primarily larger surface and buried metal objects). As such, the in-phase response is sensitive to buried and surface metal and relatively insensitive to changes in apparent conductivity of the subsurface. However, highly conductive earth materials can produce an elevated in-phase response. As with the quadrature, in-phase response can be positive or negative (relative to background) depending on the size, orientation and distribution of the metal objects causing the anomalies. Instrument output for in-phase is in parts per thousand (ppt) as a ratio of the secondary to primary field strength.

EM61

The GEONICS® EM61, a transient electromagnetic (TEM) induction device, is a new technology developed by Geonics Ltd. of Mississauga, Ontario. This instrument provides a response indicative of buried metal within the upper 2 to 3 metres of ground surface with excellent lateral resolution and can be used to map buried metal in very close proximity (less than 1 metre) to surface metal objects.

The instrument consists of a transmitter/receiver coil (1 x 0.5 metres) that generates a pulsed primary electromagnetic field that in turn induces electrical eddy currents in nearby metallic objects. Decay of these eddy currents is sensed by the coil at two times (designated early and late). Instrument response is recorded and displayed with a digital data logger. The instrument is equipped with a wheel-mounted encoder to trigger data recording at 0.2 metre intervals along the survey track line.

The EM61 can reliably detect a single 45 gallon drum at depths up to 4 metres in the absence of other surface metal and electrical interference and larger targets (USTs) at shallower depth can be resolved in the near presence of surface metal with some interpretation. An advantage with this technique is that the instrument is insensitive to changes in apparent conductivity of the ground.

Field Work

The field work was carried out on December 21st and 22nd, 2009 by geophysicists from the Golder Cambridge and Mississauga offices. Accessible areas of the site were surveyed using the EM31, as shown in Figure 1 (attached). EM31 data was collected along lines spaced approximately 3 metres apart, at station intervals of approximately 1 metre along each line. The location of the EM31 survey points was measured real-time while in the field using a Trimble GeoXH differential GPS system. There were several areas that were not able to be surveyed due to surface obstructions on site, which included dirt piles, construction trailers, and significant topography.

Due to the presence of a fence surrounding the buildings on site, EM31 surveying was not able to be completed in the immediate vicinity of the buildings. The EM61 was used to survey the accessible areas surrounding the buildings inside the fence. EM61 readings were taken at 0.2 metre intervals along lines spaced 1 metre apart. The EM61 survey lines were generally oriented perpendicular to the building walls, and were laid out using a locally setup grid. The corner points of the grid were later measured using the differential GPS system to reference the grid location.

Upon completion of the field survey the digital survey data from both the EM31 and EM61 systems were transferred to a computer and contoured.

Processing

The EM31 data was combined with the differential GPS data to georeference the EM31 data. Prior to combining the GPS data, it was post-corrected to increase the positional accuracy. The EM31 data was then contoured using the Surfer Surface Mapping System (Golden Software, Inc.), and was imported into AutoCAD for interpretation.

The EM61 data was contoured using Surfer and then imported into AutoCAD for interpretation. The location of the EM61 grid was then oriented using the GPS measured corner locations of the grid.

Results

The EM31 survey results are presented in Figures 2 to 4. Figure 2 presents the EM31 quadrature response and Figure 3 presents the EM31 in-phase response. Interpretation of the data was performed through analysis of the data and comparison of the quadrature and in-phase response. The EM31 interpreted results are presented in Figure 5. With the exception of anomalies that are associated with surface metallic objects, there were four main types of anomalies identified in the EM31 data, which are summarized in Table 1, below.

The EM31 survey results indicate two potential discrete buried metallic anomalies near the northeast corner of the surveyed area, that could potentially be buried USTs.

Table 1: Identified EM31 Anomalies

Type of Anomaly	Interpretation
Linear, strong quadrature and inphase response	Buried pipe with associated metal – either a metallic or reinforced concrete pipe
Linear, strong quadrature and low or no inphase response	Buried pipe with little or no associated metal – concrete pipe
Localized, increased quadrature and no inphase response	Change in soil and/or groundwater composition – possibly due to contaminated soils and/or groundwater
Localized, increased quadrature and inphase response	Buried metallic object

The EM61 survey results are presented on Figures 5 and 6, which presents the EM61 differential response, which is sensitive to the presence of metal within the subsurface. With the exception of surface metal, the EM61 survey does not indicate the presence of any buried USTs in the vicinity of the buildings. The EM61 results indicate a number of buried metallic conduits in the vicinity of the buildings.

Study Limitations

This geophysical survey was carried out with a specific technology for the purpose of identifying anomalies potentially indicative of USTs and buried metallic debris in the upper 2-3 metres of the ground surface. It is not possible to conclude absolutely whether or not other buried objects (e.g. gas, water and electrical utilities) are present beneath the site. If intrusive investigation is required as a result of the data and interpretation presented herein, service clearances should be obtained.

Closure

We trust that this technical memorandum report meets your needs at the present time. If you have any questions or require clarification, please contact the undersigned at your convenience.



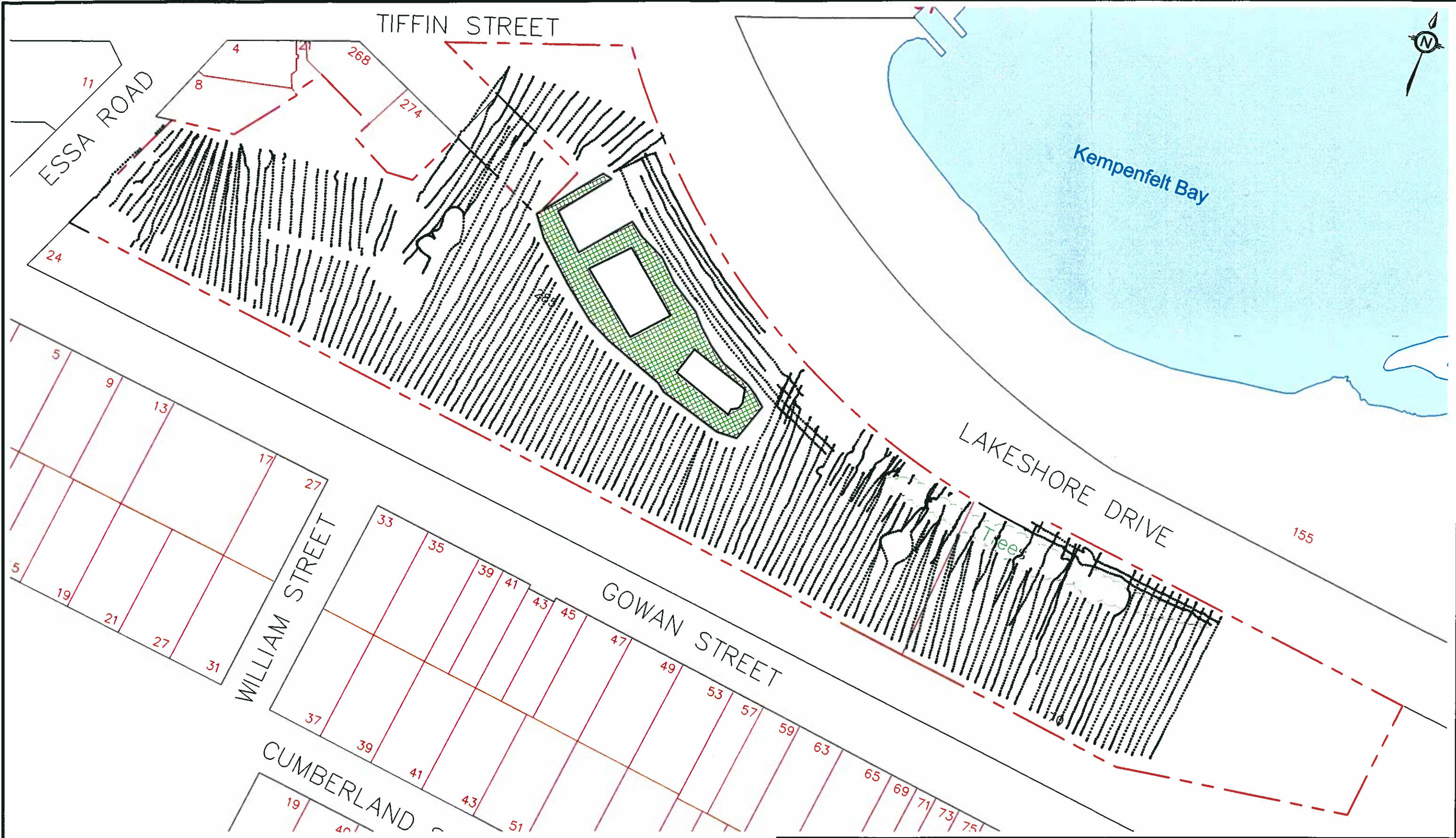
Wayne Mulder, P.Geo
Geophysicist

WEM/CRP/crp



Christopher Phillips, M.Sc., P.Geo
Senior Geophysicist - Associate

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LEGEND

-  EM61 COVERAGE
-  EM31 TRACK LINE

0 5 10 25 50
SCALE 1:1250 metres

NOTES:

Projection UTM NAD 83 Zone 17
911 Address City of Barrie 2007



FILE No. 09-1170-6024 - Figure 1 - Site.dwg

PROJECT No. 09-1170-6024

REV.

SCALE AS SHOWN

DATE 05 JAN 2010

DESIGN

CAD A RAMER

CHECK C PHILLIPS

REVIEW C PHILLIPS

TITLE

GEOPHYSICAL SURVEY LOCATIONS

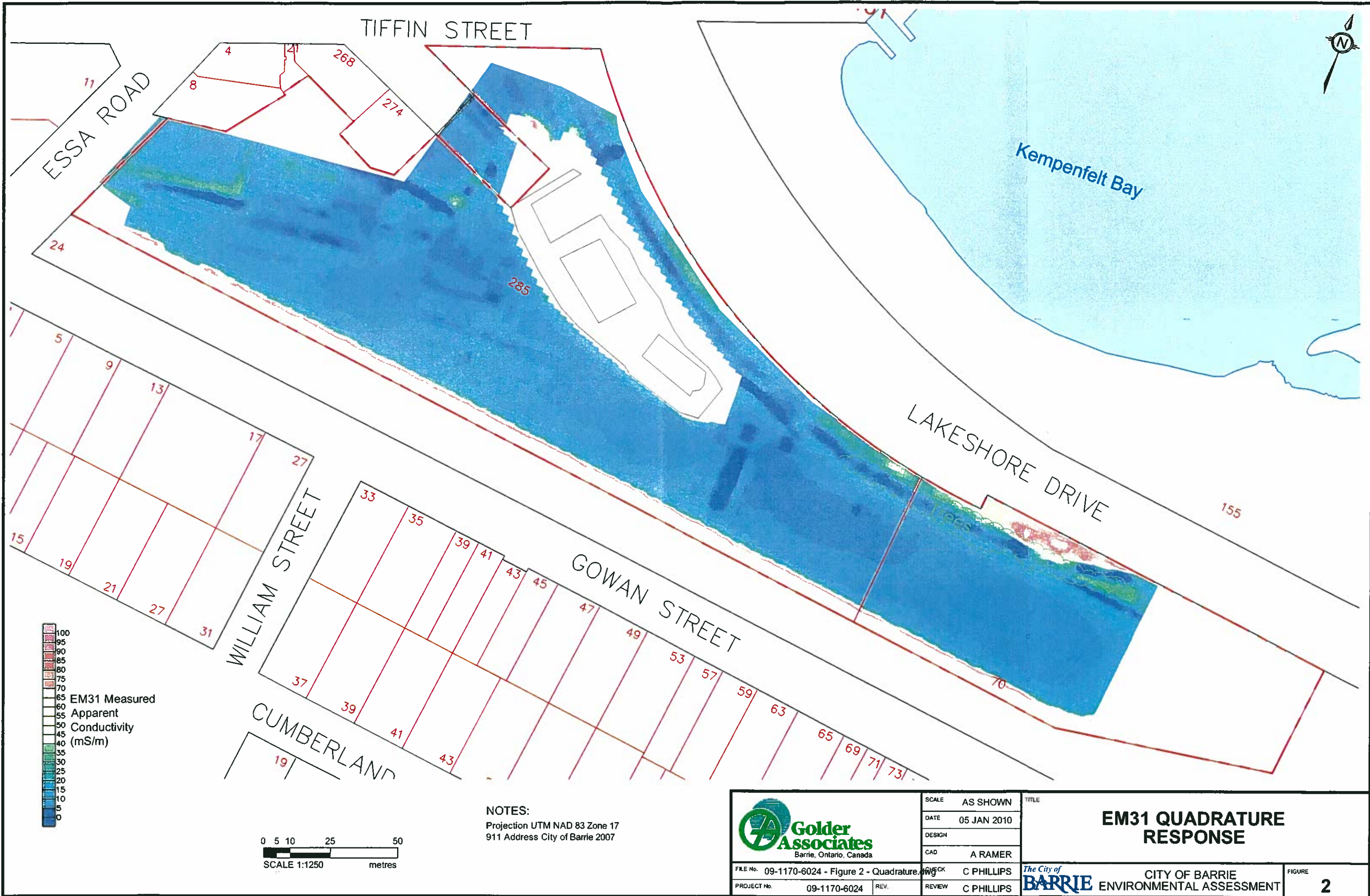
The City of
BARRIE

CITY OF BARRIE
ENVIRONMENTAL ASSESSMENT

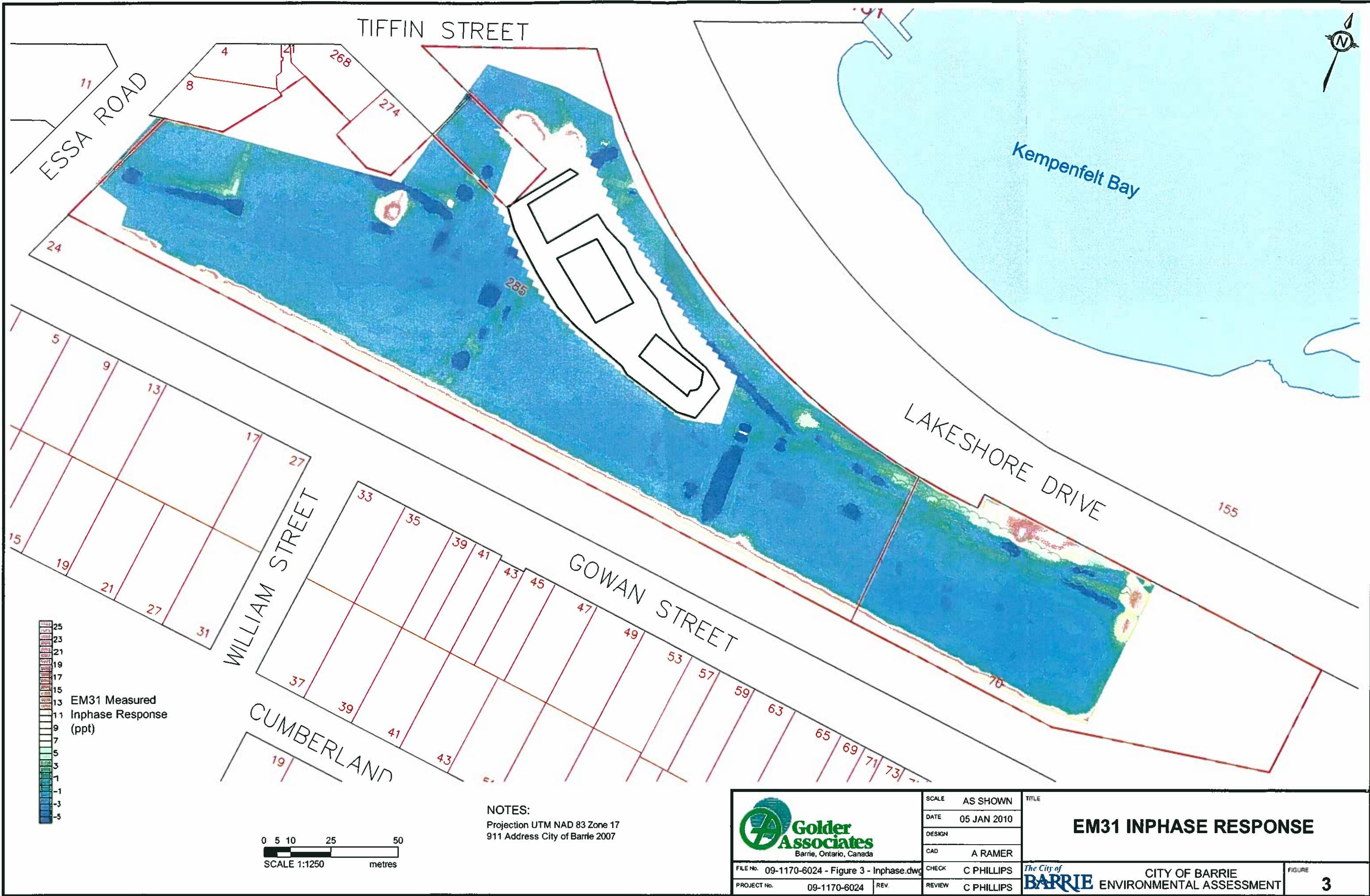
FIGURE

1

PLOT DATE: January 29, 2010
FILENAME: N:\Active\2009\Other offices\09-1170-6024 Allendale EM31 EM61\CAD\09-1170-6024 - Figure 2 - Quadrature.dwg



PLOT DATE: January 29, 2010
FILENAME: N:\Active\2009\Other offices\09-1170-6024 Allendale EM31 EM61\CAD\09-1170-6024 - Figure 3 - Inphase.dwg



NOTES:
Projection UTM NAD 83 Zone 17
911 Address City of Barrie 2007

0 5 10 25 50
SCALE 1:1250 metres

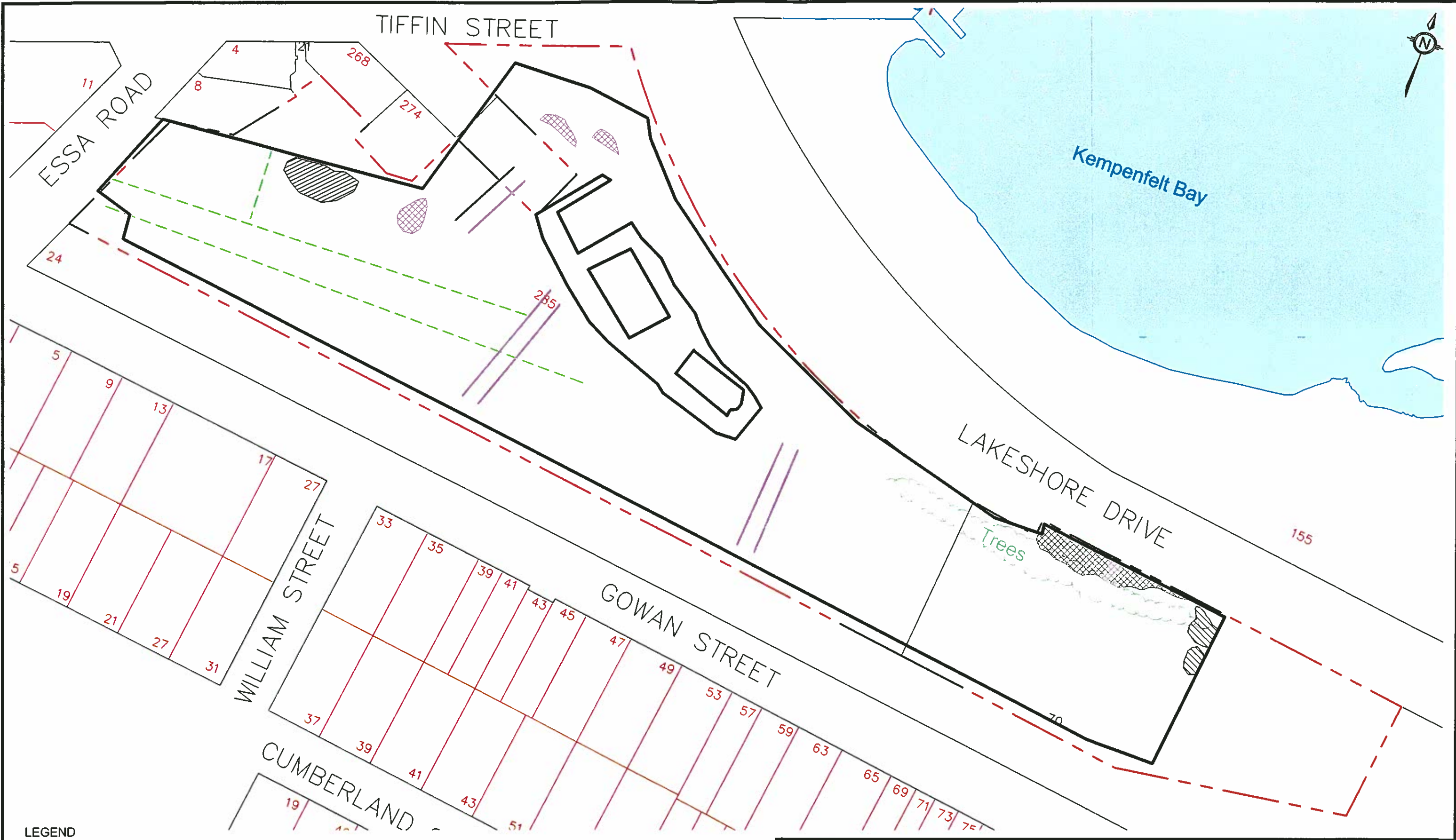


FILE No. 09-1170-6024 - Figure 3 - Inphase.dwg
PROJECT No. 09-1170-6024 REV.

SCALE	AS SHOWN
DATE	05 JAN 2010
DESIGN	
CAD	A RAMER
CHECK	C PHILLIPS
REVIEW	C PHILLIPS

TITLE	
EM31 INPHASE RESPONSE	
The City of BARRIE	CITY OF BARRIE ENVIRONMENTAL ASSESSMENT
FIGURE	3

PLOT DATE: January 29, 2010
FILENAME: N:\Active\2009\Other offices\09-1170-6024 Allendale EM31 EM61\CAD\09-1170-6024 - Figure 4 - EM31 Results.dwg



LEGEND

- Surface metal
- Local change in soil and/or groundwater
- Buried metallic object

- Buried pipe - Metallic
- Buried pipe - Non-metallic
- Site boundary

0 5 10 25 50
SCALE 1:1250 metres

NOTES:

Projection UTM NAD 83 Zone 17
911 Address City of Barrie 2007



FILE No. 09-1170-6024 - Figure 4 - EM31 Results.dwg
PROJECT No. 09-1170-6024

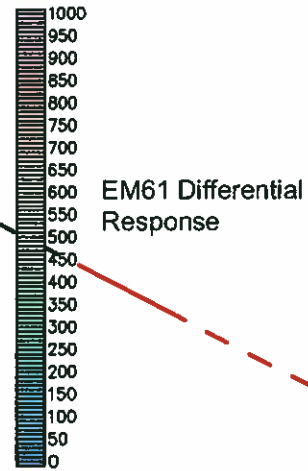
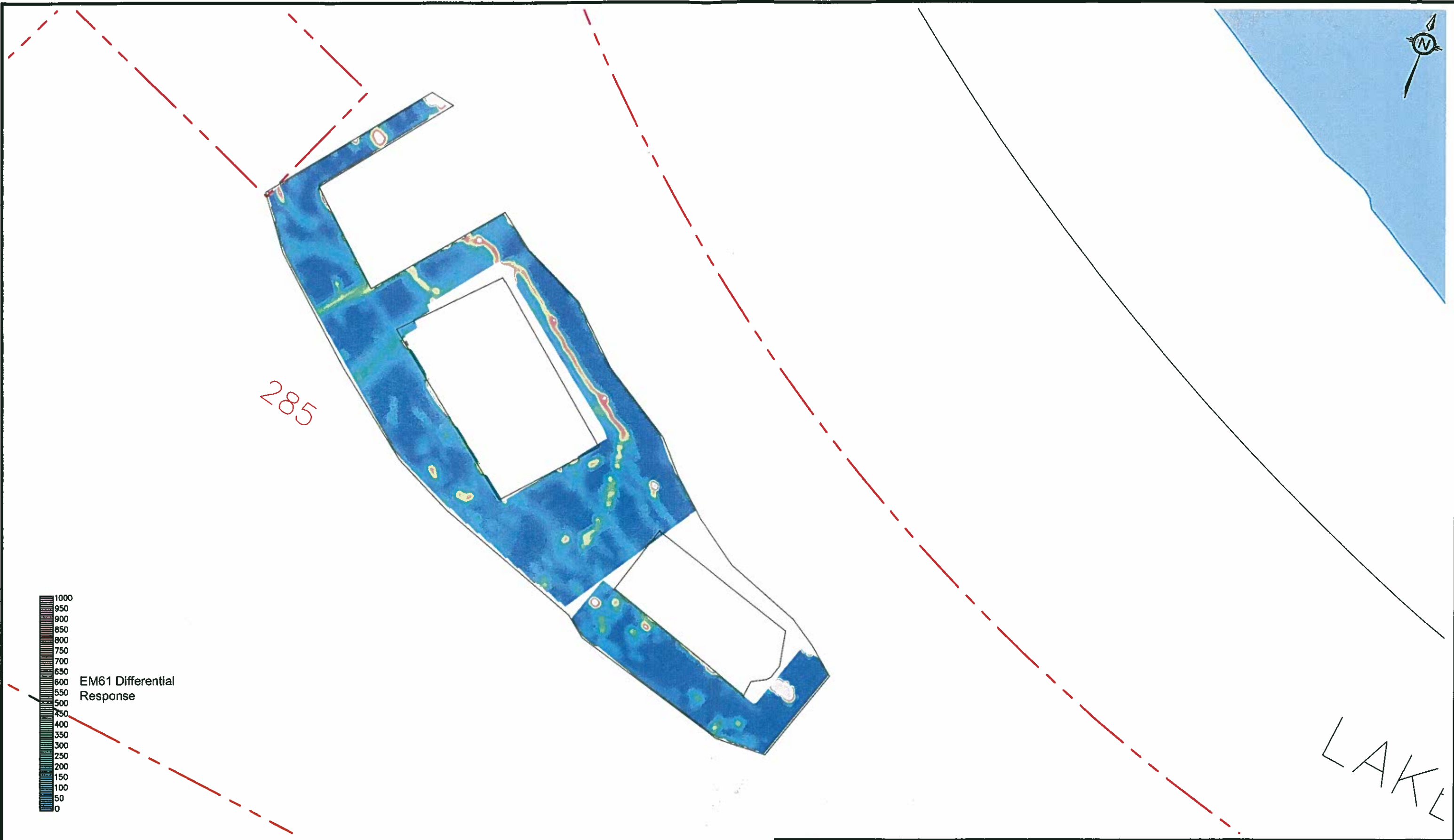
SCALE AS SHOWN
DATE 05 JAN 2010
DESIGN
CAD A RAMER
CHECK C PHILLIPS
REVIEW C PHILLIPS

EM31 INTERPRETED RESULTS

The City of
BARRIE CITY OF BARRIE
ENVIRONMENTAL ASSESSMENT

FIGURE
4

PLOT DATE: January 29, 2010
FILENAME: N:\Active\2009\Other offices\09-1170-6024 Attendole EM31 EM61\CAD\09-1170-6024 - Figure 5 - EM61 Differential.dwg

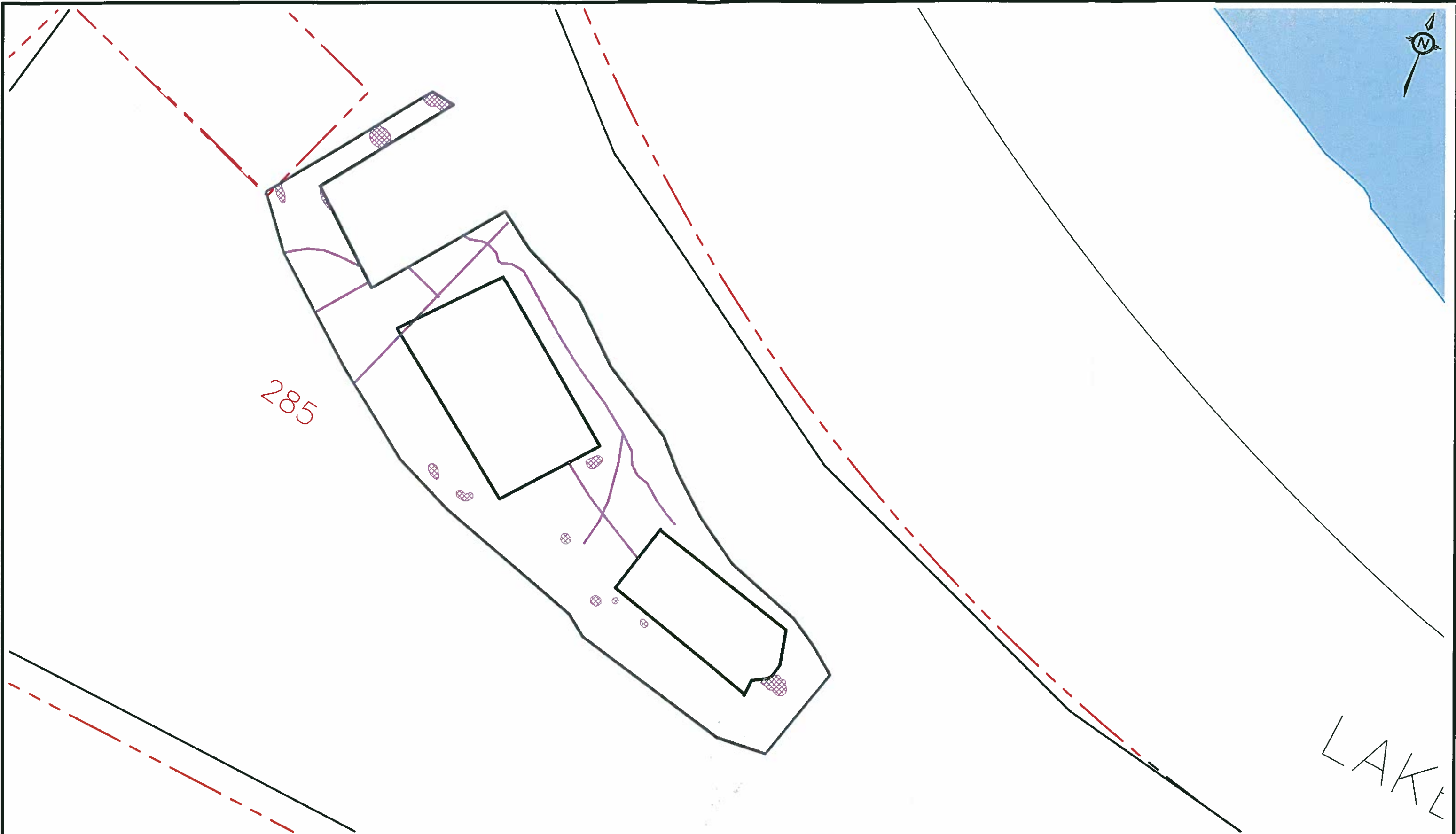


0 5 10 20
SCALE 1:500 metres

NOTES:
Projection UTM NAD 83 Zone 17
911 Address City of Barrie 2007

 Barrie, Ontario, Canada		SCALE	AS SHOWN	EM61 DIFFERENTIAL RESPONSE	
		DATE	05 JAN 2010		
		DESIGN			
		CAD	A RAMER	 CITY OF BARRIE ENVIRONMENTAL ASSESSMENT	
FILE No. 09-1170-6024 - Figure 5 - EM61 Differential.dwg		DESIGNER	C PHILLIPS		
PROJECT No.	09-1170-6024	REV.		REVIEW	C PHILLIPS
				FIGURE	5

PLOT DATE: January 29, 2010
FILENAME: N:\Active\2009\Other offices\09-1170-6024 Allendale EM61 EM61\CAD\09-1170-6024 - Figure 6 - EM61 Results.dwg



LEGEND

-  Surface metal
-  Buried Pipe - Metallic
-  Site boundary

0 5 10 20
SCALE 1:500 metres

NOTES:

Projection UTM NAD 83 Zone 17
911 Address City of Barrie 2007



FILE No. 09-1170-6024 - Figure 6 - EM61 Results.dwg
PROJECT No. 09-1170-6024

SCALE	AS SHOWN
DATE	05 JAN 2010
DESIGN	
CAD	A RAMER
CHECK	C PHILLIPS
REVIEW	C PHILLIPS

TITLE		FIGURE
EM61 INTERPRETED RESULTS		
The City of BARRIE CITY OF BARRIE ENVIRONMENTAL ASSESSMENT		6



APPENDIX B

Record of Test Pit Sheets

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP1 **Test Pit Location:** Northwest portion of Site, near former lawn bowling area
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.30	dark brown, frozen, TOPSOIL				
0.30	0.45	dry to Damp, Black, gravel and sand fill	1	0.40 – 0.55	<25	Metals & Inorganics, PAHs
0.45	3.8	fine SAND, oxidized (approx. 20 cm)	2	0.50 – 0.65	<25	
		transitioning to a	3	1.20 – 1.35	<25	
		light brown, fine SAND, trace silt	4	1.75 – 1.90	<25	
			5	2.25 – 2.40	<25	
			6	2.75 – 2.90	<25	
			7	3.20 – 3.35	<25	
			8	3.80 – 3.95	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Moisture noted at 3.0 m.

Golder Associates
 Prepared:
 Checked:

 SMF
 CLG

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP2 **Test Pit Location:** Northwest corner of the Site
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.32	dark brown, frozen, TOPSOIL				
0.32	0.48	dry to damp, black, gravel and sand fill, some ash, some charcoal, some brownish red brick	1	0.40 – 0.55	<25	Metals & Inorganics, PAHs, BTEX, PHC F1-F4
0.45	3.5	fine SAND, oxidized	2	0.75 – 0.90	<25	
		transitioning to a	3	1.25 – 1.40	<25	
		light brown, fine SAND, trace silt	4	1.75 – 1.90	<25	
			5	2.25 – 2.40	<25	
			6	2.85 – 3.00	<25	
			7	3.20 – 3.35	<25	VOCs, PHC F1-F4
			8	3.50 – 3.65	<25	

Notes:

1. ppm = parts per million by volume.
2. Moisture noted at 2.0 m, seepage at 3.5 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP3 **Test Pit Location:** Southwest corner of Site, near
CN rail and south of former lawn
bowling area
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.5	brown to black, gravel and sand fill, some wood, some rounded cobble, insulation	1	0.50 – 0.65	<25	Metals & Inorganics, PAHs
			2	1.00 – 1.15	<25	
0.5	2.75	fine SAND, oxidized	3	1.50 – 1.65	<25	VOCs, PHC F1-F4
		transitioning to a	4	2.00 – 2.15	<25	
		light brown, fine SAND, trace silt	5	2.75 – 2.90	<25	

Notes:

1. ppm = parts per million by volume.
2. Seepage at 2.5 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP4 **Test Pit Location:** Southern fenceline, south of office building
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.9	black, gravel and sand fill, trace cobble, some rubber	1	0.50 – 0.65	<25	
0.9	1.3	fine SAND, oxidized	2	1.10 – 1.25	<25	Metals & Inorganics, PAHs
1.3	3.5	light brown, fine SAND, trace silt with black bedding	3	1.50 – 1.65	<25	
			4	2.00 - 2.15	<25	
			5	2.50 – 2.65	<25	
			6	3.00 – 3.15	<25	
			7	3.30 – 3.45	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Seepage at 3.0 m.
3. Field replicate collected at TP4-1.1 (labelled DUP1).

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP5 **Test Pit Location:** South property line, south of concrete pad
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	1.3	black, gravel and sand fill, trace cobble, some reddish brown brick	1	0.50 – 0.65	<25	Metals & Inorganics, PAHs
			2	1.00 – 1.15	<25	
1.3	4.2	light brown, fine SAND, trace silt with black bedding, some oxidation	3	1.50 – 1.65	<25	VOCs, PHC F1-F4
			4	2.00 – 2.15	<25	
			5	2.50 – 2.65	<25	
			6	3.00 – 3.15	<25	
			7	3.50 – 3.65	<25	
			8	4.00 – 4.15	<25	
			9	4.20 – 4.35	<25	

Notes:

1. ppm = parts per million by volume.
2. Moisture at 3.5 m, seepage at 3.0 m.

Golder Associates

Prepared:
Checked:SME
CLG

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP6 **Test Pit Location:** 15 m west of former restaurant/
freight storage building
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	1.2	black, gravel and sand fill, some reddish brown brick, some metal, some PVC	1	0.60 – 0.75	<25	Metals & Inorganics, PAHs, BTEX, PHC F1-F4
1.2	4.0	light brown, fine SAND, trace silt, with black bedding, some oxidation	2	1.25 – 1.40	<25	
			3	1.50 – 1.65	<25	
			4	2.00 – 2.15	<25	
			5	2.60 – 2.75	<25	
			6	3.10 – 3.25	<25	
			7	3.80 – 3.95	<25	VOCs, PHC F1-F4
			8	4.00 – 4.15	<25	

Notes:

1. ppm = parts per million by volume.
2. Moisture at 3.5 m, seepage at 4.0 m.
3. Non-active wire uncovered at 0.6 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP7 **Test Pit Location:** 25 m southwest of office building
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.4	frozen, light brown SAND				
0.4	3.5	light brown, fine SAND, trace silt, with black bedding, some oxidation	1	0.50 – 0.65	<25	
			2	1.00 – 1.15	<25	Metals & Inorganics, PAHs
			3	1.50 – 1.65	<25	
			4	2.00 – 2.15	<25	
			5	3.00 – 3.15	<25	
			6	3.50 – 3.65	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Moisture at 3.5 m, Seepage at 4.0 m.
3. Hit non-active clay pipe at 0.6 m.
4. Unearthed buried 2" PVC monitoring well. Decommissioned on 8-Jan-2010 by Canadian Soil Drilling.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP8 **Test Pit Location:** Southern fenceline in the vicinity
of the storm sewer lateral through
the Site
Date: 4-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.9	black, sand and gravel fill	1	0.10 – 0.25	<25	Metals & Inorganics, PAHs
0.4	3.5	disturbed, brown to greyish brown, fine SAND, trace silt	2	0.50 – 0.65	<25	
			3	1.00 – 1.15	<25	
			4	1.50 – 1.65	<25	
			5	2.00 – 2.15	<25	
			6	2.50 – 2.65	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Test Pit Dry. Completed at the depth of the buried utility.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP9 **Test Pit Location:** East of former lawn bowling facility, south of temporary storage bin
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.95	fine sand fill, oxidized	1	0.25 – 0.40	<25	Metals & Inorganics, PAHs
			2	0.50 – 0.65	<25	
0.95	4.0	light brown, fine SAND, trace silt with black bedding	3	1.00 – 1.15	<25	
			4	1.50 – 1.65	<25	
			5	2.00 – 2.15	<25	
			6	3.00 – 3.15	<25	
			7	4.00 – 4.15	<25	
						VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Moisture at 3.5 m, Seepage at 4.0 m
3. Scrap Metal stored on ground beside Test Pit

RECORD OF TEST PIT

Job Number:	09-1170-6024	Project Location:	Allandale Station, Barrie ON
Test Pit Number:	TP10	Test Pit Location:	East of former passenger station, south of berm running along the northern property boundary
Date:	5-Jan-2010	Logged by:	S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.45	frozen, black, sand and gravel fill, some roots				
0.45	2.30	orangish brown, fine sand and rounded gravel fill	1	0.50 – 0.65	<25	
			2	1.00 – 1.15	<25	Metals & Inorganics, PAHs
			3	1.50 – 1.65	<25	
			4	2.00 – 2.15	<25	
2.30	2.40	dark brown, TOPSOIL, some roots				
2.40	3.80	light brown transitioning to a greyish brown fine SAND, trace silt, oxidized	5	2.50 – 2.65	<25	
			6	3.00 – 3.15	<25	VOCs, PHC F1-F4
			7	3.80 – 3.95	<25	

Notes:

1. ppm = parts per million by volume.
2. Seepage at 3.8 m.
3. Metal and wire found in black fill.

Golder Associates

Prepared:
Checked:

SMF
CLC

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP11 **Test Pit Location:** East-central portion of the Site
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.1	frozen, black, sand and gravel fill	1	0.1	<25	
0.1	3.40	light brown, fine SAND, with black bedding, some oxidation	2	0.5	<25	Metals & Inorganics, PAHs
			3	1.0	<25	
			4	1.5	<25	
			5	2.0	<25	
			6	3.0	<25	
			7	3.4	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Wet at 3.2 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP12 **Test Pit Location:** Northern fenceline, East Side of Property
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.1	dark brown, sandy TOPSOIL, some roots	1	0.1	<25	
0.1	1.9	light brown, fine sand and gravel fill, large asphalt pieces, some metal	2	0.75	<25	
1.9	2.75	brown, fine SAND with black bedding, some roots	3	1.75	<25	
			4	2.0	<25	
			5	2.75	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Wet at 2.75 m.
3. Large Pieces of Asphalt Pieces found buried in area.
4. 30" diameter concrete pipe found at 1.75 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP13 **Test Pit Location:** Northeast corner of the Site
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.6	black, sand and gravel fill	1	0.25 – 0.40	<25	Metals & Inorganics, PAHs
			2	0.50 – 0.65	<25	
0.6	1.9	light brown, fine sand and gravel fill, some oxidation between 0.6 m and 0.8 m	3	1.00 – 1.15	<25	
			4	1.50 – 1.65	<25	
1.9	3.9	brown, fine SAND with black bedding, oxidized transitioning to a greyish brown, fine SAND	5	2.00 – 2.15	<25	
			6	3.00 – 3.15	<25	
			7	3.80 – 3.95	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Wet at 3.8 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP14 **Test Pit Location:** Southeast corner of the Site
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.8	black, sand and gravel fill	1	0.50 – 0.65	<25	Metals & Inorganics, PAHs
0.8	1.6	fine SAND, oxidized	2	1.00 – 1.15	<25	
			3	1.50 – 1.65	<25	VOCs, PHC F1-F4
1.6	3.2	light brown, fine SAND with black bedding, some oxidation	4	2.00 – 2.15	<25	
			5	2.50 – 2.65	<25	
			6	3.20 – 3.35	<25	

Notes:

1. ppm = parts per million by volume.
2. Wet at 2.6 m.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP15 **Test Pit Location:** South fenceline, east side of the Site
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.6	black, sand and gravel fill	1	0.50 – 0.65	<25	
0.6	0.7	fine gravel fill (pea stone)				
0.7	3.4	fine SAND, oxidized	2	0.75 – 0.90	<25	Metals & Inorganics, PAHs
		transitioning to a	3	1.00 – 1.15	<25	
		light brown, fine SAND with black bedding, some oxidation	4	1.50 – 1.65	<25	
			5	2.00 – 2.15	<25	
			6	3.00 – 3.15	<25	
			7	3.40 – 3.55	<25	

Notes:

1. ppm = parts per million by volume.
2. Wet at 3.2 m.
3. Field replicate collected at TP15-0.75 (labelled DUP3).

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP16 **Test Pit Location:** 10 m east of TP10 within berm
running along the north side of
the Site
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	2.0	black, sand and gravel fill, transitioning to a light brown sand and gravel fill	1	0.50 – 0.65	<25	
			2	1.00 – 1.15	<25	Metals & Inorganics, PAHs
			3	1.50 – 1.65	<25	Metals & Inorganics, PAHs, VOCs, PHC F1-F4
			4	2.00 – 2.15	<25	

Notes:

1. ppm = parts per million by volume.
2. Test Pit Dry.
3. Found buried 2" metal pipe running east- west within berm.
4. Ballast, metal, wire, coal, and a rail tie in test pit.

RECORD OF TEST PIT

Job Number: 09-1170-6024 **Project Location:** Allandale Station, Barrie ON
Test Pit Number: TP17 **Test Pit Location:** North of station buildings
Date: 5-Jan-2010 **Logged by:** S. M. Flaherty

Depth (m)		Soil Description	Sample No.	Sample Depth (m)	Gastechtor Reading (ppm)	Requested Analysis
From	To					
0.0	0.75	black to dark brown, sand and gravel fill, transitioning to a light brown sand and gravel fill	1	0.5	<25	
0.75	1.80	fine SAND, oxidized	2	0.75	<25	Metals & Inorganics, PAHs
1.80	4.0	light brown, fine SAND with black bedding, some oxidation	3	1.0	<25	
			4	1.5	<25	
			5	2.0	<25	
			6	3.0	<25	
			7	4.0	<25	VOCs, PHC F1-F4

Notes:

1. ppm = parts per million by volume.
2. Wet at 4.0 m.
3. Field replicate collected at TP17-4.0 (labelled DUP2).



APPENDIX C

Record of Borehole Log Sheets

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

II PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 300 mm (12 in.).

Dynamic Penetration Resistance; N_d :

The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure

PM: Sampler advanced by manual pressure

WH: Sampler advanced by static weight of hammer

WR: Sampler advanced by weight of sampler and rod

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60° conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

III SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	c_u, s_u kPa	psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	over 200	over 4,000

IV. SOIL TESTS

w	water content
w _p	plastic limit
w _l	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test ¹
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement ¹
D _R	relative density (specific gravity, G _s)
DS	direct shear test
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO ₄	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane test (LV-laboratory vane test)
γ	unit weight

Note:

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. General		(a) Index Properties (continued)	
π	3.1416	w	water content
$\ln x$	natural logarithm of x	w_L	liquid limit
$\log_{10}$	x or $\log x$, logarithm of x to base 10	w_p	plastic limit
g	acceleration due to gravity	I_p	plasticity index = $(w_L - w_p)$
t	time	w_s	shrinkage limit
F	factor of safety	I_L	liquidity index = $(w - w_p)/I_p$
V	volume	I_C	consistency index = $(w_L - w)/I_p$
W	weight	e_{max}	void ratio in loosest state
II. STRESS AND STRAIN		e_{min}	void ratio in densest state
γ	shear strain	I_D	density index = $(e_{max} - e)/(e_{max} - e_{min})$ (formerly relative density)
Δ	change in, e.g. in stress: $\Delta \sigma$	(b) Hydraulic Properties	
ϵ	linear strain	h	hydraulic head or potential
ϵ_v	volumetric strain	q	rate of flow
η	coefficient of viscosity	v	velocity of flow
ν	Poisson's ratio	i	hydraulic gradient
σ	total stress	k	hydraulic conductivity (coefficient of permeability)
σ'	effective stress ($\sigma' = \sigma - u$)	j	seepage force per unit volume
σ'_{vo}	initial effective overburden stress	(c) Consolidation (one-dimensional)	
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)	C_c	compression index (normally consolidated range)
σ_{oct}	mean stress or octahedral stress = $(\sigma_1 + \sigma_2 + \sigma_3)/3$	C_r	recompression index (over-consolidated range)
τ	shear stress	C_s	swelling index
u	porewater pressure	C_a	coefficient of secondary consolidation
E	modulus of deformation	m_v	coefficient of volume change
G	shear modulus of deformation	c_v	coefficient of consolidation
K	bulk modulus of compressibility	T_v	time factor (vertical direction)
III. SOIL PROPERTIES		U	degree of consolidation
(a) Index Properties		σ'_p	pre-consolidation pressure
$\rho(\gamma)$	bulk density (bulk unit weight*)	OCR	over-consolidation ratio = σ'_p/σ'_{vo}
$\rho_d(\gamma_d)$	dry density (dry unit weight)	(d) Shear Strength	
$\rho_w(\gamma_w)$	density (unit weight) of water	τ_p, τ_r	peak and residual shear strength
$\rho_s(\gamma_s)$	density (unit weight) of solid particles	ϕ'	effective angle of internal friction
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)	δ	angle of interface friction
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s/\rho_w$) (formerly G_s)	μ	coefficient of friction = $\tan \delta$
e	void ratio	c'	effective cohesion
n	porosity	c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
S	degree of saturation	p	mean total stress $(\sigma_1 + \sigma_3)/2$
* Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density $\times$ acceleration due to gravity)		p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
		q	$(\sigma_1 + \sigma_3)/2$ or $(\sigma'_1 + \sigma'_3)/2$
		q_u	compressive strength $(\sigma_1 + \sigma_3)$
		S_i	sensitivity

- Notes: 1 $\tau = c' + \sigma' \tan \phi'$
2 Shear strength = (Compressive strength)/2

PROJECT: 08-1182-0085

RECORD OF BOREHOLE: BH1

SHEET 1 OF 1

LOCATION: N 4914241.1 ; E 604570.2

BORING DATE: 7-Jan-2010

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS (PPM) ⊕ ND = Not Detected 100 200 300 400				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected				NOTE:		
								20	40		60			80
0	Truck Mounted CME 55 200 mm OD Hollow Stem Auger	GROUND SURFACE		224.09							MP Elevation (masl)	224.949		
		Loose, black to brown, fine sand, some gravel, trace silt (FILL)		0.00	1	DO	50	ND				Concrete with steel protective casing		
1					2	DO	8	ND				Bentonite Seal		
					3	DO	1	ND						
2					4	DO	8			Yes				
3			Compact, light brown, fine SAND, trace silt, black cross-bedding, oxidation staining	220.74	5	DO	15	ND						
				3.35			6	DO	13		Yes			
4					7	DO	12	ND						
5			218.76											
			5.33											
6		End of Borehole												
7														
8														
9														
10														

DEPTH SCALE

1 : 50

**Golder
Associates**

LOGGED: SMF

CHECKED: CLS

BAR ENV SIMPLE 0911706024-ENV.GPJ GAL-CANADA.GDT 15-4-10 SMF

PROJECT: 08-1182-0085

RECORD OF BOREHOLE: BH2

SHEET 1 OF 1

LOCATION: N 4914206.8 ;E 604748.3

BORING DATE: 7-Jan-2010

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS (PPM) ⊕ ND = Not Detected 100 200 300 400				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected					NOTE:	
0	Truck Mounted CME 55 200 mm OD Hollow Stem Auger	GROUND SURFACE		224.30 0.00								MP Elevation (msl)	225.146	
		Compact, black to dark brown, fine sand, some gravel, trace silt, oxidation staining (FILL)		1	DO	50	ND						Concrete with steel protective casing	
1				2	DO	14				Yes		Bentonite Seal		
2				3	DO	15	ND							
					4	DO	4	ND						
3				5	DO	17	ND							
		Compact, light brown, fine SAND, black cross-bedding, oxidation staining, silt lense at 4.5 m		221.87 2.43										
					4	DO	4	ND						
					5	DO	17	ND						
4					6	DO	20				Yes			
				219.43 4.87										
5		End of Borehole												
6														
7														
8														
9														
10														

15-Jan-2010
(3.35 mbgs)
220.95

51 mm PVC
Screen
#2 Silica Sand

Caved Material

Concrete with steel protective casing

Bentonite Seal

222.48

225.146

219.43

▽
15-Jan-2010
(3.35 mbgs)
220.95

51 mm PVC
Screen
#2 Silica Sand

Caved Material

DEPTH SCALE

1:50



LOGGED: SMF

CHECKED: CLG

BAR ENV SIMPLE 0911706024-ENV.GPJ GAL-CANADA.GDT 15-4-10 SMF

PROJECT: 08-1182-0085

RECORD OF BOREHOLE: BH3

SHEET 1 OF 1

LOCATION: N 4914232.0 ;E 604649.6

BORING DATE: 7-Jan-2010

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS (PPM) ⊕ ND = Not Detected 100 200 300 400				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected				NOTE:		
								20	40	60				80
0	Truck Mounted CME 55 200 mm Hollow Stem Auger	GROUND SURFACE		223.73								MP Elevation (masl)	224.662	
		Compact, black to dark brown, fine sand, some gravel, trace silt, oxidation staining (FILL)		0.00	1	DO	50	ND					Concrete with steel protective casing	
1														Bentonite Seal
				2	DO	10	ND							
2			3	DO	6	ND								
			Very loose, light brown, fine SAND, trace silt, black cross-bedding, oxidation staining		221.30									
				2.43	4	DO	4				Yes			
3												15-Jan-2010 (3.12 mbgs) 220.61	51 mm PVC Screen #2 Silica Sand	
					5	DO	2	ND						
4					6	DO	1				Yes			
													Caved Material	
5		End of Borehole		218.86										
				4.87										
6														
7														
8														
9														
10														

▽
15-Jan-2010
(3.12 mbgs)
220.61

51 mm PVC
Screen
#2 Silica Sand

Caved Material

BAR ENV SIMPLE 0911706024-ENV.GPJ GAL-CANADA.GDT 15-4-10 SMF

DEPTH SCALE

1 : 50



LOGGED: SMF

CHECKED: [Signature]

PROJECT: 08-1182-0085

RECORD OF BOREHOLE: BH4

SHEET 1 OF 1

LOCATION: N 4914250.2 ;E 604390.7

BORING DATE: 8-Jan-2010

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS (PPM) ⊕ ND = Not Detected 100 200 300 400				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected				NOTE:		
								20	40		60			80
0	Truck Mounted CME 55 200 mm Hollow Stem Auger	GROUND SURFACE		225.18							MP Elevation (mast)	226.055		
		Frozen, black to dark brown, fine sand, some gravel (FILL)		0.00	1	DO	50	ND				Concrete with steel protective casing		
1		Loose, orangey brown transitioning to a light brown, fine SAND, trace silt, black cross-bedding, oxidation staining		224.58								Bentonite Seal		
				0.60	2	DO	7	ND						
2					3	DO	8	ND						
3					4	DO	7			Yes				
4					5	DO	8	ND						
				6	DO	7			Yes					
5		End of Borehole		220.31										
				4.87										
6														
7														
8														
9														
10														

▽
15-Jan-2010
(3.33 mbgs)
221.85

51 mm PVC
Screen
#2 Silica Sand

Caved Material

DEPTH SCALE

1 : 50



LOGGED: SME

CHECKED: QLG

BAR ENV SIMPLE 0911706024-ENV/GPJ GAL-CANADA.GDT 15-4-10 SMF

PROJECT: 08-1182-0085

RECORD OF BOREHOLE: BH5

SHEET 1 OF 1

LOCATION: N 4914317.6 ; E 604505.5

BORING DATE: 8-Jan-2010

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] @				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] @				NOTE:		
								ND = Not Detected						
								HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected						
							100	200	300	400				
							20	40	60	80				
0	Truck Mounted CME 55 200 mm Hollow Stem Auger	GROUND SURFACE		223.45								MP Elevation (masl)	224.452	
		Loose, black to dark brown, fine sand, some gravel (FILL)		0.00	1	DO	ND						Concrete with steel protective casing	
1					2	DO	6	ND					Bentonite Seal	
2		Loose, light brown, fine SAND, trace to some silt, black cross-bedding		221.63	3	DO	6							
				1.82	4	DO	5	ND						
3					5	DO	4							
4					6	DO	6	ND						
5				7	DO	7	ND							
		End of Borehole		218.27										
				5.18										
6														
7														
8														
9														
10														

BAR ENV SIMPLE 0911706024-ENV.GPJ GAL-CANADA.GDT 15-4-10 SMF

DEPTH SCALE

1 : 50



LOGGED: SMF

CHECKED: GUS

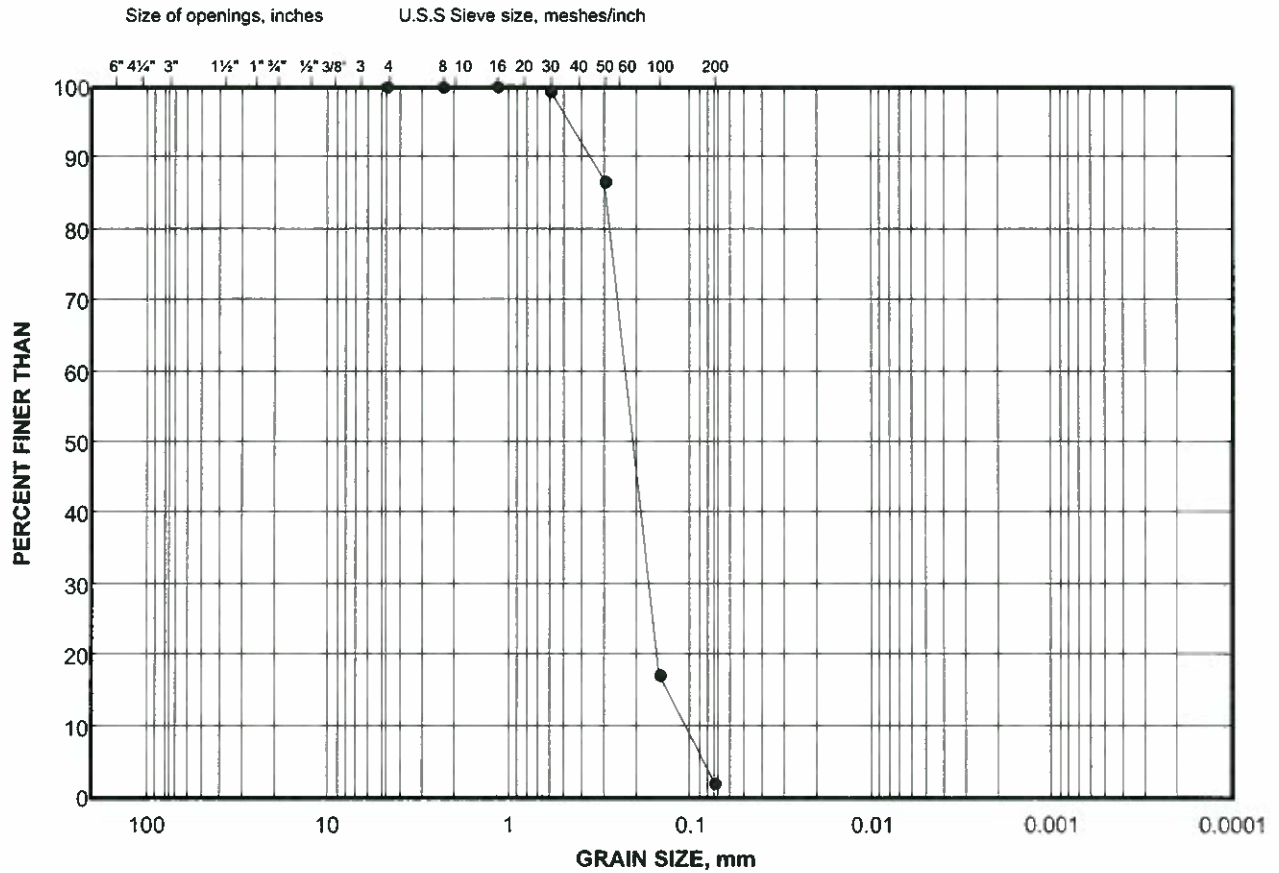


APPENDIX D

Results of Grain Size Analysis

GRAIN SIZE DISTRIBUTION SAND

FIGURE D-1





APPENDIX E

Laboratory Certificates of Analysis - Soil



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 Metals & Inorganics in Soil											
DATE SAMPLED: Jan 04, 2010	DATE RECEIVED: Jan 06, 2010	DATE REPORTED: Jan 15, 2010	SAMPLE TYPE: Soil								
Parameter	Unit	G/S	RDL	TP1-0.40 1628785	TP2-0.40 1628795	TP3-0.5 1628805	TP4-1.1 1628815	DUP1 1628820	TP5-0.5 1628830	TP6-0.6 1628840	TP7-1.0 1628850
Antimony	µg/g	40	1.6	<1.6	5.5	<1.6	<1.6	<1.6	2.9	<1.6	<1.6
Arsenic	µg/g	18	0.6	10.7	14.4	<0.6	<0.6	<0.6	5.4	2.6	<0.6
Barium	µg/g	670	0.3	108	73.2	22.9	11.9	12.3	563	58.0	5.8
Beryllium	µg/g	8.0	0.4	0.5	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Boron (Hot Water Extractable)	µg/g	2	0.10	0.30	0.27	0.27	0.27	0.26	0.19	0.24	<0.10
Cadmium	µg/g	1.9	0.4	<0.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	µg/g	160	0.6	11.8	8.8	5.7	6.7	6.9	8.3	6.7	3.2
Cobalt	µg/g	80	0.3	5.4	6.1	1.5	1.4	1.6	5.9	2.2	1.0
Copper	µg/g	230	0.3	33.0	111	5.3	2.2	2.2	72.9	33.0	2.3
Lead	µg/g	120	0.5	34.6	212	6.5	1.5	1.5	65.8	101	1.0
Molybdenum	µg/g	40	0.5	2.0	1.6	<0.5	<0.5	<0.5	0.7	<0.5	<0.5
Nickel	µg/g	270	0.6	12.4	10.8	2.6	2.9	3.1	31.6	5.0	2.0
Selenium	µg/g	5.5	0.8	1.8	1.3	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g	40	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Thallium	µg/g	3.3	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vanadium	µg/g	86	0.4	19.3	20.3	9.6	14.5	14.9	11.7	9.5	5.9
Zinc	µg/g	340	0.4	19.2	129	25.4	9.5	9.6	105	73.7	5.5
Chromium, Hexavalent	µg/g	8	0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Cyanide, Free*	µg/g	0.051	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Mercury	µg/g	3.9	0.011	0.075	0.485	0.021	<0.011	<0.011	0.076	0.390	<0.011
Electrical Conductivity (2:1)	mS/cm	1.4	0.002	0.874	0.202	0.144	0.081	0.073	0.158	0.146	0.067
Sodium Adsorption Ratio (2:1)	N/A	12	N/A	0.088	0.311	0.093	0.109	0.109	0.072	0.081	0.704
pH, 2:1 CaCl2 Extraction				6.76	7.17	7.17	7.24	7.19	7.39	7.52	7.85

Certified By:

Elizabeth Polakowska



AGAT

Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 Metals & Inorganics in Soil

O. Reg. 153 Metals & Inorganics in Soil											
DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010			SAMPLE TYPE: Soil		
Parameter	Unit	G / S	RDL	TP8-0.10 1628860	TP9-0.25 1628870	TP10-1.0 1628880	TP11-0.5 1628890	TP13-0.25 1628905	TP14-0.5 1628910	TP15-0.75 1628920	DUP3 1628924
Antimony	µg/g	40	1.6	5.8	<1.6	<1.6	<1.6	5.5	3.8	3.0	2.8
Arsenic	µg/g	18	0.6	10.0	<0.6	<0.6	<0.6	7.8	3.9	2.7	2.5
Barium	µg/g	670	0.3	45.6	10.6	16.2	9.0	40.6	33.4	24.3	23.6
Beryllium	µg/g	8.0	0.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Boron (Hot Water Extractable)	µg/g	2	0.10	0.43	0.42	<0.10	<0.10	0.29	0.23	0.25	0.27
Cadmium	µg/g	1.9	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	µg/g	160	0.6	11.3	5.1	4.1	3.5	10.4	7.9	7.5	6.6
Cobalt	µg/g	80	0.3	5.9	2.2	1.6	1.3	12.5	6.4	2.9	2.8
Copper	µg/g	230	0.3	111	2.2	3.5	4.1	117	83.1	87.2	86.4
Lead	µg/g	120	0.5	215	2.0	1.9	2.2	135	108	73.7	77.8
Molybdenum	µg/g	40	0.5	1.3	<0.5	<0.5	<0.5	0.9	0.6	<0.5	<0.5
Nickel	µg/g	270	0.6	21.2	4.0	2.7	2.3	85.0	24.9	7.6	8.1
Selenium	µg/g	5.5	0.8	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Silver	µg/g	40	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Thallium	µg/g	3.3	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Vanadium	µg/g	86	0.4	13.1	9.2	8.2	7.2	11.4	9.9	13.0	11.6
Zinc	µg/g	340	0.4	171	9.0	12.0	7.1	103	73.6	51.7	63.8
Chromium, Hexavalent	µg/g	8	0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Cyanide, Free*	µg/g	0.051	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Mercury	µg/g	3.9	0.011	0.207	<0.011	<0.011	<0.011	0.168	0.157	0.063	0.048
Electrical Conductivity (2:1)	mS/cm	1.4	0.002	0.202	0.096	0.109	0.086	0.206	0.156	0.110	0.110
Sodium Adsorption Ratio (2:1)	N/A	12	N/A	0.082	0.633	0.083	0.549	0.191	0.152	0.075	0.079
pH, 2:1 CaCl2 Extraction				7.27	7.09	7.58	7.84	7.40	7.47	7.38	7.36

Certified By:

Elizabeth Polakowska



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 Metals & Inorganics in Soil						
DATE SAMPLED: Jan 04, 2010	DATE RECEIVED: Jan 06, 2010	DATE REPORTED: Jan 15, 2010	SAMPLE TYPE: Soil			
Parameter	Unit	G / S	RDL	TP16-1.0 1628930	TP16-1.5 1628940	TP17-0.75 1628944
Antimony	µg/g	40	1.6	<1.6	8.2	<1.6
Arsenic	µg/g	18	0.6	1.5	11.6	<0.6
Barium	µg/g	670	0.3	47.0	347	16.6
Beryllium	µg/g	8.0	0.4	<0.4	0.7	<0.4
Boron (Hot Water Extractable)	µg/g	2	0.10	0.12	0.76	0.14
Cadmium	µg/g	1.9	0.4	<0.4	1.6	<0.4
Chromium	µg/g	160	0.6	8.7	20.0	6.0
Cobalt	µg/g	80	0.3	4.3	6.1	1.5
Copper	µg/g	230	0.3	22.3	168	5.8
Lead	µg/g	120	0.5	14.6	328	2.6
Molybdenum	µg/g	40	0.5	<0.5	3.8	<0.5
Nickel	µg/g	270	0.6	10.9	24.9	2.2
Selenium	µg/g	5.5	0.8	<0.8	<0.8	<0.8
Silver	µg/g	40	0.4	<0.4	<0.4	<0.4
Thallium	µg/g	3.3	0.4	<0.4	0.4	<0.4
Vanadium	µg/g	86	0.4	16.3	16.7	15.8
Zinc	µg/g	340	0.4	38.3	259	19.9
Chromium, Hexavalent	µg/g	8	0.40	<0.40	<0.40	<0.40
Cyanide, Free*	µg/g	0.051	0.05	<0.05	<0.05	<0.05
Mercury	µg/g	3.9	0.011	0.031	11.5	0.041
Electrical Conductivity (2:1)	mS/cm	1.4	0.002	0.145	0.468	0.079
Sodium Adsorption Ratio (2:1)	N/A	12	N/A	0.136	0.082	0.091
pH, 2:1 CaCl2 Extraction				7.78	7.46	7.26

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New

1628785-1628944 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

*Reporting limit for Free Cyanide was revised on Jan 22,2010 to meet a new Reg. 153 standard.

Certified By:

Elizabeth Polakowska



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg 153 - Volatile Organic Compounds in Soil

DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010			SAMPLE TYPE: Soil		
Parameter	Unit	G / S	RDL	TP1-3.8 1628790	TP2-3.2 1628800	TP3-2.75 1628810	TP4-3.3 1628825	TP5-4.0 1628835	TP6-3.8 1628845	TP7-3.5 1628855	TP8-2.5 1628865
Chloromethane	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vinyl Chloride	µg/g	0.032	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroethane	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichlorofluoromethane	µg/g	4	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Acetone	µg/g	16	0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
1,1-Dichloroethylene	µg/g	0.064	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methylene Chloride	µg/g	1.6	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
TRANS-1,2-Dichloroethylene	µg/g	1.3	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Methyl tert-butyl Ether	µg/g	1.6	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
1,1-Dichloroethane	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methyl Ethyl Ketone	µg/g	70	0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047
CIS 1,2-Dichloroethylene	µg/g	1.9	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroform	µg/g	0.47	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2- Dichloroethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1-Trichloroethane	µg/g	6.1	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.21	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Benzene	µg/g	0.32	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloropropane	µg/g	0.16	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.55	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Bromodichloromethane	µg/g	1.5	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
CIS-1,3-Dichloropropene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methyl Isobutyl Ketone	µg/g	31	0.041	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041
TRANS-1,3-Dichloropropene	µg/g		0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
1,1,2-Trichloroethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Toluene	µg/g	6.4	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
2-Hexanone	µg/g		0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470
Dibromochloromethane	µg/g	2.3	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Ethylene Dibromide	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Tetrachloroethene	µg/g	1.9	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.087	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	2.4	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	1.1	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
m & p-Xylene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

Certified By:

Judy Takewick



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg 153 - Volatile Organic Compounds in Soil											
DATE SAMPLED: Jan 04, 2010		DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010			SAMPLE TYPE: Soil			
Parameter	Unit	G / S	RDL	TP1-3.8 1628790	TP2-3.2 1628800	TP3-2.75 1628810	TP4-3.3 1628825	TP5-4.0 1628835	TP6-3.8 1628845	TP7-3.5 1628855	TP8-2.5 1628865
Bromoform	µg/g	0.61	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Styrene	µg/g	34	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2,2- Tetrachloroethane	µg/g	0.05	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
o-Xylene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	9.6	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.2	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichlorobenzene	µg/g	1.2	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	3.2	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Xylenes (Total)	µg/g	26	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Moisture Content	%		0.1	19.3	20.9	16.3	17.2	17.9	15.8	4.7	10.8
Surrogate		Unit	Acceptable Limits								
Toluene-d8	% Recovery	60-130									
4-Bromofluorobenzene	% Recovery	70-130									
				95	96	93	94	96	96	99	98
				108	98	95	89	89	84	85	82

Certified By:

Joey Tokumaki



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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ATTENTION TO: Christi Groves

O. Reg 153 - Volatile Organic Compounds in Soil

DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010				SAMPLE TYPE: Soil	
Parameter	Unit	G / S	RDL	TP9-4.0 1628875	TP10-3.0 1628885	TP11-3.4 1628895	TP12-2.75 1628900	TP13-3.8 1628908	TP14-1.5 1628915	TP16-1.5 1628940	TP17-4.0 1628949
Chloromethane	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Vinyl Chloride	µg/g	0.032	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroethane	µg/g		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichlorofluoromethane	µg/g	4	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Acetone	µg/g	16	0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
1,1-Dichloroethylene	µg/g	0.064	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methylene Chloride	µg/g	1.6	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
TRANS-1,2-Dichloroethylene	µg/g	1.3	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Methyl tert-butyl Ether	µg/g	1.6	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
1,1-Dichloroethane	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methyl Ethyl Ketone	µg/g	70	0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047
CIS 1,2-Dichloroethylene	µg/g	1.9	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chloroform	µg/g	0.47	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1-Trichloroethane	µg/g	6.1	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.21	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Benzene	µg/g	0.32	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichloropropane	µg/g	0.16	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.55	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Bromodichloromethane	µg/g	1.5	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
CIS-1,3-Dichloropropene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Methyl Isobutyl Ketone	µg/g	31	0.041	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041	<0.041
TRANS-1,3-Dichloropropene	µg/g		0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
1,1,2-Trichloroethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Toluene	µg/g	6.4	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
2-Hexanone	µg/g		0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470
Dibromochloromethane	µg/g	2.3	0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Ethylene Dibromide	µg/g	0.05	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Tetrachloroethene	µg/g	1.9	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.087	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	2.4	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	1.1	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
m & p-Xylene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002

Judy Takumeli

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Certificate of Analysis

AGAT WORK ORDER: 10T378906
PROJECT NO: 09-1170-6024

ATTENTION TO: Christi Groves



CLIENT NAME: GOLDER ASSOCIATES LTD.

O. Reg 153 - Volatile Organic Compounds in Soil

DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010				SAMPLE TYPE: Soil	
Parameter	Unit	G / S	RDL	TP9-4.0 1628875	TP10-3.0 1628885	TP11-3.4 1628895	TP12-2.75 1628900	TP13-3.8 1628908	TP14-1.5 1628915	TP16-1.5 1628940	TP17-4.0 1628949
Bromoform	µg/g	0.61	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Styrene	µg/g	34	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,1,2,2- Tetrachloroethane	µg/g	0.05	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
o-Xylene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichlorobenzene	µg/g	9.6	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,4-Dichlorobenzene	µg/g	0.2	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2-Dichlorobenzene	µg/g	1.2	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,2,4-Trichlorobenzene	µg/g	3.2	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Xylenes (Total)	µg/g	26	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Moisture Content	%		0.1	20.5	18.7	16.5	14.0	17.9	6.5	21.3	19.2
Acceptable Limits											
Surrogate	Unit										
Toluene-d8	% Recovery	60-130									
4-Bromofluorobenzene	% Recovery	70-130									
		97	83	97	82	97	80	98	82	99	81

Certified By:

Jacky Takewski



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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<http://www.agatlabs.com>

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg 153 - Volatile Organic Compounds in Soil

DATE SAMPLED: Jan 04, 2010	DATE RECEIVED: Jan 06, 2010	DATE REPORTED: Jan 15, 2010	SAMPLE TYPE: Soil
Parameter	Unit	G / S	RDL
Chloromethane	µg/g		0.002
Vinyl Chloride	µg/g	0.032	0.002
Bromomethane	µg/g	0.05	0.002
Chloroethane	µg/g		0.005
Trichlorofluoromethane	µg/g	4	0.004
Acetone	µg/g	16	0.130
1,1-Dichloroethylene	µg/g	0.064	0.002
Methylene Chloride	µg/g	1.6	0.010
TRANS-1,2-Dichloroethylene	µg/g	1.3	0.003
Methyl tert-butyl Ether	µg/g	1.6	0.004
1,1-Dichloroethane	µg/g		0.002
Methyl Ethyl Ketone	µg/g	70	0.047
CIS 1,2-Dichloroethylene	µg/g	1.9	0.002
Chloroform	µg/g	0.47	0.002
1,2-Dichloroethane	µg/g	0.05	0.002
1,1,1-Trichloroethane	µg/g	6.1	0.002
Carbon Tetrachloride	µg/g	0.21	0.002
Benzene	µg/g	0.32	0.002
1,2-Dichloropropane	µg/g	0.16	0.002
Trichloroethylene	µg/g	0.55	0.004
Bromodichloromethane	µg/g	1.5	0.003
CIS-1,3-Dichloropropene	µg/g		0.002
Methyl Isobutyl Ketone	µg/g	31	0.041
TRANS-1,3-Dichloropropene	µg/g		0.003
1,1,2-Trichloroethane	µg/g	0.05	0.002
Toluene	µg/g	6.4	0.002
2-Hexanone	µg/g		0.470
Dibromochloromethane	µg/g	2.3	0.003
Ethylene Dibromide	µg/g	0.05	0.002
Tetrachloroethene	µg/g	1.9	0.002
1,1,1,2-Tetrachloroethane	µg/g	0.087	0.002
Chlorobenzene	µg/g	2.4	0.002
Ethylbenzene	µg/g	1.1	0.002
m & p-Xylene	µg/g		0.002

Certified By:

Jody Takewicki



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O. Reg 153 - Volatile Organic Compounds in Soil

DATE SAMPLED: Jan 04, 2010	DATE RECEIVED: Jan 06, 2010	DATE REPORTED: Jan 15, 2010	SAMPLE TYPE: Soil
Parameter	Unit	G / S	RDL
Bromoform	µg/g	0.61	0.002
Styrene	µg/g	34	0.002
1,1,2,2- Tetrachloroethane	µg/g	0.05	0.004
o-Xylene	µg/g		0.002
1,3-Dichlorobenzene	µg/g	9.6	0.002
1,4-Dichlorobenzene	µg/g	0.2	0.002
1,2-Dichlorobenzene	µg/g	1.2	0.002
1,2,4-Trichlorobenzene	µg/g	3.2	0.007
Xylenes (Total)	µg/g	26	0.002
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.002
Moisture Content	%		0.1
			18.9
Surrogate	Unit	Acceptable Limits	
Toluene-d8	% Recovery	60-130	98
4-Bromofluorobenzene	% Recovery	70-130	80

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New
1628790-1628952 Results are based on the dry weight of the soil.

Certified By:

Jacky Takewski



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PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 - Petroleum Hydrocarbons F1 - F4 (C6 - C50) in Soil (PAHs Incl.)

DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010			SAMPLE TYPE: Soil		
Parameter	Unit	G / S	RDL	TP1-3.8 1628790	TP2-3.2 1628800	TP3-2.75 1628810	TP4-3.3 1628825	TP5-4.0 1628835	TP6-3.8 1628845	TP7-3.5 1628855	TP8-2.5 1628865
C6 - C10 (F1)	µg/g		5	<5	<5	<5	<5	<5	<5	<5	<5
C6 - C10 (F1 minus BTEX)	µg/g	55	5	<5	<5	<5	<5	<5	<5	<5	<5
C>10 - C16 (F2)	µg/g	230	10	<10	<10	<10	<10	<10	<10	<10	<10
C>10 - C16 (F2 minus Naphthalene)	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10
C>16 - C34 (F3)	µg/g	1700	50	<50	<50	<50	<50	<50	<50	<50	<50
C>16 - C34 (F3 minus PAHs)	µg/g		50	<50	<50	<50	<50	<50	<50	<50	<50
C>34 - C50 (F4)	µg/g	3300	50	<50	<50	<50	<50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		0.1	19.3	20.9	16.3	17.2	17.9	15.8	4.7	10.8
Parameter	Unit	G / S	RDL	TP9-4.0 1628875	TP10-3.0 1628885	TP11-3.4 1628895	TP12-2.75 1628900	TP13-3.8 1628908	TP14-1.5 1628915	TP16-1.5 1628940	TP17-4.0 1628949
C6 - C10 (F1)	µg/g		5	<5	<5	<5	<5	<5	<5	<5	<5
C6 - C10 (F1 minus BTEX)	µg/g	55	5	<5	<5	<5	<5	<5	<5	<5	<5
C>10 - C16 (F2)	µg/g	230	10	<10	<10	<10	<10	<10	<10	<10	<10
C>10 - C16 (F2 minus Naphthalene)	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10
C>16 - C34 (F3)	µg/g	1700	50	<50	<50	<50	<50	<50	<50	260	<50
C>16 - C34 (F3 minus PAHs)	µg/g		50	<50	<50	<50	<50	<50	<50	250	<50
C>34 - C50 (F4)	µg/g	3300	50	<50	<50	<50	<50	<50	<50	140	<50
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		0.1	20.5	18.7	16.5	14.0	17.9	6.5	21.3	19.2
Parameter	Unit	G / S	RDL	DUP2 1628952							
C6 - C10 (F1)	µg/g		5	<5							
C6 - C10 (F1 minus BTEX)	µg/g	55	5	<5							
C>10 - C16 (F2)	µg/g	230	10	<10							
C>10 - C16 (F2 minus Naphthalene)	µg/g		10	<10							
C>16 - C34 (F3)	µg/g	1700	50	<50							
C>16 - C34 (F3 minus PAHs)	µg/g		50	<50							
C>34 - C50 (F4)	µg/g	3300	50	<50							
Gravimetric Heavy Hydrocarbons	µg/g		50	NA							
Moisture Content	%		0.1	18.9							

Certified By:

Joely Takewell



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
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<http://www.agatlabs.com>

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 - Petroleum Hydrocarbons F1 - F4 (C6 - C50) in Soil (PAHs Incl.)

DATE SAMPLED: Jan 04, 2010

DATE RECEIVED: Jan 06, 2010

DATE REPORTED: Jan 15, 2010

SAMPLE TYPE: Soil

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New

1628790-1628952 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.

Total C6 - C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:

Judy Takumshi



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christl Groves

O. Reg. 153 - Petroleum Hydrocarbons F1 - F4 (C6 - C50) in Soil (PAHs Incl.)

DATE SAMPLED: Jan 04, 2010	DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010		SAMPLE TYPE: Soil
Parameter	Unit	G / S	RDL	TP2-0.40 1628795	TP6-0.6 1628840	
Benzene	µg/g	0.32	0.10	<0.10	<0.10	
Toluene	µg/g	6.4	0.08	<0.08	<0.08	
Ethylbenzene	µg/g	1.1	0.05	<0.05	<0.05	
Xylenes (Total)	µg/g	26	0.07	<0.07	<0.07	
C6 - C10 (F1)	µg/g		5	<5	<5	
C6 - C10 (F1 minus BTEX)	µg/g	55	5	<5	<5	
C>10 - C16 (F2)	µg/g	230	10	<10	<10	
C>10 - C16 (F2 minus Naphthalene)	µg/g		10	<10	<10	
C>16 - C34 (F3)	µg/g	1700	50	64	74	
C>16 - C34 (F3 minus PAHs)	µg/g		50	64	73	
C>34 - C50 (F4)	µg/g	3300	50	53	76	
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	
Moisture Content	%		0.1	16.8	7.9	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New

1628795-1628840 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.

Total C6 - C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:

Jokey Takewski



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 PAHs in Soil											
DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010			SAMPLE TYPE: Soil		
Parameter	Unit	G / S	RDL	TP1-0.40 1628785	TP2-0.40 1628795	TP3-0.5 1628805	TP4-1.1 1628815	DUP1 1628820	TP5-0.5 1628830	TP6-0.6 1628840	TP7-1.0 1628850
Naphthalene	µg/g	9.6	0.03	0.13	<0.03	0.05	0.07	<0.03	0.06	0.07	<0.03
Acenaphthylene	µg/g	0.15	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	µg/g	21	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Fluorene	µg/g	62	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	µg/g	12	0.02	0.18	<0.02	0.06	0.07	<0.02	0.06	0.09	<0.02
Anthracene	µg/g	0.67	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene	µg/g	9.6	0.02	0.13	<0.02	0.09	0.04	<0.02	0.08	0.11	<0.02
Pyrene	µg/g	96	0.02	0.13	<0.02	0.07	0.04	<0.02	0.07	0.10	<0.02
Benzo(a)anthracene	µg/g	0.96	0.02	0.09	<0.02	0.07	0.02	<0.02	0.05	0.07	<0.02
Chrysene	µg/g	9.6	0.02	0.12	<0.02	0.07	0.04	<0.02	0.07	0.08	<0.02
Benzo(b)fluoranthene	µg/g	0.96	0.02	0.06	<0.02	0.05	0.02	<0.02	0.05	0.06	<0.02
Benzo(k)fluoranthene	µg/g	0.96	0.02	0.03	<0.02	0.02	<0.02	<0.02	0.02	0.03	<0.02
Benzo(a)pyrene	µg/g	0.3	0.02	0.08	<0.02	0.06	0.02	<0.02	0.05	0.08	<0.02
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.02	0.06	<0.02	0.04	0.02	<0.02	0.04	0.06	<0.02
Dibenzo(a,h)anthracene	µg/g	0.1	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Benzo(g,h,i)perylene	µg/g	9.6	0.02	0.08	<0.02	0.05	0.03	<0.02	0.06	0.07	<0.02
Moisture Content	%			12.4	16.8	24.8	5.7	7.0	12.3	7.9	2.7
Surrogate	Unit	Acceptable Limits			97	87	91	66	71	80	79
Chrysene-d12	%	60-130									84

Certified By:

Jody Takewski



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O. Reg. 153 PAHs in Soil

DATE SAMPLED: Jan 04, 2010			DATE RECEIVED: Jan 06, 2010			DATE REPORTED: Jan 15, 2010			SAMPLE TYPE: Soil			
Parameter	Unit	G / S	RDL	TP8-0.10 1628860	TP9-0.25 1628870	TP10-1.0 1628880	TP11-0.5 1628890	TP13-0.25 1628905	TP14-0.5 1628910	TP15-0.75 1628920	DUP3 1628924	
Naphthalene	µg/g	9.6	0.03	0.13	<0.03	<0.03	<0.03	0.52	0.25	0.10	0.10	
Acenaphthylene	µg/g	0.15	0.02	0.04	<0.02	<0.02	<0.02	0.16	0.07	0.03	0.02	
Acenaphthene	µg/g	21	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Fluorene	µg/g	62	0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.02	<0.02	<0.02	
Phenanthrene	µg/g	12	0.02	0.21	<0.02	<0.02	<0.02	0.50	0.36	0.12	0.14	
Anthracene	µg/g	0.67	0.02	0.03	<0.02	<0.02	<0.02	0.16	0.08	0.03	0.03	
Fluoranthene	µg/g	9.6	0.02	0.23	<0.02	<0.02	<0.02	0.68	0.35	0.13	0.12	
Pyrene	µg/g	96	0.02	0.22	<0.02	<0.02	<0.02	0.72	0.37	0.13	0.12	
Benzo(a)anthracene	µg/g	0.96	0.02	0.16	<0.02	<0.02	<0.02	0.48	0.26	0.09	0.09	
Chrysene	µg/g	9.6	0.02	0.23	<0.02	<0.02	<0.02	0.63	0.33	0.13	0.12	
Benzo(b)fluoranthene	µg/g	0.96	0.02	0.23	<0.02	<0.02	<0.02	0.65	0.38	0.14	0.12	
Benzo(k)fluoranthene	µg/g	0.96	0.02	0.09	<0.02	<0.02	<0.02	0.30	0.12	0.05	0.04	
Benzo(a)pyrene	µg/g	0.3	0.02	0.22	<0.02	<0.02	<0.02	0.41	0.19	0.08	0.06	
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.02	0.19	<0.02	<0.02	<0.02	0.35	0.18	0.08	0.06	
Dibenzo(a,h)anthracene	µg/g	0.1	0.02	0.06	<0.02	<0.02	<0.02	0.10	0.04	0.02	0.02	
Benzo(g,h,i)perylene	µg/g	9.6	0.02	0.24	<0.02	<0.02	<0.02	0.42	0.21	0.10	0.07	
Moisture Content	%			9.2	14.4	7.4	8.1	5.6	7.8	6.4	7.0	
Surrogate	Unit	Acceptable Limits										
Chrysene-d12	%	60-130			88	87	84	76	94	95	86	95

Certified By:

Judy Takemshi



AGAT Laboratories

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O. Reg. 153 PAHs in Soil						
DATE SAMPLED: Jan 04, 2010	DATE RECEIVED: Jan 06, 2010		DATE REPORTED: Jan 15, 2010		SAMPLE TYPE: Soil	
Parameter	Unit	G / S	RDL	TP16-1.0 1628930	TP16-1.5 1628940	TP17-0.75 1628944
Naphthalene	µg/g	9.6	0.03	<0.03	0.28	<0.03
Acenaphthylene	µg/g	0.15	0.02	<0.02	0.04	<0.02
Acenaphthene	µg/g	21	0.03	<0.03	0.03	<0.03
Fluorene	µg/g	62	0.02	<0.02	0.07	<0.02
Phenanthrene	µg/g	12	0.02	<0.02	0.85	<0.02
Anthracene	µg/g	0.67	0.02	<0.02	0.23	<0.02
Fluoranthene	µg/g	9.6	0.02	<0.02	1.5	<0.02
Pyrene	µg/g	96	0.02	<0.02	1.3	<0.02
Benzo(a)anthracene	µg/g	0.96	0.02	<0.02	0.93	<0.02
Chrysene	µg/g	9.6	0.02	<0.02	0.82	<0.02
Benzo(b)fluoranthene	µg/g	0.96	0.02	<0.02	0.67	<0.02
Benzo(k)fluoranthene	µg/g	0.96	0.02	<0.02	0.33	<0.02
Benzo(a)pyrene	µg/g	0.3	0.02	<0.02	0.60	<0.02
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.02	<0.02	0.36	<0.02
Dibenzo(a,h)anthracene	µg/g	0.1	0.02	<0.02	0.10	<0.02
Benzo(g,h,i)perylene	µg/g	9.6	0.02	<0.02	0.33	<0.02
Moisture Content	%			2.3	21.3	7.4
Surrogate	Unit	Acceptable Limits				
Chrysene-d12	%	60-130				
		78	81	83		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New
1628785-1628944 Results are based on the dry weight of the soil.

Certified By:

Joshy Takumshi



AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 10T378906

PROJECT NO: 09-1170-6024

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

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1628795	TP2-0.40	T2 (ICC) - New	O. Reg. 153 Metals & Inorganics in Soil	Lead	120	212
1628860	TP8-0.10	T2 (ICC) - New	O. Reg. 153 Metals & Inorganics in Soil	Lead	120	215
1628905	TP13-0.25	T2 (ICC) - New	O. Reg. 153 Metals & Inorganics in Soil	Lead	120	135
1628905	TP13-0.25	T2 (ICC) - New	O. Reg. 153 PAHs in Soil	Acenaphthylene	0.15	0.16
1628905	TP13-0.25	T2 (ICC) - New	O. Reg. 153 PAHs in Soil	Benzo(a)pyrene	0.3	0.41
1628940	TP16-1.5	T2 (ICC) - New	O. Reg. 153 Metals & Inorganics in Soil	Lead	120	328
1628940	TP16-1.5	T2 (ICC) - New	O. Reg. 153 Metals & Inorganics in Soil	Mercury	3.9	11.5
1628940	TP16-1.5	T2 (ICC) - New	O. Reg. 153 PAHs in Soil	Benzo(a)pyrene	0.3	0.60



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T379379

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 Metals & Inorganics in Soil									
DATE SAMPLED: Jan 07, 2010	DATE RECEIVED: Jan 09, 2010	DATE REPORTED: Jan 20, 2010	SAMPLE TYPE: Soil						
Parameter	Unit	G / S	RDL	BH1-7.5-9.5 1630811	BH2-2.5-4.5 1630816	BH3-7.5-9.5 1630821	BH4-7.5-9.5 1630827	BH5-6" 1630830	
Antimony	µg/g	40	1.6	1.9	<1.6	<1.6	<1.6	<1.6	
Arsenic	µg/g	18	0.6	0.6	1.4	<0.6	<0.6	<0.6	
Barium	µg/g	670	0.3	8.5	23.5	12.4	11.1	14.0	
Beryllium	µg/g	8.0	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Boron (Hot Water Extractable)	µg/g	2	0.10	0.12	0.13	0.11	<0.10	<0.10	
Cadmium	µg/g	1.9	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Chromium	µg/g	160	0.6	3.4	6.1	3.9	3.8	4.8	
Cobalt	µg/g	80	0.3	1.2	1.9	1.6	1.1	1.9	
Copper	µg/g	230	0.3	21.6	17.1	2.2	2.3	3.5	
Lead	µg/g	120	0.5	11.7	18.5	1.2	1.0	1.3	
Molybdenum	µg/g	40	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Nickel	µg/g	270	0.6	2.2	3.6	2.9	2.4	3.3	
Selenium	µg/g	5.5	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	
Silver	µg/g	40	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Thallium	µg/g	3.3	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Vanadium	µg/g	86	0.4	6.1	7.6	6.8	8.1	8.1	
Zinc	µg/g	340	0.4	11.6	16.3	6.6	6.1	8.5	
Chromium, Hexavalent	µg/g	8	0.40	<0.40	<0.40	<0.40	<0.40	<0.40	
Cyanide, Free*	µg/g	0.051	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Mercury	µg/g	3.9	0.011	0.015	0.034	<0.011	<0.011	<0.011	
Electrical Conductivity (2:1)	mS/cm	1.4	0.002	0.105	0.199	0.102	0.108	0.086	
Sodium Adsorption Ratio (2:1)	N/A	12	N/A	0.220	0.275	0.144	0.674	0.199	
pH, 2:1 CaCl2 Extraction				7.81	7.78	7.67	7.66	7.77	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New

1630811-1630830 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

*Reporting limit for Free Cyanide was revised on Jan 22, 2010 to meet a new Reg. 153 standard.

Certified By:

Elizabeth Polakowska



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T379379

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 - Petroleum Hydrocarbons F1 - F4 (C6 - C50) in Soil									
DATE SAMPLED: Jan 07, 2010	DATE RECEIVED: Jan 09, 2010	DATE REPORTED: Jan 20, 2010	SAMPLE TYPE: Soil						
Parameter	Unit	G / S	RDL	BH1-12.5-14.5 1630813	BH2-12.5-14.5 1630818	BH3-12.5-14.5 1630824	BH4-12.5-14.5 1630829	BH5-10"-12" 1630831	
C6 - C10 (F1)	µg/g		5	<5	<5	<5	<5	<5	
C6 - C10 (F1 minus BTEX)	µg/g	55	5	<5	<5	<5	<5	<5	
C>10 - C16 (F2)	µg/g	230	10	<10	<10	<10	<10	<10	
C>16 - C34 (F3)	µg/g	1700	50	<50	<50	<50	<50	<50	
C>34 - C50 (F4)	µg/g	3300	50	<50	<50	<50	<50	<50	
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	NA	NA	NA	
Moisture Content	%		0.1	15.8	11.9	18.1	15.9	19.4	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New

1630813-1630831 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.

Total C6 - C50 results are corrected for BTEX and PAH contributions (when is available).

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified without the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Certified By:

Jacky Takewski



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T379379

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 - VOCs in Soil						
DATE SAMPLED: Jan 07, 2010	DATE RECEIVED: Jan 09, 2010	DATE REPORTED: Jan 20, 2010	SAMPLE TYPE: Soil			
Parameter	Unit	G / S	RDL	BH1-12.5-14.5 1630813	BH2-12.5-14.5 1630818	BH3-12.5-14.5 1630824
Chloromethane	µg/g		0.002	<0.002	<0.002	<0.002
Vinyl Chloride	µg/g	0.032	0.002	<0.002	<0.002	<0.002
Bromomethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002
Chloroethane	µg/g		0.005	<0.005	<0.005	<0.005
Trichlorofluoromethane	µg/g	4	0.004	<0.004	<0.004	<0.004
Acetone	µg/g	16	0.130	<0.130	<0.130	<0.130
1,1-Dichloroethylene	µg/g	0.064	0.002	<0.002	<0.002	<0.002
Methylene Chloride	µg/g	1.6	0.010	<0.010	<0.010	<0.010
TRANS-1,2-Dichloroethylene	µg/g	1.3	0.003	<0.003	<0.003	<0.003
Methyl tert-butyl Ether	µg/g	1.6	0.004	<0.004	<0.004	<0.004
1,1-Dichloroethane	µg/g		0.002	<0.002	<0.002	<0.002
Methyl Ethyl Ketone	µg/g	70	0.047	<0.047	<0.047	<0.047
CIS 1,2-Dichloroethylene	µg/g	1.9	0.002	<0.002	<0.002	<0.002
Chloroform	µg/g	0.47	0.002	<0.002	<0.002	<0.002
1,2-Dichloroethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002
1,1,1-Trichloroethane	µg/g	6.1	0.002	<0.002	<0.002	<0.002
Carbon Tetrachloride	µg/g	0.21	0.002	<0.002	<0.002	<0.002
Benzene	µg/g	0.32	0.002	<0.002	<0.002	<0.002
1,2-Dichloropropane	µg/g	0.16	0.002	<0.002	<0.002	<0.002
Trichloroethylene	µg/g	0.55	0.004	<0.004	<0.004	<0.004
Bromodichloromethane	µg/g	1.5	0.003	<0.003	<0.003	<0.003
CIS-1,3-Dichloropropene	µg/g		0.002	<0.002	<0.002	<0.002
Methyl Isobutyl Ketone	µg/g	31	0.041	<0.041	<0.041	<0.041
TRANS-1,3-Dichloropropene	µg/g		0.003	<0.003	<0.003	<0.003
1,1,2-Trichloroethane	µg/g	0.05	0.002	<0.002	<0.002	<0.002
Toluene	µg/g	6.4	0.002	<0.002	<0.002	<0.002
2-Hexanone	µg/g		0.470	<0.470	<0.470	<0.470
Dibromochloromethane	µg/g	2.3	0.003	<0.003	<0.003	<0.003
Ethylene Dibromide	µg/g	0.05	0.002	<0.002	<0.002	<0.002
Tetrachloroethene	µg/g	1.9	0.002	<0.002	<0.002	<0.002
1,1,1,2-Tetrachloroethane	µg/g	0.087	0.002	<0.002	<0.002	<0.002
Chlorobenzene	µg/g	2.4	0.002	<0.002	<0.002	<0.002
Ethylbenzene	µg/g	1.1	0.002	<0.002	<0.002	<0.002
m & p-Xylene	µg/g		0.002	<0.002	<0.002	<0.002

Certified By:

Judy Takumski



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T379379

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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<http://www.agatlabs.com>

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 - VOCs in Soil									
DATE SAMPLED: Jan 07, 2010	DATE RECEIVED: Jan 09, 2010	DATE REPORTED: Jan 20, 2010	SAMPLE TYPE: Soil						
Parameter	Unit	G / S	RDL	BH1-12.5-14.5 1630813	BH2-12.5-14.5 1630818	BH3-12.5-14.5 1630824	BH4-12.5-14.5 1630829	BH5-10'-12' 1630831	
Bromoform	µg/g	0.61	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Styrene	µg/g	34	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
1,1,2,2- Tetrachloroethane	µg/g	0.05	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	
o-Xylene	µg/g		0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
1,3-Dichlorobenzene	µg/g	9.6	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
1,4-Dichlorobenzene	µg/g	0.2	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
1,2-Dichlorobenzene	µg/g	1.2	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
1,2,4-Trichlorobenzene	µg/g	3.2	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	
Xylenes (Total)	µg/g	26	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
1,3-Dichloropropene (Cis + Trans)	µg/g	0.059	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Moisture Content	%		0.1	15.8	11.9	18.1	15.9	19.4	
Surrogate	Unit	Acceptable Limits							
Toluene-d8	% Recovery	60-130		96	103	104	104	107	
4-Bromofluorobenzene	% Recovery	70-130		111	86	102	94	98	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T2 (ICC) - New
1630813-1630831 Results are based on the dry weight of the soil.

Certified By:

Joshua Takemushi



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T379379

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg. 153 PAHs in Soil									
DATE SAMPLED: Jan 07, 2010		DATE RECEIVED: Jan 09, 2010		DATE REPORTED: Jan 20, 2010		SAMPLE TYPE: Soil			
Parameter	Unit	G / S	RDL	BH1-7.5-9.5 1630811	BH2-2.5-4.5 1630816	BH3-7.5-9.5 1630821	BH4-7.5-9.5 1630827	BH5-6" 1630830	
Naphthalene	µg/g	9.6	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Acenaphthylene	µg/g	0.15	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Acenaphthene	µg/g	21	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Fluorene	µg/g	62	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Phenanthrene	µg/g	12	0.02	<0.02	0.04	<0.02	<0.02	<0.02	
Anthracene	µg/g	0.67	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Fluoranthene	µg/g	9.6	0.02	<0.02	0.03	<0.02	<0.02	<0.02	
Pyrene	µg/g	96	0.02	<0.02	0.03	<0.02	<0.02	<0.02	
Benzo(a)anthracene	µg/g	0.96	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Chrysene	µg/g	9.6	0.02	<0.02	0.02	<0.02	<0.02	<0.02	
Benzo(b)fluoranthene	µg/g	0.96	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Benzo(k)fluoranthene	µg/g	0.96	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Benzo(a)pyrene	µg/g	0.3	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Indeno(1,2,3-cd)pyrene	µg/g	0.76	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Dibenzo(a,h)anthracene	µg/g	0.1	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
Benzo(g,h,i)perylene	µg/g	9.6	0.02	<0.02	0.03	<0.02	<0.02	<0.02	
Moisture Content	%			10.9	10.5	6.1	7.6	7.9	
Surrogate	Unit	Acceptable Limits							
Chrysene-d12	%	60-130		86	90	81	92	86	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2 (ICC) - New
1630811-1630830 Results are based on the dry weight of the soil.

Certified By:

Joel Takushi



APPENDIX F

Laboratory Certificates of Analysis - Groundwater



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg 153 Petroleum Hydrocarbon F1 - F4 in Water (With PAHs)

DATE SAMPLED: Jan 15, 2010		DATE RECEIVED: Jan 16, 2010			DATE REPORTED: Jan 27, 2010			SAMPLE TYPE: Water			
Parameter	Unit	G / S	RDL	MW1 1636666	MW2 1636668	MW3 1636680	MW4 1636692	MW5 1636704	DUP1 1636716	Field Blank 1636728	Trip Blank 1636740
C6 - C10 (F1)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C6 - C10 (F1 minus BTEX)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C>10 - C16 (F2)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C>10 - C16 (F2 minus Naphthalene)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C6 - C16 (F1 + F2)	µg/L	1000	100	<100	<100	<100	<100	<100	<100	<100	<100
C>16 - C34 (F3)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C>16 - C34 (F3 minus PAHs)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C>34 - C50 (F4)	µg/L		100	<100	<100	<100	<100	<100	<100	<100	<100
C>16 - C50 (F3 + F4)	µg/L	1000	100	<100	<100	<100	<100	<100	<100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L		500	NA	NA	NA	NA	NA	NA	NA	NA

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2(PGW)

1636666-1636740 The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.

Total C6-C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:

Joely Takemshi

Certificate of Analysis

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

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ATTENTION TO: Christi Groves

CLIENT NAME: GOLDER ASSOCIATES LTD.

O. Reg. 153 PAHs in Water - Table 2

DATE SAMPLED: Jan 15, 2010			DATE RECEIVED: Jan 16, 2010			DATE REPORTED: Jan 27, 2010			SAMPLE TYPE: Water			
Parameter	Unit	G / S	RDL	MW1 1636666	MW2 1636668	MW3 1636680	MW4 1636692	MW5 1636704	DUP1 1636716	Field Blank 1636728	Trip Blank 1636740	
Naphthalene	µg/L	21	0.12	<0.12	<0.12	<0.12	<0.12	0.12	<0.12	<0.12	<0.12	
Acenaphthylene	µg/L	310	0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	
Acenaphthene	µg/L	20	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Fluorene	µg/L	280	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	
Phenanthrene	µg/L	63	0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	
Anthracene	µg/L	12	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluoranthene	µg/L	130	0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	
Pyrene	µg/L	40	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(a)anthracene	µg/L	0.2	0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	
Chrysene	µg/L	0.5	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(b)fluoranthene	µg/L	0.2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(k)fluoranthene	µg/L	0.2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Indeno(1,2,3-cd)pyrene	µg/L	0.2	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Dibenzo(a,h)anthracene	µg/L	0.2	0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	<0.09	
Benzo(g,h,i)perylene	µg/L	0.2	0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	
Surrogate	Unit	Acceptable Limits										
Chrysene-d12	%	60-130			80	82	88	71	85	87	80	78

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2(PGW)

Certified By:

Janey Takewell



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

5835 COOPERS AVENUE
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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Jan 15, 2010		DATE RECEIVED: Jan 16, 2010				DATE REPORTED: Jan 27, 2010				SAMPLE TYPE: Water		
Parameter	Unit	G / S	RDL	MW1 1636666	MW2 1636668	MW3 1636680	MW4 1636692	MW5 1636704	DUP1 1636716	Field Blank 1636728	Trip Blank 1636740	
Chloromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	
Vinyl Chloride	µg/L	0.5	0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	
Bromomethane	µg/L	3.7	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Chloroethane	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Trichlorofluoromethane	µg/L		0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	
Acetone	µg/L	3000	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
1,1 Dichloroethene	µg/L	0.66	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Methylene Chloride	µg/L	50	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
trans- 1,2-dichloroethylene	µg/L	100	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Methyl tert-butyl ether	µg/L	700	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
1,1-Dichloroethane	µg/L	70	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Methyl Ethyl Ketone	µg/L	350	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
cis- 1,2-Dichloroethylene	µg/L	70	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Chloroform	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
1,2 - Dichloroethane	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
1,1,1-Trichloroethane	µg/L	200	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Carbon Tetrachloride	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Benzene	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
1,2-Dichloropropane	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Trichloroethylene	µg/L	50	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Bromodichloromethane	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
cis-1,3-Dichloropropene	ug/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Methyl Isobutyl Ketone	µg/L	350	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
trans-1,3-Dichloropropene	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
1,1,2-Trichloroethane	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Toluene	µg/L	24	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
2-Hexanone	µg/L		0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	
Dibromochloromethane	µg/L	5.0	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Ethylene Dibromide	µg/L	1.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
Tetrachloroethene	µg/L	5.0	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	
1,1,1,2-Tetrachloroethane	µg/L	5.0	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Chlorobenzene	µg/L	30	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Ethylbenzene	µg/L	2.4	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
m & p-Xylene	µg/L		0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	

Certified By:

Judy Takushi



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christli Groves

O. Regulation 153 - Volatile Organic Compounds in Water

DATE SAMPLED: Jan 15, 2010			DATE RECEIVED: Jan 16, 2010			DATE REPORTED: Jan 27, 2010			SAMPLE TYPE: Water		
Parameter	Unit	G / S	RDL	MW1 1636666	MW2 1636668	MW3 1636680	MW4 1636692	MW5 1636704	DUP1 1636716	Field Blank 1636728	Trip Blank 1636740
Bromoform	µg/L	5.0	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Styrene	µg/L	100	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,1,2,2-Tetrachloroethane	µg/L	1.0	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	µg/L		0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,3-Dichlorobenzene	µg/L	630	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,4-Dichlorobenzene	µg/L	1.0	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichlorobenzene	µg/L	3.0	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	µg/L	70	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
1,3-Dichloropropene (Cis + Trans)	µg/L	1.4	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes (Total)	µg/L	300	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits									
Toluene-d8	% Recovery	60-130									
4-Bromofluorobenzene	% Recovery	70-130									
		81	86	76	79	73	85	82	82	82	82
		87	81	77	79	83	76	75	79	79	79

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2(PGW)
1636666-1636740 Dilution factor=1

Certified By:

Jacky Takewell



AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christi Groves

O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report

DATE SAMPLED: Jan 15, 2010			DATE RECEIVED: Jan 16, 2010			DATE REPORTED: Jan 27, 2010			SAMPLE TYPE: Water			
Parameter	Unit	G / S	RDL	MW1 1636666	RDL	MW2 1636668	RDL	MW3 1636680	RDL	MW4 1636692	RDL	MW5 1636704
Antimony	µg/L	6.0	1.00	<1.00	1.00	<1.00	1.00	<1.00	1.00	<1.00	1.00	<1.00
Arsenic	µg/L	25	0.60	2.70	0.60	1.99	0.60	1.25	0.60	5.17	0.60	0.79
Barium	µg/L	1000	0.50	303	0.50	153	0.50	107	0.50	461	0.50	26.8
Beryllium	µg/L	4.0	1.00	<1.00	1.00	<1.00	1.00	<1.00	1.00	<1.00	1.00	<1.00
Boron	µg/L	5000	10.0	50.6	10.0	46.2	10.0	36.0	10.0	36.3	10.0	30.3
Cadmium	µg/L	5.0	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20
Chromium	µg/L	50	0.60	108	0.60	15.7	0.60	24.4	0.60	21.9	0.60	9.28
Cobalt	µg/L	100	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50
Copper	µg/L	23	0.80	3.77	0.80	1.80	0.80	2.46	0.80	2.75	0.80	1.62
Lead	µg/L	10	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50	0.50	<0.50
Molybdenum	µg/L	7300	0.50	4.00	0.50	<0.50	0.50	1.94	0.50	0.70	0.50	3.03
Nickel	µg/L	100	0.60	3.29	0.60	3.95	0.60	1.71	0.60	3.45	0.60	0.76
Selenium	µg/L	10	0.80	5.19	0.80	2.64	0.80	2.80	0.80	5.12	0.80	1.61
Silver	µg/L	1.2	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20	0.20	<0.20
Thallium	µg/L	2.0	0.30	<0.30	0.30	<0.30	0.30	<0.30	0.30	<0.30	0.30	<0.30
Vanadium	µg/L	200	0.40	1.03	0.40	3.13	0.40	2.27	0.40	5.07	0.40	1.33
Zinc	µg/L	1100	5.00	<5.00	5.00	<5.00	5.00	<5.00	5.00	7.21	5.00	<5.00
Mercury	µg/L	0.12	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	<0.10
Sodium	mg/L	200	0.1	651	0.1	312	0.1	253	0.1	607	0.1	109
Free Cyanide	µg/L	52	10	<10	10	<10	10	<10	10	<10	10	<10
Chromium VI	µg/L	50	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0	5.0	<5.0
Chloride	mg/L	250	10	1050	1.0	524	10	422	10	1060	1.0	112
Nitrate as N	mg/L	10	0.50	4.36	0.10	5.55	0.50	5.49	0.50	4.78	0.05	1.95
Nitrite as N	mg/L	1	0.50	<0.50	0.10	<0.10	0.50	<0.10	0.50	<0.50	0.05	<0.05
pH	N/A		N/A	8.02	N/A	7.92	N/A	7.93	N/A	7.92	N/A	8.27
Electrical Conductivity	uS/cm		2	3960	2	2250	2	1850	2	4100	2	686

Certified By:

Phil Munster

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Certificate of Analysis

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

ATTENTION TO: Christi Groves

CLIENT NAME: GOLDER ASSOCIATES LTD.

O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report

DATE SAMPLED: Jan 15, 2010			DATE RECEIVED: Jan 16, 2010			DATE REPORTED: Jan 27, 2010		SAMPLE TYPE: Water	
Parameter	Unit	G / S	RDL	DUP1 1636716	RDL	Field Blank 1636728	Trip Blank 1636740		
Antimony	µg/L	6.0	1.00	<1.00	1.00	<1.00	<1.00		
Arsenic	µg/L	25	0.60	1.34	0.60	<0.60	<0.60		
Barium	µg/L	1000	0.50	97.2	0.50	<0.50	<0.50		
Beryllium	µg/L	4.0	1.00	<1.00	1.00	<1.00	<1.00		
Boron	µg/L	5000	10.0	32.7	10.0	<10.0	<10.0		
Cadmium	µg/L	5.0	0.20	<0.20	0.20	<0.20	<0.20		
Chromium	µg/L	50	0.60	13.9	0.60	<0.60	<0.60		
Cobalt	µg/L	100	0.50	<0.50	0.50	<0.50	<0.50		
Copper	µg/L	23	0.80	2.12	0.80	<0.80	<0.80		
Lead	µg/L	10	0.50	<0.50	0.50	<0.50	<0.50		
Molybdenum	µg/L	7300	0.50	1.62	0.50	<0.50	<0.50		
Nickel	µg/L	100	0.60	2.81	0.60	<0.60	<0.60		
Selenium	µg/L	10	0.80	2.28	0.80	<0.80	<0.80		
Silver	µg/L	1.2	0.20	<0.20	0.20	<0.20	<0.20		
Thallium	µg/L	2.0	0.30	<0.30	0.30	<0.30	<0.30		
Vanadium	µg/L	200	0.40	2.86	0.40	<0.40	<0.40		
Zinc	µg/L	1100	5.00	<5.00	5.00	<5.00	<5.00		
Mercury	µg/L	0.12	0.10	<0.10	0.10	<0.10	<0.10		
Sodium	mg/L	200	0.1	268	0.05	0.14	<0.05		
Free Cyanide	µg/L	52	10	<10	10	<10	<10		
Chromium VI	µg/L	50	5.0	<5.0	5.0	<5.0	<5.0		
Chloride	mg/L	250	1.0	449	0.10	<0.10	<0.10		
Nitrate as N	mg/L	10	0.05	5.26	0.05	<0.05	<0.05		
Nitrite as N	mg/L	1	0.05	<0.05	0.05	<0.05	<0.05		
pH	N/A		N/A	7.93	N/A	6.46	5.58		
Electrical Conductivity	uS/cm		2	1950	2	<2	<2		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2(PGW)

1636666-1636740

Revised Jan.28/10

Revision: Samples 1636728 & 1636740 were re-analysed for Na and the values obtained are included in this report.

Certified By:

Mike Munro



AGAT

Laboratories

Guideline Violation

AGAT WORK ORDER: 10T380707

PROJECT NO: 09-1170-6024

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CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christl Groves

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1636666	MW1	T2 (PGW) - New	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	790	1050
1636666	MW1	T2 (PGW) - New	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chromium	50	108
1636666	MW1	T2 (PGW) - New	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	490	651
1636666	MW1	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	250	1050
1636666	MW1	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chromium	50	108
1636666	MW1	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	200	651
1636668	MW2	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	250	524
1636668	MW2	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	200	312
1636680	MW3	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	250	422
1636680	MW3	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	200	253
1636692	MW4	T2 (PGW) - New	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	790	1060
1636692	MW4	T2 (PGW) - New	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	490	607
1636692	MW4	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	250	1060
1636692	MW4	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	200	607
1636716	DUP1	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Chloride	250	449
1636716	DUP1	T2(PGW)	O. Reg 153 - Metals & Inorganics in water - Table 2 - Revised Final Report	Sodium	200	268

Certificate of Analysis

AGAT WORK ORDER: 10T388196

PROJECT NO: 09-1170-6024 Allandale Stationlands

ATTENTION TO: Christi Groves

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CLIENT NAME: GOLDER ASSOCIATES LTD.

O. Reg 153 - Metals & Inorganics in Water

DATE SAMPLED: Feb 17, 2010			DATE RECEIVED: Feb 26, 2010				DATE REPORTED: Mar 08, 2010				SAMPLE TYPE: Water			
Parameter	Unit	G / S	RDL	MW1 1672840	MW2 1672860	MW3 1672861	MW4 1672865	MW5 1672866	DUP2 1672872	Trip Blank 1672879	Field Blank 1672882			
Antimony	µg/L	6.0	1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00			
Arsenic	µg/L	25	0.60	1.34	1.02	1.40	1.65	0.67	2.05	<0.60	<0.60			
Barium	µg/L	1000	0.50	370	136	125	266	16.5	261	<0.50	<0.50			
Beryllium	µg/L	4.0	1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00			
Boron	µg/L	5000	10.0	33.9	30.7	27.8	32.3	22.0	31.5	<10.0	<10.0			
Cadmium	µg/L	5.0	0.20	<0.20	<0.20	0.27	<0.20	<0.20	<0.20	<0.20	<0.20			
Chromium	µg/L	50	0.60	2.68	25.9	2.07	75.5	3.30	1.48	<0.60	<0.60			
Cobalt	µg/L	100	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50			
Copper	µg/L	23	0.80	3.49	1.54	2.59	2.39	1.86	2.62	<0.80	<0.80			
Lead	µg/L	10	0.50	<0.50	1.15	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50			
Molybdenum	µg/L	7300	0.50	3.57	<0.50	1.52	1.02	1.89	1.16	<0.50	<0.50			
Nickel	µg/L	100	0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60			
Selenium	µg/L	10	0.80	2.07	2.00	1.21	3.92	<0.80	4.11	<0.80	<0.80			
Silver	µg/L	1.2	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20			
Thallium	µg/L	2.0	0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30			
Vanadium	µg/L	200	0.40	1.93	2.70	2.41	2.58	2.21	2.77	<0.40	0.55			
Zinc	µg/L	1100	5.00	7.11	<5.00	21.4	<5.00	<5.00	<5.00	<5.00	<5.00			
Mercury	µg/L	0.12	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
Sodium	mg/L	200	0.05	675	281	244	646	122	633	0.09	0.13			
Free Cyanide	µg/L	52	10	<10	<10	<10	<10	<10	<10	<10	<10			
Chromium VI	µg/L	50	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0			
Chloride	mg/L	250	0.10	1150	491	447	965	131	986	0.10	<0.10			
Nitrate as N	mg/L	10	0.05	6.24	5.86	5.62	5.14	1.95	6.86	<0.05	<0.05			
Nitrite as N	mg/L	1	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
pH	N/A		N/A	7.99	7.94	7.89	7.99	8.23	7.92	6.50	6.15			
Electrical Conductivity	uS/cm		2	3900	2010	1800	3510	656	3460	<2	<2			

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2(PGW)

Certified By:

Mike Munson



AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 10T388196

PROJECT NO: 09-1170-6024 Allandale Stationlands

CLIENT NAME: GOLDER ASSOCIATES LTD.

ATTENTION TO: Christy Groves

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SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	GUIDEVALUE	RESULT
1672840	MW1	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Chloride	250	1150
1672840	MW1	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Sodium	200	675
1672860	MW2	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Chloride	250	491
1672860	MW2	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Sodium	200	281
1672861	MW3	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Chloride	250	447
1672861	MW3	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Sodium	200	244
1672865	MW4	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Chloride	250	965
1672865	MW4	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Chromium	50	75.5
1672865	MW4	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Sodium	200	646
1672872	DUP2	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Chloride	250	986
1672872	DUP2	T2(PGW)	O. Reg 153 - Metals & Inorganics in Water	Sodium	200	633

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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