

September 2014

**SUPPLEMENTAL ENVIRONMENTAL
INVESTIGATIONS - FINAL REPORT**

**City of Barrie Bunker's Creek
Historical Landfills**

Submitted to:
City of Barrie
Environmental Operations
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SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS, CITY OF BARRIE BUNKER'S CREEK HISTORICAL LANDFILLS

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the City of Barrie (City), to carry out a supplemental environmental investigation of Historical Waste Sites within the City of Barrie. This report describes the results of investigations conducted at the Bunker's Creek waste disposal area between April 2013 and February 2014 as illustrated on Figures 1 and 2. Also indicated in Figure 1 is the initial D-4 Assessment Area as identified in the City's 2009 Official Plan. The initial D-4 Assessment Area was approximately 219 Ha and based on the findings of these investigations has been confirmed that it can be reduced to 8.1 Ha.

Golder previously conducted a D4 Study and Environmental Assessment of Historical Waste Sites within the City of Barrie between 2011 and 2012. The Ministry of the Environment (MOE) identified nine possible closed waste disposal sites within the City on the basis of information collected largely in 1979, supplemented with information available up to 1994 when the MOE Waste Inventory was finalized. As these waste sites were largely "unorganized" their exact location and character were not known. Residential, commercial, and industrial development has occurred on the parts of the waste sites; the remainder is public parkland.

The impact of waste sites is a factor of the type and age of, the material deposited, the depth of waste, the cover material and the local hydrogeology and stream character. As a result, investigations of areas where waste is known to have been deposited must assess these factors in order to determine the potential for impact. Older waste fill areas containing little putrescible material and pre-dating the use of industrial organics may be relatively innocuous, whereas those containing large amounts of organic material or liquid waste can continue to generate landfill gas or seepage although more than twenty-five years has passed since closure of these sites.



2.0 BACKGROUND

Four of the nine Sites identified in the MOE Waste Disposal Site Inventory within the City of Barrie are considered to be included in the Bunker's Creek Landfill area:

- Site 1 - Anne Street North and Vespra Street: Located on the northwest corner Anne Street North and Vespra Street and shown of this intersection – closed 1956 – MOE Site No. X 4101;
- Site 2 - Vespra Street and Innisfil Street: Located northwest of the intersection of Vespra Street and Innisfil Street – closed 1959 – MOE Site No. X 4102;
- Site 3 - Vespra Street and Innisfil Street: Located on the northeast corner of Vespra Street and Innisfil Street – closed 1960 – MOE Site No. X 4103; and,
- Site 7 - Vespra Street and Bradford Street: Located northeast of the intersection of Innisfil Street and Vespra Street – closed 1964 – MOE Site No. X4107.

The findings of the D4 Assessment Study estimated the estimated areal extent of waste as illustrated on Figure 2. It is noted that the delineation of waste extent was limited to sites accessible to the City (i.e., City owned lands). It is further noted that access to Site 2 was limited due to forest cover in the vicinity of Milligan's Pond.

The landfill is present on both sides of Bunker's Creek, and is bounded by Anne Street to the west, Bradford Street to the east, Perry Street to the north, and Victoria Street to the south. In regards to the City owned former Fire Hall property, the available information indicates that the waste extends to the north of the former building, but not beyond (i.e., to the south). It was not known whether there was waste under this building. The building was demolished in July 2013; however, no further investigations have been conducted under the former building footprint since its demolition.

Overall, the material within the Bunker's Creek Landfills consisted of coarse soil fill overlying thin layers of waste material. Waste thickness ranged from 0.05 m at several locations to a maximum thickness of 2.59 m encountered on the south side of Bunker's Creek, east of Milligan's Pond. The maximum depth of waste extended to 7.21 mbgs south of Bunker's Creek in the Boys Street easement. Cover or fill material ranged in thickness from 1.27 m to 8.33 m. For the most part, the waste materials identified in the boreholes consisted of solid materials (e.g., glass, plastic, bricks, metal) and did not contain putrescible materials.

Soil impacts are not anticipated to extend beyond the limits of waste. Impacts assumed to be related to road salt application (i.e., electrical conductivity, sodium adsorption ratio, sodium, and chloride) are exempt under O.Reg.153/04.

Interpreted groundwater flow direction is toward Bunker's Creek and ultimately to the east toward Lake Simcoe. Monitoring wells MW-B1, MW-B3, MW-B7, located at the northern limits of Sites 1 and 2, and the east of the north portion of Site 7 do not appear to be impacted by buried waste, which is consistent with the anticipated limits of the household waste fill locations. As stated above, based on interpreted shallow horizontal groundwater flow, groundwater outside the limits of waste (with the exception of to the east of Site 7), would not be impacted by buried waste materials.



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Landfill gas has not migrated significantly beyond the former landfill site to the north of Sites 1 and 2, or east of Site 7 and concentrations are generally below a concentration of 5%, the Lower Explosive Limit of methane, with the exception of gas probes located within the waste fill areas in the centre or southern portions of the former landfills.

Surface water quality results indicated the presence of elevated iron concentrations; however, concentrations of iron exceed the PWQO prior to flowing through the former landfill sites. Previous surface water investigations conducted along Bunker's Creek (MOE, 2011) identified leachate pools west of Innisfil Street and between Innisfil and Sanford Streets. The data indicated that the leachate pools had elevated concentrations of metals, lower pH, and higher conductivity when compared to surface water. Phosphorus and unionized ammonia were noted at elevated levels along the creek. Unionized ammonia was well under the PWQO in the upstream sample, increased to a maximum concentration of 2.152 mg/L in a leachate seep noted between Innisfil and Sanford Street before falling again to below the PWQO in the downstream sample. Phosphorus shows the same trend. Iron concentrations exceed the PWQO in all sampling locations, consistent with Golder's 2012 sampling results.

Based on the elevated ammonia concentrations in groundwater in Bunker's Creek monitoring wells, and the elevated iron concentration also noted, these parameters were identified as appropriate for use as landfill tracers to determine impacts to surface water resulting from the buried waste.

Based on the findings of the D4 Assessment Study, the following recommendations were made:

- Confirm the landfill gas ("LFG") monitoring results based on monitoring of LFG at all gas probes in the Bunker's Creek Landfills every two months for a period of one year;
- Obtain permission from private land owners, if possible, at Sites 3 and 7 to assess the soil and groundwater quality at these locations and to determine the limits of waste to the east and north;
- To confirm the limits of landfill gas impact to the south of Vespra Street, west of Innisfil Street, install two gas probes (i) south of GP-B10 along Victoria, and (ii) on the west part of Vespra Street near Anne Street. Wells could also, or in replacement of these two wells, be located within the industrial properties (with permission from the owners) to further reduce the D4 Assessment Area at this location;
- To confirm the limits of groundwater impact to the east of Site 7 install one additional monitoring well east of Site 7 (on the northwest corner of Vespra Street and Bradford Street) and/or, if possible, obtain groundwater quality information from the private land owner to the east of Site 7;
- Should any work be considered within the vicinity of Milligan's Pond (i.e., within Site 2), a risk assessment is recommended to assess the environmental condition and associated risks within this area. Further subsurface investigations would be required to support this risk assessment;
- A review of each alternative is required to identify the preferred alternative for each Site; and,
- Decommission the monitoring wells and landfill gas probes in accordance with O. Reg. 903 when no longer required.



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Recommendations for environmental monitoring were as follows:

- Monitor groundwater and surface water quality quarterly for one year at all existing locations within the Bunker's Creek Landfills. Submit all groundwater and surface water samples for analysis of major ions and indicators, metals, inorganics, polynuclear aromatic hydrocarbons (PAH), volatile organic compounds (VOC), and petroleum hydrocarbon fractions F1 through F4 (PHC F1 to F4); and,
- Upon completion of the annual monitoring, re-assess the monitoring program.



3.0 SCOPE OF WORK

3.1 Monitoring Well and Landfill Gas Probe Installation

The borehole drilling, monitoring well construction and gas probe construction program was completed to further delineate groundwater and soil gas quality near the estimated perimeter of the former landfills. The scope of work for the delineation program conducted in the Bunker's Creek Landfills involved the following:

- Advancement of 4 boreholes within City owned rights of way (ROW) to confirm limits of waste. The work was completed by the City's drilling Contractor, Altech Drilling and Investigative Services Ltd. (Altech) of Elmira, Ontario (MOE licence #7282), using a geo-probe drill rig equipped with a soil core sampler;
- Installation of one monitoring well (MW-B23; see Figure 2) in the Vespra Street ROW to delineate impacts identified at monitoring wells MW-B6 to the west;
- Installation of three soil-gas probes (GP-B20 to GP-B22) in areas where elevated methane was detected, in order to delineate the extent of landfill gas migration (i.e., within the Anne Street, Vespra Street, and Victoria Street ROWs);
- Collection of soil samples during drilling for visual characterization, head space screening of volatile organic compounds; and,
- Submission of one soil sample from borehole MW-B23 for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) and PHC F1 to F4.

Subsurface investigations were limited to the City owned lands including road allowances.

3.2 Groundwater and Landfill Gas Monitoring

Based on the recommendations from the D4 Assessment Studies the following monitoring program was implemented:

- Collection of groundwater samples from the seven previously existing monitoring wells (MW-B1 through MW-B7) on a tri-annual basis (i.e., in April, August, and December 2013) and from the recent monitoring well (MW-B23) twice following its installation (i.e., in August and December 2013);
- Collection of landfill gas samples from the nineteen existing landfill gas monitors (GP-B1 through GP-B19) on a bi-monthly basis between April 2013 and February 2014, and from the three new landfill gas monitors on a bi-monthly basis, following their installation, between August 2013 and February 2014;
- Groundwater samples were collected from each monitoring well and submitted for analysis of parameters including VOC, PHC F1 to F4, PAH, O. Reg. 153/04 metals, inorganics, and general water quality parameters during each sampling event;
- Measurement of headspace vapour concentrations in the eight monitoring wells using an RKI Eagle 2 combustible gas meter calibrated to both hexane (for detection of hydrocarbons) and isobutylene (for detection of volatile organic compounds);
- Measurement of gas concentrations in the 22 gas probes using a GEM 2000 gas meter to analyze methane, carbon dioxide and oxygen; and,



- Completion of a survey of the elevation and location of the new monitoring well/LFG monitor locations to one of the City's second order benchmarks by a registered Ontario Land Surveyor.

Subsurface investigations were limited to the City owned lands and road allowances.

3.3 Impact Assessment Using D-4 Guidelines

The available information was reviewed in the context of D-4 Guidelines to determine the extent of impact of the waste sites. Factors to be considered when land use is proposed on or within 500 metres of a non-operating site include: ground and surface water contamination by leachate, surface runoff, ground settlement, visual impact, soil contamination and hazardous waste, and in particular, landfill-generated gases. The focus of the current study completed by Golder includes groundwater, leachate and landfill gas (i.e., methane) migration from the site to adjacent properties. Visual impacts were not commented on as the waste was not apparent (i.e., there were no mounds in Sites 1, 2, 3, or 7). Comments are provided on general direction of runoff from the site, where possible. The scope of the current study completed by Golder does not include assessment of ground settlement or contaminated soils and impacts on private sites.



4.0 FIELD INVESTIGATION METHODS

The field work at the Bunker's Creek Landfills was completed between April 4, 2013 and March 31, 2014. The work consisted of the advancement of 4 boreholes to better delineate the extent of impacts, installation of one groundwater monitoring well and three landfill gas wells, and groundwater, landfill gas, and surface water sampling.

Borehole, monitoring well, and gas probe locations for this investigation were limited to the City owned lands and road allowances.

4.1 Health and Safety

The City retained the drilling contractor (Altech), who was responsible for the health and safety of on-Site workers during the drilling program. Altech was responsible for the coordination of utility clearances with the local utility companies prior to the initiation of the field work to identify possible buried services in the area of the proposed borehole locations. A health and safety tailgate meeting was held with Altech each day prior to commencement of the drilling activities.

Golder developed and implemented Site-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 and those associated with the proposed work was completed each day of the field program.

4.2 Borehole Advancement

Altech was retained by the City for borehole drilling, monitoring well installation, and gas probe installation. Drilling was completed between July 15 and 23, 2013. The boreholes were advanced and soil samples were obtained at regular depth intervals using a Geo-Probe drill rig equipped with soil core sampling equipment.

Soil cuttings generated during the drilling of the boreholes were placed in 205 L drums and left on-Site for subsequent disposal by Assured Industrial Services (AIS), a MOE licensed waste hauler (Certificate of Approval #A840688), of Gormley, Ontario.

4.3 Soil Sampling

Soil samples were obtained at regular depth intervals in the boreholes and were logged in the field noting subsurface conditions and visual evidence of waste and/or contamination (if observed). A portion of each soil sample was placed in a sealed plastic bag, and, if sent for analysis was placed in laboratory supplied sample jars. Bagged portions of the samples were subsequently screened for combustible vapours using an RKI Eagle gas detector operated in methane detection mode, and calibrated to both hexane (for hydrocarbon detection) and isobutylene (for volatile organic compound detection [PID]). The gas in the plastic soil sample bag headspace was sampled shortly after sample collection. Conditions encountered in the boreholes are summarized on the Record of Borehole Log sheets provided in Appendix A.

One soil sample, B23-1, collected between 0 and 1.5 m below grade at MW-B23 (see Figure 2), was submitted for analysis of BTEX and PHC F1 to F4. The soil sample was immediately placed in coolers with ice and submitted to AGAT Laboratories Ltd. (AGAT) of Mississauga, Ontario, under chain-of-custody. The selection of samples for laboratory analysis was based on visual and olfactory observations (i.e., odour or staining) during drilling, and headspace readings.



4.4 Well Installation

4.4.1 Monitoring Wells

One groundwater monitoring well was constructed within borehole B23 on July 16, 2013. The monitoring well was subsequently re-labeled MW-B23. The monitoring well screen was installed to facilitate the assessment of potential impacts relating to the identified waste upgradient to the west.

The monitoring well installation consisted of a single monitoring well constructed with a nominal 50 mm (2-inch) diameter solid PVC plastic riser pipe fitted with a nominal 50 mm diameter threaded PVC screen, 3.05 m in length. The pipe was pre-washed and delivered to the Site in factory sealed plastic bags. The annulus of the borehole adjacent to the screened portion of the well was backfilled with #1 silica filter sand to approximately 0.15 m above the top of the screen. The remainder of the borehole annulus adjacent to the well riser pipe was backfilled with bentonite to within 0.3 m of ground surface, where a concrete plug was placed. The monitoring well was completed with a flush mount well casing set in the concrete. Details of the monitoring well installation is provided on the Record of Borehole sheets contained in Appendix A. The MOE Well Record for these wells is provided in Appendix B.

The monitoring well was surveyed on July 30, 2013 by Rudy Mak Surveying Ltd., of Barrie, Ontario, a registered Ontario Land Surveyor. The elevations of the ground surface in the vicinity of the well, and the top of the measuring pipe were measured relative to a geodetic benchmark. Groundwater levels were measured twice in the monitoring well (i.e., in August and December 2013), using an electronic water level tape.

4.4.2 Gas Probes

A shallow gas probe was installed at three additional locations on July 15 or 23, 2013, labeled GP-B20 through GP-B22. The landfill gas probe screens were installed in the vadose zone (i.e., above the anticipated groundwater elevation) to facilitate the assessment of the presence/absence of landfill gas.

Each landfill gas probe installation consisted of a single monitoring well constructed with a nominal 50 mm (2 inch) diameter solid PVC plastic riser pipe fitted with a nominal 50 mm diameter threaded PVC screen, 3.05 m in length. The pipe was pre-washed and delivered to the Site in factory sealed plastic bags. At each gas probe location, the annulus of the borehole adjacent to the screened portion of the well was backfilled with silica filter sand to just above the top of the screen. The bottom 1.7 m of GP-B22 consists of caved material due to flowing sand conditions. The remainder of the borehole annulus adjacent to the well riser pipe was backfilled with bentonite to within 0.15 m of ground surface, where a concrete plug was placed. Gas probes GP-B20 and GP-B22 were completed with a flush mounted well casing, while gas probe GP-B21 was completed with a 100 mm diameter stick-up steel protective well casing set in the concrete. Details of the landfill gas probe installations are provided on the Record of Borehole sheets contained in Appendix A. The MOE Well Record for the probes is provided in Appendix B.

The landfill gas probes were surveyed on July 30, 2013 by Rudy Mak Surveying Ltd.



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Table 4.1: Summary of Monitoring Well and Gas Probe Installation - Bunker's Creek Landfills

Well	Monitoring Pipe Elev. (masl)	Ground Surface Elev. (masl)	Depth to Bottom of Screen (mbgs)	Top of Screen Elev. (masl)	Bottom of Well Elev. (masl)	Screen Installation Description
Site 1						
GP-B20	228.29	228.43	4.57	226.90	223.85	Native sand
GP-B21	228.71	227.66	4.12	226.59	223.54	Unknown – daylighted hole
Site 2						
GP-B22	225.01	225.11	3.81	224.35	221.30	Native sand
Site 7						
MW-B23	221.01	221.14	3.93	220.26	217.21	Waste – wood and brick

4.5 Groundwater Sampling

Monitoring well MW-B23 was equipped with dedicated low density polyethylene (LDPE) tubing and a foot valve (Waterra™-type system) for subsequent well purging and water sampling. The well was developed using dedicated surge blocks to pump the well until ten well volumes were removed from the well, using a hydraulic lift pump to flush out the annulus of excess sediment to aid in reduction of silt content in the groundwater samples. The well was allowed to recover for a minimum of 24 hours prior to sample collection.

Prior to collection of groundwater samples, a minimum of approximately three well volumes were purged from the wells. Purged water was placed in 205 L drums for subsequent disposal off-Site by AIS.

Groundwater samples were collected at least twice from each monitoring well in 2013. At the time of sampling, the groundwater samples were placed in coolers with ice and subsequently submitted to the commercial analytical laboratory under chain-of-custody procedures. Table 4.2 provides a summary of the groundwater samples submitted for laboratory analysis.

During the groundwater sampling events at each location, the wells were sampled for parameters including VOC, PHC F1 to F4, metals, major ions and indicators, ammonia, cyanide, mercury, phenols, chromium VI, and PAH.



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Table 4.2: Summary of Analyzed Groundwater Samples – Bunker's Creek Landfills

Well Number and I.D.	Date Sampled	Combustible Gas Reading in Well Headspace (ppm)	PID Reading in Well Headspace (ppm)	Final Field pH	Final Field Temp. (°C)	Final Field Cond. (µS/cm)	Total Volume Purged (L)
MW-B1	22-Apr-2013	NM	NM	7.11	7.9	559	15
	21-Aug-2013	NM	NM	7.14	10.6	3015	15
	10-Dec-2013	0	1	6.80	8.0	2290	15
MW-B2	22-Apr-2013	NM	NM	7.06	10.7	629	22
	20-Aug-2013	NM	NM	6.68	12.7	2129	21
	10-Dec-2013	260	0	6.54	10.3	1590	24
MW-B3	22-Apr-2013	NM	NM	7.40	7.8	541	1.5
	21-Aug-2013	NM	NM	6.92	11.6	1180	13.5
	10-Dec-13	0	0	7.11	6.0	1190	3
MW-B4	22-Apr-2013	NM	NM	6.72	7.7	742	15
	20-Aug-2013	NM	NM	6.45	12.5	3408	14
	12-Dec-2013	48% LEL	0	7.25	7.8	2600	15
MW-B5	22-Apr-2013	NM	NM	7.33	8.5	640	20
	20-Aug-2013	NM	NM	6.99	15.2	2104	18
	10-Dec-2013	0	0	6.72	10.0	1555	20
MW-B6	22-Apr-2013	NM	NM	6.92	8.5	605	27
	20-Aug-2013	NM	NM	6.38	16.8	2050	27.5
	10-Dec-2013	6% LEL	0	6.60	8.9	1450	27
MW-B7	22-Apr-2013	NM	NM	6.97	11.6	636	45
	21-Aug-2013	NM	NM	6.38	15.3	2144	30
	10-Dec-2013	80	0	6.78	10.4	1945	27
MW-B23	21-Aug-2013	NM	NM	5.07	21.3	53	21
	10-Dec-2013	380	0	6.65	10.5	2550	15

Notes:

PID = photolization detector (for organic vapour detection)

µS/cm = micro Siemens per centimetre

ppm = parts per million by volume

NM = not measured

% LEL = percent of the lower explosive limit of hexane



4.6 Landfill Gas Sampling

Landfill gas sampling was conducted at previously existing landfill gas monitors every two months at each location between April 2013 and March 2014. Landfill gas sampling was conducted at gas monitors GP-B20 to GP-B22 every two months at each location between August 2013 and February/March 2014 (i.e., following their installation).

A portable, high volume pump (25 L/min) was used to purge three times the volume of each gas well prior to sampling. Readings including the relative concentrations of carbon dioxide (CO₂), methane (CH₄), and oxygen (O₂) were obtained from the nineteen gas probes using a calibrated GEM 2000 monitor.

Table 1 provides a full list of landfill gas readings in the landfill gas probes. Figure 3 provides a summary of methane gas concentrations in plan view.

In some locations, groundwater was above the top of the screens and methane gas readings at these locations should be reviewed with caution.

4.7 Surface Water Sampling

Five surface water samples (SWB1 through SWB5) along Bunker's Creek were collected three times between April 22, 2013 and December 10, 2013 in the vicinity of the former landfills (see Figure 2 for sampling locations). Samples were collected from downstream (SWB1) to upstream (SWB5) locations to prevent cross-contamination. A clean, dry amber glass jar was used to collect samples from the middle of the water column and was subsequently poured into laboratory supplied sampling containers. At the time of sampling, the surface water samples were placed in coolers with ice and subsequently submitted to the commercial analytical laboratory under chain-of-custody procedures. Each surface water sample was submitted for laboratory analysis of VOC, metals, and major ions and indicators. Table 4.6 provides a summary of the surface water samples submitted for laboratory analysis.

Table 4.3: Summary of Analyzed Surface Water Samples – Bunker's Creek Landfills

Well Number and I.D.	Location Relative to Former Landfills	Date Sampled	Final Field pH	Final Field Temp. (°C)	Final Field Cond. (µS/cm)	Dissolved Oxygen (mg/L)	Flow
SWB1	Downgradient	23-Apr-13	7.71	6.8	469	11.36	Moderate
		23-Aug-13	6.86	15.1	1374	8.66	Moderate
		10-Dec-13	6.68	2.8	1844	12.98	Moderate
SWB2	Sites 3 and 7	23-Apr-13	7.39	6.7	467	11.21	Low
		23-Aug-13	7.03	15.0	1432	6.32	Low
		10-Dec-13	7.03	3.5	1680	13.20	Moderate
SWB3	Site 2	23-Apr-13	7.48	7.3	477	11.16	Moderate
		23-Aug-13	7.17	15.7	1375	8.89	High
		10-Dec-13	7.01	3.0	1950	12.61	Moderate



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Well Number and I.D.	Location Relative to Former Landfills	Date Sampled	Final Field pH	Final Field Temp. (°C)	Final Field Cond. (µS/cm)	Dissolved Oxygen (mg/L)	Flow
SWB4	Site 1	23-Apr-13	NM	8.0	NM	11.05	Low
		23-Aug-13	7.63	16.3	1703	7.66	Low
		10-Dec-13	7.04	3.9	1840	12.38	Moderate
SWB5	Upgradient	23-Apr-13	7.42	8.2	482	11.58	Moderate to High
		23-Aug-13	7.59	15.7	1443	6.88	Low
		10-Dec-13	7.41	4.8	1850	12.02	Moderate

Notes:

ppm = parts per million by volume
µS/cm = micro Siemens per centimetre

NM = not measured

4.8 Analytical Program

Golder retained the services of AGAT Laboratories Inc. (AGAT) of Mississauga, Ontario for the analysis of soil samples. The City retained the services of Exova of Ottawa, Ontario for the analysis of groundwater and surface water samples during the April 2013 sampling event and E3 Laboratories Inc. (E3) of Niagara-on-the-Lake, Ontario (which subcontracted a portion of the analyses to Caduceon Environmental Laboratories (Caduceon) of Kingston, Ontario in August 2013 and to Paracel Laboratories Ltd. (Paracel) of Niagara Falls in December 2013) for the August and December 2013 sampling events. AGAT, Exova, E3, Caduceon, and Paracel are accredited by the Standards Council of Canada/Canadian Association of Environmental Analytical Laboratories ("CAEAL") program. Analytical methods are reported by the laboratories on the Laboratory Certificates of Analysis provided in Appendices D through F.

4.8.1 Quality Assurance/Quality Control

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 D through F.

The laboratories maintain in-house quality assurance/quality control ("QA/QC") programs to govern sample analysis. Standard QA/QC protocols include the analysis of method blanks, matrix spikes and 10% replicates for each sample batch. In addition to the quality control employed by the laboratories, the following QA/QC samples were also submitted during the work program:

- One blind groundwater duplicate sample during each sampling event (MW-B22, a duplicate of MW-B2, Dup A, a duplicate of MW-B7, and Dup 1, a duplicate of MW-B6 in April, August, and December 2013, respectively) were submitted for analysis of all analyzed parameters;
- Four blind field blank samples (labelled as Field Blank) were submitted for analysis of all analysed parameters during the work program (i.e., a minimum of one field blank per sampling event); and,
- Three trip blank samples (labelled as Trip Blank) were submitted for analysis of all analyzed parameters during the April and August 2013 sampling events and for VOC only during the December 2013 sampling event.



5.0 PHYSICAL CHARACTERISTICS

5.1 Utilities and Water Supply

A number of public utilities are located in the vicinity of the Bunker's Creek Landfills, including municipal sewer and water services, natural gas, fibre optic, and telephone lines (Figure 5). No services are located within Vespra Street between Robert Street and Sanford Street where landfill impacts may exist.

5.2 Stratigraphy and Waste/Fill Distribution

Details of the conditions encountered in the boreholes are presented on the Record of Borehole sheets provided in Appendix A. Subsurface conditions encountered are specific to the borehole locations and are expected to vary between and beyond borehole and sampling locations. Whereas this is generally the case for any subsurface investigation, the variable nature of fill and waste placement associated with unorganized waste disposal operations is difficult to correlate. The drilling locations were limited by property ownership (only on City lands) and access, and the distribution and character of the waste between the wells is inferred and should be interpreted with caution.

The material encountered at the boreholes largely consisted of sand and gravel fill, waste, underlain by sand. Silty clay was noted at borehole B23 at a depth of 6.02 mbgs to the maximum depth of investigation. Figure 7 illustrates the materials encountered in the boreholes along a cross-section generally oriented from west to east through the Bunker's Creek Landfills.

Waste materials (i.e., asphalt, wood and brick) were encountered in borehole B23 ranging in depth from 0.71 m to 3.63 m. This borehole is in the Vespra Street ROW east of Site 7.

The waste/fill material is underlain by organic (peat) material, consistent with the location of the landfills adjacent to Bunker's Creek. Based on previous investigations, the municipal aquifer is encountered at an elevation of approximately 175 masl in the vicinity of the Sites. The nearest pumping well (i.e., Well 15) is located approximately 460 m east of Site 7.

5.3 Groundwater

A summary of groundwater elevations obtained from the on-Site monitoring wells and gas probes is provided in Table C-1 (Appendix C). The depths to groundwater in the monitoring wells as obtained during the work program are summarized in Table 5.1 below. Monitoring wells MW-B2, MW-B4, and MW-B7 exhibited odours (organic) during all sampling events. Hydrocarbon-related sheen or odours were noted in groundwater purged from monitoring well MW-B6. Groundwater elevations during the work program ranged from 219.23 masl (at MW-B7 in April 2013) to 222.83 masl (at MW-B1 in April 2013).

Figure 4 illustrates the groundwater flow directions within the waste and fill based on the available information from the wells in this study in August 2013. Groundwater flow is interpreted to be easterly overall, but locally towards the low point of Bunker's Creek. At Site 1, shallow groundwater flow is interpreted to be toward Bunker's Creek. Groundwater originating from the waste areas would flow away from adjacent properties located outside the estimated waste fill areas and impacts associated with buried waste would not be anticipated in these areas. At Site 2, shallow groundwater is interpreted to be toward Milligan's Pond or Bunker's Creek in the northern portion of the Site, north of the creek and north-easterly toward Bunker's Creek to the south of the Creek. Again, groundwater originating from within the waste fill areas would not likely impact adjacent properties



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outside the estimated limits of waste. At Sites 3 and 7, shallow groundwater flow is interpreted to be north toward Bunker's Creek and potentially flows off-Site to the adjacent property to the east before discharging to Bunker's Creek near monitoring well MW-B7.

Vertical gradients were calculated for the nested monitoring well locations where the gas probes were not dry. The vertical gradient could not be calculated at MW-B4 as the gas probe was offset. Vertical gradients at monitoring well nests B5 and B6 varied from slight downward gradients (less than -0.02 m/m in September 2012 and June 2013) to minimal gradients (less than 0.03 m/m) in April and December 2013. Vertical gradients at MW-B7 were consistently upwards ranging from 0.007 m/m in September 2012 and December 2013 to 0.01 m/m in April 2013.

Table 5.1: Summary of Groundwater Elevations - Bunker's Creek Monitoring Wells

Table 6.1. Summary of Groundwater Elevations, Banker's Creek, Westinghouse							
Well	Monitoring Pipe Elev. (masl)	Ground Surface Elev. (masl)	Top of Screen Elev. (masl)	Bottom of Well Elev. (masl)	Sampling Date	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
Site 1							
MW-B1	228.41	227.53	221.71	220.19	17-Sep-12	4.92	222.61
					22-Apr-13	4.70	222.83
					20-Jun-13	4.81	222.72
					21-Aug-13	4.91	222.63
					10-Dec-13	4.83	222.71
MW-B2	225.90	226.00	221.48	218.43	17-Sep-12	3.42	222.59
					22-Apr-13	3.31	222.69
					21-Aug-13	3.44	222.56
					10-Dec-13	3.33	222.67
Site 2							
MW-B3	225.94	224.85	223.76	220.71	17-Sep-12	2.35	222.50
					22-Apr-13	2.18	222.68
					20-Jun-13	2.16	222.69
					21-Aug-13	2.48	222.38
					10-Dec-13	2.33	222.53



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Well	Monitoring Pipe Elev. (masl)	Ground Surface Elev. (masl)	Top of Screen Elev. (masl)	Bottom of Well Elev. (masl)	Sampling Date	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
MW-B4	222.35	221.31	219.52	218.00	17-Sep-12	0.99	220.32
					22-Apr-13	0.86	220.45
					20-Jun-13	0.96	220.35
					20-Aug-13	1.02	220.29
					12-Dec-13	0.93	220.38
Site 3							
MW-B5	223.39	222.37	218.60	217.08	17-Sep-12	1.94	220.43
					4-Apr-13	1.83	220.58
					20-Jun-13	1.92	220.49
					10-Oct-13	1.91	220.50
					12-Dec-13	1.93	220.48
Site 7							
MW-B6	223.09	222.25	220.31	217.27	17-Sep-12	0.81	221.43
					22-Apr-13	0.54	221.71
					20-Jun-13	0.57	221.67
					20-Aug-13	0.73	221.51
					10-Dec-13	0.62	221.63
MW-B7	221.38	220.30	217.64	214.59	17-Sep-12	1.05	219.25
					22-Apr-13	1.08	219.23
					20-Jun-13	1.01	219.29
					21-Aug-13	0.87	219.44
					10-Dec-13	0.96	219.35



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Well	Monitoring Pipe Elev. (masl)	Ground Surface Elev. (masl)	Top of Screen Elev. (masl)	Bottom of Well Elev. (masl)	Sampling Date	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
MW-B23	221.01	221.14	220.26	217.21	20-Aug-13	0.56	220.58
					10-Dec-13	0.32	220.82

Notes:

mbgs =metres below ground surface

masl = metres above sea level



6.0 INVESTIGATION RESULTS

6.1 Site Condition Standards

The analytical results for soil and groundwater were compared to the full depth site condition standards for residential/parkland/institutional 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 April 15, 2011 ("MOE Table 2 Standards").

Based on information obtained from the boreholes, the Site is generally underlain by soils, which consist of more than 50 percent by mass of particles that are 75 µm or larger in mean diameter. Therefore, the texture of soil at the Site would likely be classified as coarse-grained for the application of site-condition standards set out in O. Reg. 153/04, as amended.

The MOE Table 2 Standards are considered an appropriate basis of comparison for the sites based on public/pedestrian access and the use of an underlying aquifer as a water supply source for the City.

The MOE Table 2 Standards are provided in Tables 3 through 7 (attached). The respective Ontario Drinking Water Standards (ODWS) are also provided with the groundwater analytical results in Tables 5 through 7 following the text of the report. The analytical results for surface water samples were compared to the respective Provincial Water Quality Objectives (PWQO) for surface water and are summarized in Tables 8 and 9 following the text of the report.

In the event of a clean-up and Record of Site Condition filing for the Bunker's Creek Landfills, the MOE Table 2 site condition standards would not strictly apply to all areas of the site due to the proximity to Bunker's Creek (i.e., within 30 m) and the elevated pH values in select soil samples obtained from this investigation. The MOE Table 2 Standards have been used as a basis of comparison for this report.

6.2 Soil

Laboratory Certificates of Analysis for soil are provided in Appendix D.

Previous waste classification analysis on two soil samples indicated that the soil could be classified as solid non-hazardous waste (Golder, 2013).

Soil quality in the sample collected from fill material within borehole B23 met the MOE Table 2 standards for BTEX and PHC F1 to F4.

6.3 Groundwater

Groundwater sample locations for which the analytical results exceed the various standards used for comparison are provided on Figure 6. Laboratory Certificates of Analysis for groundwater are provided in Appendix E.

VOC, Metals, Major Ions, and PAH

Groundwater quality in samples collected from the monitoring wells met the MOE Table 2 Standards and/or the ODWS for the analyzed parameters, with the exception of the following:



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Table 6.1: Summary of 2013 Groundwater Exceedances

Monitoring Well ID	Contaminant Type	Parameter	Units	ODWS	MOE Table 2 Standard	Concentration	Date
MW-B1	Metals	Cobalt	µg/L	NS	3.8	4.9	Apr-2013
		Iron	µg/L	300 (AO)	NV	1620	Apr-2013
		Vanadium	µg/L	NS	6.2	7.9	Dec-2013
	Inorganics	Chloride	mg/L	250 (AO)	790	240 to 959	Apr-13 to Dec-13
		Sodium	mg/L	200 (AO)	490	550 to 710	Apr-13 to Dec-13
		PHC F3	µg/L	NS	500	500/900	Apr-13 (dup)
MW-B2	PAH	Naphthalene	µg/L	NS	11	14.2 / 36.2	Apr-13 / Dec-13
		Phenanthrene	µg/L	NS	1	2.3 to 5.6	Apr-13 to Dec-13
		Fluoranthene	µg/L	NS	0.41	1.2 to 6.6	Apr-13 to Dec-13
		Pyrene	µg/L	NS	4.1	6.2	Apr-13
		Benzo(a)anthracene	µg/L	NS	1.0	2.6	Apr-13
		Chrysene	µg/L	NS	0.1	0.41 to 2.6	Apr-13 to Dec-13
		Benzo(b)fluoranthene	µg/L	NS	0.1	0.44 to 2.4	Apr-13 to Dec-13
		Benzo(k)fluoranthene	µg/L	NS	0.1	0.22 to 2.2	Apr-13 to Dec-13
		Benzo(a)pyrene	µg/L	0.01	0.01	0.02 to 2.69	Apr-13 to Dec-13
		Indeno(1,2,3-cd)pyrene	µg/L	NS	0.2	1.7 / 0.78	Apr-13 / Aug-13
		Benzo(g,h,i)perylene	µg/L	NS	0.2	0.21 to 1.7	Apr-13 to Dec-13
		Biphenyl	µg/L	NS	0.05	0.16	Dec-13
		2-and1-methylnaphthalene	µg/L	NS	3.2	3.82	Dec-13
		Iron	µg/L	300 (AO)	NV	133 to 34600	Apr-13 to Dec-13
MW-B3	Metals	Lead	µg/L	10	10	55.6	Aug-13
		Vanadium	µg/L	NS	6.2	15	Dec-2013
	Inorganics	Chloride	mg/L	250 (AO)	790	360 to 396	Apr-13 to Dec-13
		Sodium	mg/L	200 (AO)	490	232 to 267	Apr-13 to Dec-13
	Metals	Cobalt	µg/L	NS	3.8	4.0	Apr-13
	Inorganics	Sodium	mg/L	200 (AO)	490	403 to 546	Apr-13 to Dec-13
		Nitrite	mg/L	1.0	NV	4.82	Dec-13



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Monitoring Well ID	Contaminant Type	Parameter	Units	ODWS	MOE Table 2 Standard	Concentration	Date
MW-B4	VOC	Benzene	µg/L	5	5.0	5.9	Dec-13
		1,4-Dichlorobenzene	µg/L	5	1	2.1 to 3.9	Apr-13 to Dec-13
	PHC	PHC F3	µg/L	NS	500	700	Apr-13
	PAH	Chrysene	µg/L	NS	0.1	0.24	Aug-13
MW-B4	Metals	Iron	µg/L	300 (AO)	NV	44900 / 70500	Apr-13 to Dec-13
		Lead	µg/L	10	10	66.9	Aug-13
		Vanadium	µg/L	NS	6.2	9.8 / 37.3	Aug-13 / Dec-13
		Mercury	mg/L	0.001	0.00029	0.0003	Aug-13
MW-B5	Inorganics	Chloride	mg/L	250 (AO)	790	552 to 590	Apr-13 to Dec-13
		Sodium	mg/L	200 (AO)	490	269 / 339	Apr-13 to Dec-13
	PAH	Fluoranthene	µg/L	NS	0.41	0.72	Aug-13
		Chrysene	µg/L	NS	0.1	0.29	Aug-13
MW-B5		Benzo(b)fluoranthene	µg/L	NS	0.1	0.42	Aug-13
		Benzo(k)fluoranthene	µg/L	NS	0.1	0.12	Aug-13
		Benzo(a)pyrene	µg/L	0.01	0.01	0.271	Aug-13
	Metals	Iron	µg/L	300 (AO)	NV	19500 to 33100	Apr-13 to Dec-13
MW-B6	Inorganics	Chloride	mg/L	250 (AO)	790	510 to 567	Apr-13 to Dec-13
		Sodium	mg/L	200 (AO)	490	318 to 333	Apr-13 to Dec-13
	PHC	PHC F3	µg/L	NS	500	700	Apr-13
	PAH	Fluoranthene	µg/L	NS	0.41	1.39	Aug-13
MW-B6		Chrysene	µg/L	NS	0.1	0.56	Aug-13
		Benzo(b)fluoranthene	µg/L	NS	0.1	0.62	Aug-13
		Benzo(a)pyrene	µg/L	0.01	0.01	0.462	Aug-13
		Benzo(g,h,i)perylene	µg/L	NS	0.2	0.26	Aug-13
MW-B6	Metals	Iron	µg/L	300 (AO)	NV	9790 to 31000	Apr-13 to Dec-13
		Vanadium	µg/L	NS	6.2	9.8/18.1	Dec-2013 (dup)
MW-B6	Inorganics	Chloride	mg/L	250 (AO)	790	395 to 938	Apr-13 to Dec-13
		Sodium	mg/L	200 (AO)	490	367/381	Dec-13 (dup)

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Monitoring Well ID	Contaminant Type	Parameter	Units	ODWS	MOE Table 2 Standard	Concentration	Date
MW-B7	PAH	Phenanthrene	µg/L	NS	1	1.4/1.2	Aug-13 (dup)
		Fluoranthene	µg/L	NS	0.41	1.4/1.1	Aug -13 (dup)
		Chrysene	µg/L	NS	0.1	0.6/0.4	Aug -13 (dup)
		Benzo(b)fluoranthene	µg/L	NS	0.1	0.2 to 0.7	Aug -13 / Dec-13
		Benzo(k)fluoranthene	µg/L	NS	0.1	0.3	Aug -13
		Benzo(a)pyrene	µg/L	0.01	0.01	0.08 to 0.48	Aug -13 / Dec-13
		Indeno(1,2,3-cd)pyrene	µg/L	NS	0.2	0.30/0.27	Aug -13 (dup)
		Benzo(g,h,i)perylene	µg/L	NS	0.2	0.33/0.31	Aug -13 (dup)
MW-B23	Metals	Iron	µg/L	300 (AO)	NV	1710 to 34900	Apr-13 to Dec-13
		Vanadium	µg/L	NS	6.2	12.3	Dec-2013
	Inorganics	Chloride	mg/L	250 (AO)	790	483 to 541	Apr-13 to Dec-13
		Sodium	mg/L	200 (AO)	490	299 to 304	Apr-13 to Dec-13
MW-B23	Metals	Iron	µg/L	300 (AO)	NV	3340 / 4730	Aug-13 / Dec-13
	Inorganics	Chloride	µg/L	250 (AO)	790	921 / 952	Aug-13 / Dec-13
		Sodium	mg/L	200 (AO)	490	457 / 469	Aug-13 / Dec-13

Notes:

NS = No standard

NV = No value

AO = Aesthetic objective



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Elevated sodium and chloride concentrations at all monitoring well locations may be attributable to road salt application in the vicinity of Vespra Street; however, waste material in these areas may also contribute to these elevated concentrations. The elevated benzene and 1,4-dichlorobenzene values at MW-B4 and historically at MW-B6 are also likely attributable to leaching of the waste materials at these locations from disposal of liquid chemical wastes.

The mercury exceedance at MW-B4 (0.0003 mg/L in August 2013) is only slightly above the MOE Table 2 Standard of 0.0029 mg/L, but remains below the ODWS of 0.001 mg/L and appears to be anomalous. This should be confirmed during subsequent sampling events.

Detectable concentrations of fluoride (0.2 mg/L) were encountered at all seven locations in August 2013 only.

The only detectable concentration of nitrite was reported at MW-B3 (4.82 mg/L) in December 2013, above the ODWS of 1.0 mg/L.

Nitrate was detected at MW-B1 (ranging from 2.34 mg/L to 7.3 mg/L in 2013) and MW-B3 (ranging from 1.59 mg/L to 5.4 mg/L), all below the ODWS of 10 mg/L.

Elevated PAH concentrations at monitoring well MW-B2, MW-B5, MW-B6, and MW-B23 may be attributed to the types of waste buried at these locations or potential burning of wastes in these areas; however may also be impacts relating to adjacent properties or former site use. Elevated PAH concentrations at MW-B7 in August and slightly lower in December 2013 may be attributable to impacts relating to adjacent properties or former site use; however, PAH were non-detect prior to August 2013 and these values should be confirmed during subsequent sampling events ensuring little to no silt is contained within the sample as this can bias the concentrations high.

Indicator Parameters

In the absence of either an MOE Table 2 Standard or ODWS, relative comparisons can be made regarding general water quality for parameters such as electrical conductivity, ammonia as N, chromium III, phenols, potassium, bromide, and phosphate. Ammonia is notably present in landfill leachate as a result of the breakdown of the organic waste component. This parameter has been added to the information in Table 6.

Elevated electrical conductivity was identified at monitoring wells MW-B1 (up to 3740 μ S/cm in December 2013), MW-B4 (up to 3460 μ S/cm in December 2013), and MW-B6 (up to 3410 μ S/cm in December 2013) which indicates that these wells are susceptible to surface infiltration and likely to road salt impacts as supported by the elevated sodium and chloride values at this location. Given their locations (i.e., within the waste fill), MW-B4 and MW-B6 are also likely influenced by surrounding waste.

Elevated ammonia concentrations were identified, notably at monitoring well MW-B4 (ranging from 116 mg/L to 149 mg/L in 2013) and MW-B6 (ranging from 18.8 mg/L to 36.4 mg/L in April 2013), considered to be indicative of impacts relating to waste in the vicinity of these wells. Elevated, albeit lower concentrations of ammonia were detected at MW-B2 (ranging from 12.9 mg/L to 13.6 mg/L in 2013), also located within the waste fill in the west part of Site 1.

Bromide was detected slightly above the laboratory reportable detection limit of 0.10 μ g/L at three of the eight locations in August 2013 and at six of the eight locations in December 2013. This parameter is therefore not particularly useful in terms of assessing landfill impacts.



Phosphate was detected at MW-B6 (0.02 mg/L) in August 2013 and at all seven locations (up to 0.07 mg/L), in August 2013.

Overall, the results of the monitoring indicate that monitoring wells MW-B2, MW-B4 and MW-B6 are impacted by the former landfills, largely on the basis of elevated ammonia and organic compounds, whereas impacts at monitoring wells MW-B1, MW-B5, MW-B7 and MW-B23 are less as a result of local waste fill characteristics, or distance from the fill area.

6.4 Surface Water

Surface water sample locations for which the analytical results exceed the various standards used for comparison are provided on Figure 6. Laboratory Certificates of Analysis for groundwater are provided in Appendix E

Surface water quality in samples collected from five locations along Bunker's Creek (see Figures 2 and 6) met the PWQO for the analyzed parameters, with the exception of the following:

- **Iron at all sampling locations** ranging in concentration from 0.511 mg/L (SWB5 in December 2013) to 1.48 mg/L (SWB1 in December 2013), greater than the PWQO of 0.3 mg/L at all locations; and,
- **Copper at all sampling locations in August 2013 only**, ranging in concentration from 0.010 mg/L (SWB5) to 0.0091 (SWB1), greater than the PWQO of 0.005 mg/L.

The relative percent difference in iron concentration between upstream (SWB5) and downstream (SWB1) samples is 97% with peaks in the vicinity of Sites 1 and 2. These elevated iron concentrations may be attributed to the types of waste buried at these locations, however it is noted that iron concentrations exceed the PWQO in Bunker's Creek prior to flowing through the landfill sites, consistent with 2012 sampling results.

Previous exceedances of vanadium were not evident during the 2013 sampling program.

The copper exceedances noted in August and December 2013 are within five times the laboratory reportable detection limit of 0.002 mg/L and are close to the PWQO of 0.005 mg/L. The concentration of copper was highest in the downgradient surface water sampling location (i.e., as it leaves the vicinity of the landfills), but should still be viewed with caution as these results were not duplicated in the December 2013 sampling event and remain close to the laboratory RDL. The concentration of copper at SWB1 in December 2013 (0.0048 mg/L) was slightly less than the PWQO; however, remained the highest concentration, indicating that the landfills may be contributing to slightly elevated copper concentrations in Bunker's Creek.

Indicator Parameters

In the absence of a PWQO, relative comparisons can be made regarding general water quality for parameters such as electrical conductivity, calcium, magnesium, potassium, sodium and chloride.

Concentrations of sodium and chloride are highest in surface water samples in the vicinity of Sites 1 and 2. Elevated concentrations of the same parameters are noted in groundwater throughout the Sites. This indicates that Bunkers Creek is possibly exposed to road salt run-off from nearby roadways (i.e., Anne Street and Innisfil Street).

Ammonia is highest in the downstream sample (SW-B1) in 2013 ranging from 0.29 mg/L to 0.96 mg/L, while the upstream sample (SW-B5) ranged from non-detect to 0.25 mg/L. Unionized ammonia concentrations were



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calculated based on these data and all concentrations were less than or equal to 0.005 mg/L (less than the PWQO of 0.020 mg/L) at all sampling locations throughout 2013.

Concentrations of the remaining indicator parameters are similar in all surface water samples.

The former presence of leachate seeps between Sanford and Innisfil Streets and immediately west of the bridge near Innisfil Street (MOE, 2011) were not observed during the 2013 sampling events. EC values remained consistent throughout the sampling locations (ranging from 1,380 μ S/cm to 2,580 μ S/cm throughout 2013).

It was previously concluded that limited surface and groundwater interactions (such as upwelling or mixing) were occurring in the creek bed interface with the exception of bank slope seepage, but that significant impacts were occurring to the aquatic community (MOE, 2011).

Former leachate seeps were reported between Sanford and Innisfil Streets and immediately west of the bridge near Innisfil Street (MOE, 2011). During the 2013 work program, landfill odour was noted in the vicinity of SW-B1 in April and August 2013 and an iron sheen was noted at the same location in August 2013 only. No leachate seeps were noted in 2013.

Based on these results, the former leachate pools may have been attributed to the former landfills at the reported locations, specifically at the leachate pool reported west of Innisfil Street. The groundwater in the immediate vicinity of the leachate pool between Innisfil and Sanford Streets could not be assessed as this property is owned by private individuals and a comparison to groundwater composition and surface water impacts could not be conducted. It is expected that waste does exist within Sites 3 and 7, but the extent and composition (and potential related impacts) are unknown at this time. Additional investigations at these properties are still required.

6.5 Quality Assurance/Quality Control

Relative percent difference ("RPD") calculations are completed on samples where both the original and replicate/duplicate concentrations are greater than five times the laboratory detection limits.

Field duplicate groundwater samples with calculated RPD of greater than 50% are considered questionable. One blind field duplicate sample was collected during each sampling event during the 2013 work program. RPD values for field duplicate samples were less than 50%, with the exception of the following:

- naphthalene (53%), phenanthrene (139%), and 2-and 1-methylnaphthalene (57%) in the duplicate samples collected from monitoring well MW-B2 in April 2013;
- Iron (177%) and vanadium (51%) in the duplicate samples collected from monitoring well MW-B7 in August 2013; and,
- Iron (104%), vanadium (59%), and xylene mixture (57%) in the duplicate samples collected from monitoring well MW-B6 in December 2013

The RPD values that are above the limit of 50% do not significantly affect the results of the monitoring program as the concentrations of these parameters in all duplicate samples were either both above or both below the ODWS and/or MOE Table 2 Standard. Duplicate samples generally confirmed the results of the original sample and overall were considered acceptable for the analyzed parameters.



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The pH values in the monitoring wells were within the allowable range for all samples with the exception of monitoring well MW-B4 (6.48) and MW-B6 (6.35 and 6.34 in the original and duplicate sample) in December 2013, which were marginally lower than the ODWS range of 6.5 to 8.5. These slightly lower pH values correspond with higher vanadium, chloride, and sodium concentrations reported at these locations.

Surrogate standard recoveries outside the range, typically, of 70-130% are indicative of questionable results for the tested volatile organic compounds. Surrogate recoveries for MW-B3 (68.6%), MW-B4 (68.3% and 69.5%), Dup 1 (69.8%), SW-B1 (69.9%), and SW-B5 (67.4%) in December 2013 were outside the acceptable range indicating the reported VOC results may be biased slightly low for the samples. The remainder of the reported surrogate recoveries are considered acceptable on this basis.

Laboratory duplicate samples with RPDs outside the range, typically, of 0-20% are indicative of questionable results for the tested parameters. The laboratory RPD for antimony (100%) and m,p-xylenes (61.7%) were outside the acceptable range during the December 2013 sampling event. The high RPD for antimony was attributed by Paracel to low concentrations, within ten times the method detection limit, while the elevated m,p-xylenes RPD was attributed to sample heterogeneity. The remainder of the reported laboratory RPDs are considered acceptable.

Matrix spike recoveries outside the typical range of individual parameters are indicative of questionable results for the tested VOC. The reported matrix spike recoveries are considered acceptable on this basis.

E3 and Caduceon did not provide their QA/QC results during the August 2013 sampling event; however, no issues were reported for the analytical results provided.

Concentrations of analyzed parameters in the trip blanks and field blank samples were less than their respective laboratory detection limits with the exception of the following:

- Ammonia (0.07 mg/L) and chloroform (0.8 µg/L) in the field blank submitted in April 2013. The ammonia results for the associated groundwater and surface water samples collected in April 2013 appear similar to other sampling events. No chloroform was detected in the groundwater and surface water samples during the April 2013 sampling event. These low detections do not appear to significantly alter the findings of this report;
- Vanadium (0.2 µg/L), nitrate (0.1 mg/L), fluoride (0.2 mg/L), and naphthalene (0.07 µg/L) in the field blank submitted in August 2013. Concentrations of vanadium, nitrate, and naphthalene in groundwater and surface water samples collected during the August 2013 appear similar to other sampling events and are in many cases, not detected. Trace detections of fluoride (0.2 mg/L) at all groundwater sampling locations in August 2013 should be viewed as suspect based on the field blank results and are likely anomalous as they were not detected at any location during any other sampling event;
- Mercury (0.0001 mg/L) in the field blank submitted on December 11, 2013. Mercury was only detected at monitoring well MW-B2 in December 2013, consistent with previous sampling events. This low detection does not appear to significantly alter the findings of this report; and,
- Ammonia (0.06 mg/L), naphthalene (0.24 µg/L), and 2-and 1-methylnaphthalene (0.23 µg/L) in the trip blank submitted in August 2013. The ammonia, naphthalene, and 2-and 1-methylnaphthalene results for



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the associated groundwater and surface water samples collected in August 2013 appear similar to other sampling events. These low detections do not appear to significantly alter the findings of this report.

Based on the above, the associated analytical results generally appear to be representative and reproducible; however, consistent laboratory analytical locations would be recommended in the future.



7.0 LANDFILL GAS

Figure 3 provides a summary in plan view of the worst case methane gas distribution at the Bunker's Creek Landfill Sites based on the current investigation throughout 2013. In some cases, the gas probe screens were below the depths to groundwater and these results should be reviewed with caution (i.e., at GP-B6 intermittently, GP-B13, GP-B15, and GP-B17 intermittently). Large variability in LFG concentrations were noted at gas probes GP-B6, GP-B9, GP-B12, and GP-B15.

Table 7.1 provides a summary of methane gas concentrations in gas probes where methane concentration of greater than 5% LEL was noted on at least one occasion. Concentrations of methane gas above the LEL represent a potential hazard to adjacent buildings, as the gas within the soil can potentially accumulate within adjacent buildings and result in conditions where open flame or a spark could cause an explosion.

Within the waste fill area, the concentration at most wells is below 5% (the Lower Explosive Limit (LEL) of methane). Elevated methane gas concentrations (above 5% LEL) were observed at gas probes GP-B2, GP-B6, GP-B10, GP-B12, GP-B15, and GP-B16, consistent with previous results. The highest concentration of methane in 2013 was noted at GP-B16 (up to 40.5%). At GP-B6, where methane concentrations were higher in previous monitoring programs (up to 84% in October 2012), declines are noted in 2013 (19.5% in October 2013, below 5% otherwise).

Methane concentrations in all of the gas probes outside of the waste fill area are below 0.2%. Based on these data, LFG (as defined by methane concentrations) has not migrated north of Sites 1 and 2, or east of Site 7. It has also not migrated west of Anne Street (west of Site 1), south of Vespra Street (on the west side of Site 1), or south of Victoria Street (south of Site 2).

There are no longer any buildings present adjacent to these elevated methane gas concentrations. Fire Hall #1, formerly located at 65 Vespra Street, which was formerly located near the elevated methane concentrations in Site 3, was demolished in July 2013. Elevated methane concentrations at gas probe GP-B2 (Boys Street, north of Vespra Street) are located in a developed area approximately 20 m from an industrial building. Gas probe GP-B8 was installed closer to the buildings within the Boys Street right-of-way within 10 m of the adjacent buildings. Methane gas was not present at GP-B8.

The elevated methane concentrations within the waste indicate that although the waste is quite old (more than 25 years), it is still generating methane. As noted in earlier reports, elevated concentrations of methane above 50% to 60% indicate that the methane percentage of the airspace readings is artificially enhanced due to the dissolution of carbon dioxide back into the groundwater. This indicates that methane is not being generated at significant quantities and may be indicative of low potential for migration, supported by the evident low concentrations at distance from the fill area. These gas probes with elevated methane are located adjacent to parking lots, roadways, and open space and the results are not an immediate concern to the known presence of buildings or enclosed structures.



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Table 7.1 Summary of Methane Concentrations Greater than 5% LEL - Bunker's Creek Landfills

Location	Screen Interval (mbgs)	Screen Installation Description	Date	Depth to Groundwater (mbgs)	Gem 2000 Reading (% by volume)
Site 1					
GP-B2	1.37 – 2.90	Within waste fill area	18-Oct-12	NM	CH ₄ = 12.6**
			24-Oct-12	NM	CH ₄ = 15.4**
			3-Dec-12	1.17	CH ₄ = 19.9**
			18-Dec-12	Dry	CH ₄ = 21.5**
			23-Apr-13	Dry	CH ₄ = 15.3**
			22-Aug-13	Dry	CH ₄ = 15.3**
			10-Oct-13	Dry	CH ₄ = 21.4**
			12-Dec-13	Dry	CH ₄ = 4.5
GP-B9	0.77 – 2.29	Within the fill overlying waste	3-Dec-12	1.15	CH ₄ = 0.4
			18-Dec-12	1.21	CH ₄ = 1.0
			4-Apr-13	1.03	CH ₄ = 0.0
			20-Jun-13	1.17	CH ₄ = 1.8
			22-Aug-13	1.26	CH ₄ = 1.0
			10-Oct-13	1.13	CH ₄ = 0.0
			12-Dec-13	1.12	CH ₄ = 0.0
			25-Feb-14	1.18	CH ₄ = 6.1**
GP-B10	0.76 – 2.29	Within waste fill area	31-Mar-14	1.02	CH ₄ = 0.2
			3-Dec-12	1.13	CH ₄ = 46.9**
			18-Dec-12	1.10	CH ₄ = 37.9**
			4-Apr-13	1.01	CH ₄ = 32.5**
			20-Jun-13	1.13	CH ₄ = 35.2**
			22-Aug-13	1.32	CH ₄ = 35.2**
			10-Oct-13	1.21	CH ₄ = 28.6**
			12-Dec-13	1.19	CH ₄ = 38.4**
			12-Feb-14	1.33	CH ₄ = 27.3**



SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS, CITY OF BARRIE BUNKER'S CREEK HISTORICAL LANDFILLS

Location	Screen Interval (mbgs)	Screen Installation Description	Date	Depth to Groundwater (mbgs)	Gem 2000 Reading (% by volume)
Site 2					
GP-B12	0.77 – 2.29	Within waste fill area	3-Dec-12	0.77	CH ₄ = 0.0
			18-Dec-12	0.84	CH ₄ = 0.0
			4-Apr-13	0.75	CH ₄ = 0.5
			20-Jun-13	0.86	CH ₄ = 0.3
			22-Aug-13	0.90	CH ₄ = 4.4
			10-Oct-13	0.83	CH ₄ = 6.4**
			12-Dec-13	0.88	CH ₄ = 0.0
			12-Feb-14	0.91	CH ₄ = 0.0
Site 3					
GP-B15	1.52 – 3.05	Within waste fill area	28-Jun-12	1.27	CH ₄ = 8.8**
			18-Oct-12	NM	CH ₄ = 2.7
			24-Oct-12	NM	CH ₄ = 13.3**
			3-Dec-12	1.27	CH ₄ = 4.0
			18-Dec-12	1.19	CH ₄ = 18.2**
			4-Apr-13	1.12	CH ₄ = 2.5
			20-Jun-13	1.26	CH ₄ = 5.8**
			22-Aug-13	1.32	CH ₄ = 5.4**
			10-Oct-13	1.29	CH ₄ = 10.9**
			12-Dec-13	1.27	CH ₄ = 1.8
			12-Feb-14	1.38	CH ₄ = 13.0**
GP-B16	0.91 – 2.44	Within waste fill area	3-Dec-12	1.77	CH ₄ = 49.3**
			18-Dec-12	1.73	CH ₄ = 45.2**
			23-Apr-13	1.57	CH ₄ = 17.3**
			20-Jun-13	1.66	CH ₄ = 15.1**
			10-Oct-13	1.76	CH ₄ = 40.5**
			12-Dec-13	1.71	CH ₄ = 38.0**
			19-Mar-14	1.72	CH ₄ = 23.7**



SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS, CITY OF BARRIE BUNKER'S CREEK HISTORICAL LANDFILLS

Location	Screen Interval (mbgs)	Screen Installation Description	Date	Depth to Groundwater (mbgs)	Gem 2000 Reading (% by volume)
Site 7					
GP-B6	0.61 – 1.52	Within the fill overlying waste	21-Mar-12	0.41	CH ₄ = 0.2
			22-Mar-12	NM	CH ₄ = 0.1
			28-Jun-12	NM	CH ₄ = 0.0
			18-Oct-12	NM	CH ₄ = 61.8**
			19-Oct-12	NM	CH ₄ = 82.3**
			24-Oct-12	NM	CH ₄ = 84.0**
			3-Dec-12	0.65	CH ₄ = 33.2**
			18-Dec-12	0.51	CH ₄ = 14.4**
			4-Apr-13	0.32	CH ₄ = 1.6
			20-Jun-13	0.59	CH ₄ = 0.1
			22-Aug-13	Dry	CH ₄ = 0.0
			10-Oct-13	0.76	CH ₄ = 19.5**
			12-Dec-13	0.71	CH ₄ = 3.2
			12-Feb-14	0.86	CH ₄ = 71.3**

Notes:

CH₄ = methane

NM = not measured

CO₂ = carbon dioxide

O₂ = oxygen

** headspace methane concentration is greater than 5% by volume, the lower explosive limit of methane.



8.0 SUMMARY AND DISCUSSION

8.1 Estimated Extent of Waste

The estimated areal extent of waste is illustrated on Figure 2 and in cross section on Figure 7. The estimated areal extent of waste in the Bunker's Creek Landfills is based on aerial photographs and the subsurface investigations described in this report and the 2012 Subsurface Investigation (Golder, 2013). It is noted that the delineation of waste extent was limited to sites accessible to the City (i.e., City owned lands). It is further noted that access to Site 2 was limited due to forest cover in the vicinity of Milligan's Pond.

The landfill is present on both sides of Bunker's Creek, and is bounded by Anne Street to the west, Bradford Street to the east, Perry Street to the north, and Victoria Street to the south. In regards to the City owned former Fire Hall property, the available information indicates that the waste extends to the north of the former building, but not beyond (i.e., to the south).

Overall, the material within the Bunker's Creek Landfills consisted of coarse soil fill overlying thin layers of waste material.

8.2 Environmental Conditions

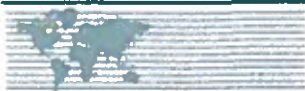
For the most part, the waste materials identified in the previously drilled boreholes consisted of solid materials (e.g., glass, plastic, bricks, metal) and did not contain putrescible materials. The chemical quality of groundwater samples exceeded the MOE Table 2 Standards and/or the ODWS at all locations.

The quality of groundwater samples collected from two monitoring wells located in the north parts of Sites 1 and 2 (i.e., MW-B1 and MW-B3) does not appear to be impacted by buried waste material. Monitoring wells MW-B2, MW-B4, MW-B5, and MW-B6 (located within each of the four former landfill sites) exhibit VOC, metals, and/or PAH impacts considered to most likely be related to the presence of buried waste material. Monitoring wells MW-B23 and MW-B7, located east of Site 7, appear to be impacted by PAH; however, it cannot be confirmed whether this is related to the presence of the landfill or possibly due to the silty nature of the samples. Confirmation of these results is recommended and, if confirmed, additional sampling downgradient of these locations would be required (i.e., east of Bradford Street).

Groundwater flow is interpreted to be easterly overall, but locally towards the low point of Bunker's Creek, consistent with 2012 findings. As a result, groundwater impacts from the landfills are considered to be limited to the identified waste fill area and do not extend north of Sites 2, 3 and 7, nor south of Sites 1, 3 and 7.

Methane concentrations in all of the gas probes outside of the waste fill area are below 0.2%. Based on these data, LFG (as defined by methane concentrations) has not migrated north of Sites 1 and 2, or east of Site 7. It has also not migrated west of Anne Street (west of Site 1), south of Vespra Street (on the west side of Site 1), or south of Victoria Street (south of Site 2).

There are no longer any buildings present adjacent to these elevated methane gas concentrations. Fire Hall #1, formerly located at 65 Vespra Street, which was formerly located near the elevated methane concentrations in Site 3, was demolished in July 2013. Elevated methane concentrations at gas probe GP-B2 (Boys Street, north of Vespra Street) are located in a developed area approximately 20 m from an industrial building. Gas probe GP-B8 was installed closer to the buildings within the Boys Street right-of-way within 10 m of the adjacent buildings. Methane gas was not present at GP-B8.



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No utilities are reported to be present in areas identified to contain waste, with the exception of the Boys Street unopened road allowance (near GP-B8) and within Sanford Street, southeast of Site 7. Groundwater flow is northerly, away from the utility corridors and landfill gas is not present within the vicinity of these corridors.

Surface water quality results from samples collected as part of this investigation indicated the presence of elevated iron concentrations; however, concentrations of iron exceed the PWQO in samples collected upstream of the former landfill sites.

Ammonia concentrations in surface water in 2013 are highest in the downstream sample (SW-B1), ranging from 0.29 mg/L to 0.96 mg/L, whereas concentrations in the upstream sample (SW-B5) ranged from non-detect to 0.25 mg/L. Concentrations of the remaining indicator parameters are similar in all surface water samples. Unionized ammonia concentrations were calculated based on these data and all concentrations were less than or equal to 0.005 mg/L (less than the PWQO of 0.020 mg/L) at all sampling locations throughout 2013.

Leachate seeps were reported to have existed previously, between Sanford and Innisfil Streets and immediately west of the bridge near Innisfil Street (MOE, 2011). During the 2013 work program, odour (possibly waste related) was noted in the vicinity of SW-B1 in April and August 2013; an iron sheen was noted at the same location in August 2013. No leachate seeps were noted in 2013.

Based on these results, the former leachate seeps may have been attributed to the former landfills at the reported locations, specifically at the leachate seep reported west of Innisfil Street. The groundwater in the immediate vicinity of the leachate seep between Innisfil and Sanford Streets could not be assessed as this property is owned by private individuals. It is expected that waste does exist within Sites 3 and 7, but the extent and composition are unknown at this time. Additional investigations at these properties are still required.

8.3 Extent of Bunker's Creek Landfills Impact

Soil impacts are not anticipated to extend beyond the limits of waste. Refer to the previous D4 Assessment Study results (Golder, 2013). Impacts assumed to be related to road salt application (i.e., electrical conductivity, sodium adsorption ratio, sodium, and chloride) are exempt under O.Reg.153/04.

Interpreted groundwater flow direction is toward Bunker's Creek and ultimately to the east toward Lake Simcoe. Monitoring wells MW-B1 and MW-B3, located at the northern limits of Sites 1 and 2 do not appear to be impacted by buried waste, which is consistent with the anticipated limits of the household waste fill locations. Monitoring wells MW-B23 and MW-B7, located east of Site 7, appear to be impacted by PAH; however, it cannot be confirmed whether it is related to the presence of the landfill or possibly due to the silty nature of the samples. As stated above, based on interpreted shallow horizontal groundwater flow, groundwater outside the limits of waste (with the exception of to the east of Site 7), would not be impacted by buried waste materials.

Landfill gas has not migrated significantly beyond the former landfill site to the north of Sites 1 and 2, or east of Site 7 (as shown by non-detectable readings of methane at locations GP-B1, GP-B3, GP-B4, GP-B13, GP-B18, GP-B19, and GP-B7). Concentrations are generally below a concentration of 5%, the Lower Explosive Limit (LEL) of methane, with the exception of GP-B2, GP-B6, GP-B10, GP-B15, and GP-B16 which are located within the waste fill areas in the centre or southern portions of the former landfills.



9.0 POTENTIAL REMEDIAL MEASURES FOR CONSIDERATION OF FUTURE DEVELOPMENT

With respect to the potential for future development of lands adjacent to a former landfill, the guidelines set out a number of criteria relative to D-4 guidelines, including those related to groundwater, surface water, soil, land settlement and landfill gas (LFG). Of these, landfill gas migration is typically the primary concern associated with the presence of waste materials in developed areas. This is because LFG can migrate through permeable unsaturated soils and potentially result in explosive concentrations of flammable gas. The typical action level for landfill gas monitoring programs is 1% methane (10% to 20% of the LEL).

Typical Landfill Gas Remedial Measures

Actions which are taken with respect to LFG are dependent upon the specific situation at each site, but can include:

- Notification of the nearby receptors (e.g., property owner, residents) and building design risk assessment possibly including monitoring of methane in the potentially affected buildings;
- Installation of methane monitoring alarm systems in adjacent buildings;
- Installation and monitoring of new gas probes closer to the receptor/building;
- Installation of or construction with passive or active LFG control at the receptor/building;
- Excavation (removal) of the waste materials; and,
- Construction of cut-off walls and passive or active gas venting/collection systems.

Waste Excavation

Excavation of waste can be undertaken in order to remove the source and rehabilitate the property through the placement of clean fill. In some cases, waste excavation is undertaken as part of development and can be incorporated into the design of the buildings and land development features. Appropriate environmental and safety controls should be developed for any such excavation.

The waste materials excavated from the closed landfills may be disposed of at a licensed landfill site, provided that the materials meet the required testing standards and the material is managed in accordance with MOE regulations.

Landfill Gas Barrier System and Landfill Gas Vents

The installation of a landfill gas barrier system or vents typically involve the excavation of a trench between the waste ("source") and the receptor, followed by the installation of a low permeability geomembrane on the "receptor" side of the barrier. A passive or active vent system, typically consisting of perforated pipe and coarse stone on the "waste" side of the barrier allows the gas to vent to the atmosphere. Passive systems rely on wind driven devices or soil gas pressures to vent the gas, whereas active systems include pumping systems. These systems, particularly an active one, may require approval of the MOE relative to air quality discharge. Landfill gas probes are installed on the "receptor" side to confirm system performance.



Landfill Capping

Capping of waste materials will reduce infiltration and the rate of leachate generation. Depending on the conditions of the soils and other features surrounding the waste, capping may also reduce the amount of landfill gas generation by reducing the level of leachate and allowing the waste to become aerobic. A disadvantage of capping is that if methane does continue to be generated, it will migrate laterally for larger distances. As a result, where landfill gas migration is the primary concern, a coarse-grained soil cap is preferred, which allows the landfill gas to preferentially vent vertically.

Risk Assessment

For options which consider leaving waste and/or impacted soil above generic MOE standards on-Site, a risk assessment under the O.Reg.153/04 guidelines would be recommended to assess risk to current and/or future site users and the natural environment.



10.0 RECOMMENDATIONS

Based on the findings of the above scope of work, Golder recommends the following:

- Based on the findings of this investigation, the D-4 Assessment Area can be reduced to the limits shown on Figure 8;
- Investigations on private properties, in areas where D-4 Assessment Areas delineated largely on the basis of wells removed from the source, should be considered to further reduce the D4 Assessment Area;
- Two additional monitoring wells should be installed along Bradford Street to confirm the limits of groundwater impact to the east of Site 7;
- Notification of the nearby receptors (e.g., property owner, residents) of the potential presence of landfill gas and building design risk assessment possibly including monitoring of methane in the potentially affected buildings. Refer to Figure 8 for potentially affected properties;
- A risk assessment is recommended to assess the environmental condition and associated risks in the vicinity of Milligan's Pond (i.e., within Site 2) as it is accessible to the public. Further subsurface investigations would be required to support this risk assessment; and,
- Monitoring wells and landfill gas probes should be decommissioned in accordance with O. Reg. 903 when no longer required.

Recommendations for Environmental Monitoring Are As Follows:

- Monitor groundwater, surface water quality, and landfill gas annually at all existing locations within the Bunker's Creek Landfills. Submit groundwater and surface water samples for analysis of major ions and indicators, metals, inorganics, PAH, VOC, and PHC F1 to F4. Surface water sampling should be completed at least 72 hours following a significant rainfall event (i.e., 10 mm rainfall).



SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS, CITY OF BARRIE BUNKER'S CREEK HISTORICAL LANDFILLS

11.0 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

Paul Dewaele, P.Eng.
Principal

CLG/PJD/plc

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12.0 LIMITATIONS

This report has been prepared for the exclusive use of the City of Barrie. This report is not intended to be utilized as supporting documentation for a Record of Site Condition under Ontario Regulation 153/04 or its amendment under O.Reg.511/09 at this time. 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 Associates Ltd. (Golder).

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 investigations conducted by Golder and is based solely on Site conditions encountered at the time of the field work (i.e. between April 4, 2013 to March 31, 2014), 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 and groundwater 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. Subsurface conditions encountered are specific to the borehole and monitoring well locations and will vary between and beyond borehole, and sampling locations.

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.



SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS, CITY OF BARRIE BUNKER'S CREEK HISTORICAL LANDFILLS

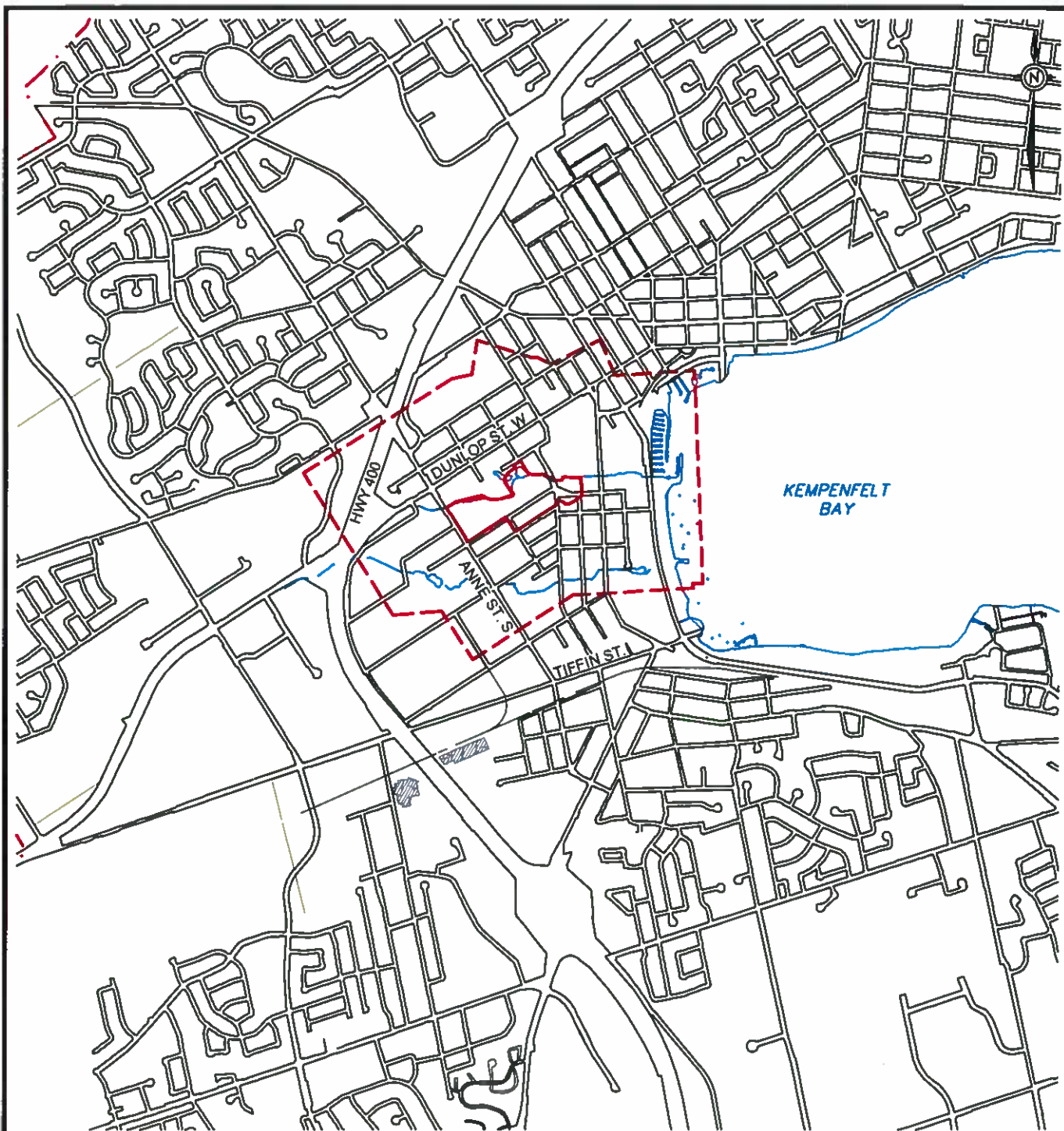
13.0 REFERENCES

The following is a list of references reviewed for the purposes of preparing this report:

Source	Date
Golder Associates Ltd., 2014. 2013 Annual Groundwater Monitoring Program Report. Report prepared for the City of Barrie.	June 2014
Golder Associates Ltd., 2013. D4 Study and Environmental Assessment, Historical Waste Sites Along Bunker's Creek Within the City of Barrie. Report prepared for the City of Barrie.	March 19, 2013



FIGURES

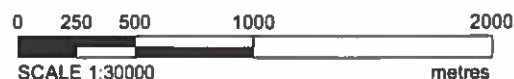


- - - - - 500 m ESTIMATED WASTE LIMIT OFFSET (ORIGINAL D4 ASSESSMENT AREA)
————— NEW D4 ASSESSMENT AREA (REFER TO FIGURE 10)

The City of
BARRIE

NOTES:

1. DATUM IS NAD UTM 83 ZONE 17
2. MAPPING BASED ON COUNTY OF SIMCOE MUNICIPAL BASE
3. 500 m OFFSET D-4 ASSESSMENT AS PER CITY OF BARRIE 2009 OFFICIAL PLAN



SCALE AS SHOWN

DATE 2014-08-25

DESIGN

CAD STB

CHECK

REVIEW

REGIONAL LOCATION MAP

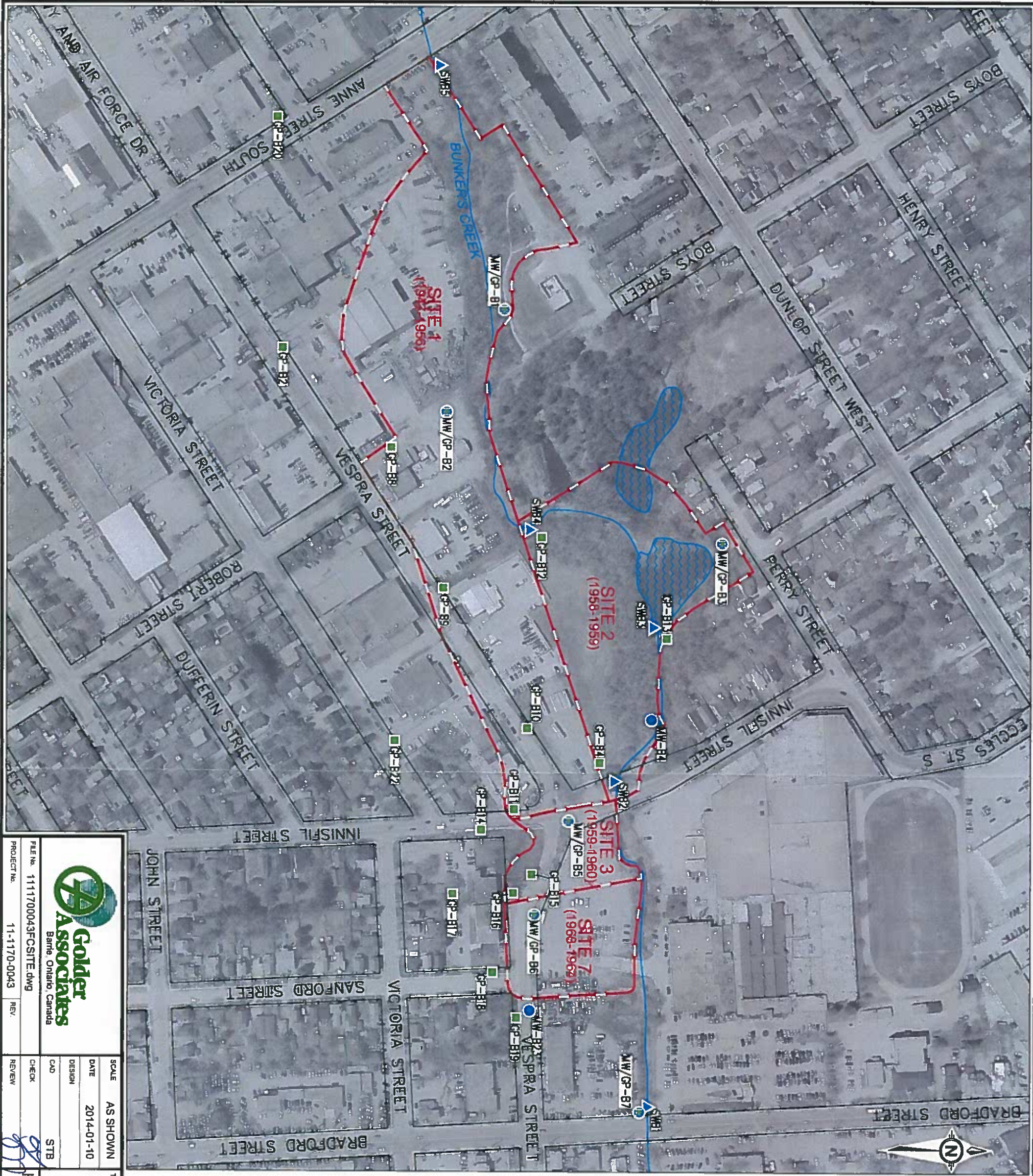
BUNKER'S CREEK LANDFILLS
CITY OF BARRIE

FIGURE

1

FILE No. 1111700043FCREG.dwg

PROJECT No. 11-1170-0043 REV.



LEGEND:

- ESTIMATED WASTE LIMIT
- GAS PROBE
- MONITORING WELL
- MONITORING WELL / GAS PROBE
- SURFACE WATER SAMPLING LOCATION

NOTES:

1. DATUM IS NAD83 ZONE 17
2. ALL MAPPED BOUNDARIES, LIMITS, AND INTERPOLATED FEATURES ARE APPROXIMATE
3. CAD BASE DIGITAL 1:2000 MUNICIPAL MAPPING COURTESY CITY OF BARRIE
4. IMAGE COURTESY CITY OF BARRIE 2002. SITE FEATURES ARE APPROXIMATE





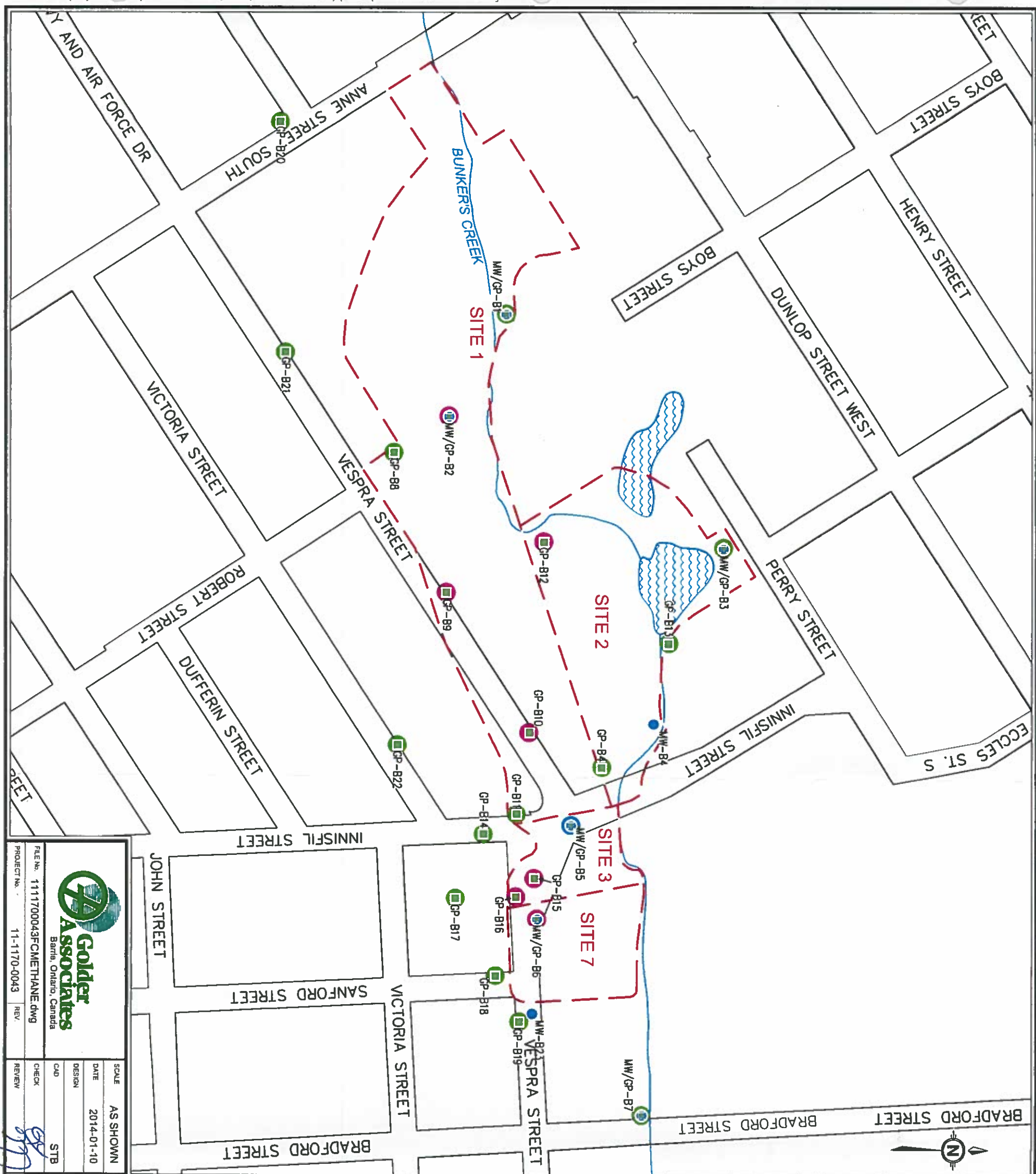
Golder Associates
Barrie, Ontario, Canada

FILE No.	1111700043FCSITE.dwg
PROJECT No.	11-1170-0043
REV.	
SCALE	AS SHOWN
DATE	2014-01-10
DESIGN	
CAD	STB
CHECK	
REVIEW	

**BUNKER'S CREEK
WASTE SITES
GAS PROBE AND MONITORING WELL
LOCATION MAP**

HISTORICAL WASTE DISPOSAL SITES
CITY OF BARRIE

FIGURE
2

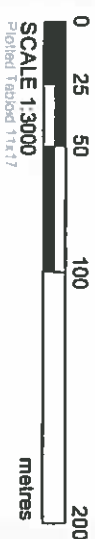


LEGEND:

- 
- ESTIMATED WASTE LIMIT
- GAS PROBE
- MONITORING WELL
- MONITORING WELL / GAS PROBE
- <0.2% METHANE GAS CONCENTRATION
- 0.2% - 4.9% METHANE GAS CONCENTRATION
- >5.0% METHANE GAS CONCENTRATION

NOTES:

1. DATUM IS NAD83 ZONE 17
2. ALL MAPPED BOUNDARIES, LIMITS, AND INTERPOLATED FEATURES ARE APPROXIMATE
3. CAD BASE DIGITAL 1:2000 MUNICIPAL MAPPING
4. COURTESY CITY OF BARRIE
5. READINGS REPRESENT WORST CASE CONDITIONS FROM ALL SAMPLING EVENTS



**Golder
Associates**

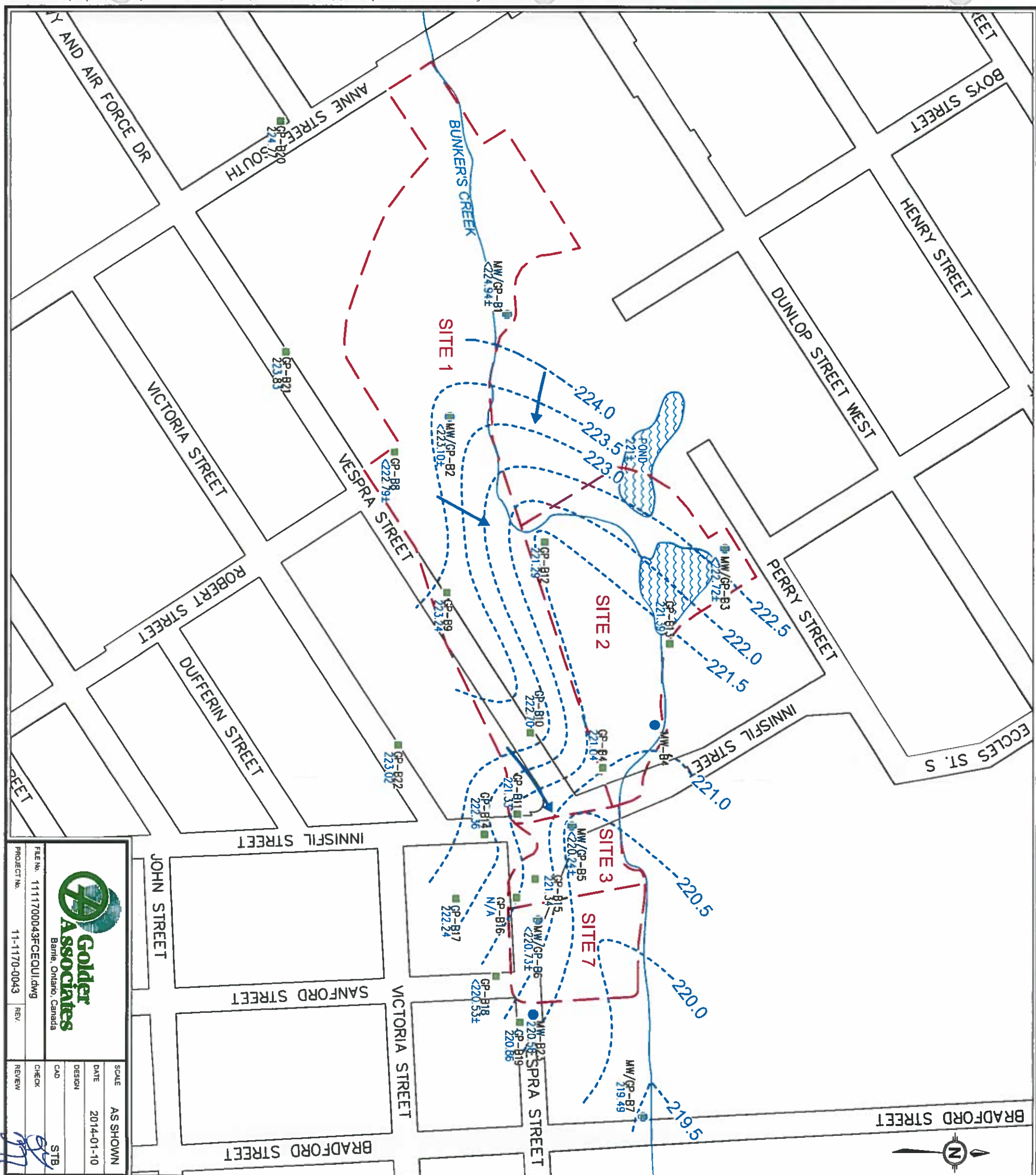
PROJECT No. 1-11-70-0043 REV. _____

FILE No. 1111700043FCMEI:THANE dwg

Goldner Associates
Barrie, Ontario, Canada

SCALE	AS SHOWN
DATE	2014-01-10
DESIGN	
CAD	STB
CHECK	
REVIEW	

**METHANE GAS
CONCENTRATIONS
APR. 2013 - FEB. 2014**

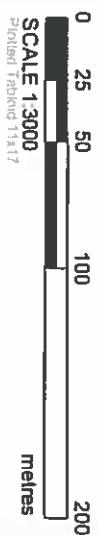


LEGEND:

-
- ESTIMATED WASTE LIMIT
- INTERPOLATED EQUIPOTENTIAL LINE
- INTERPOLATED GROUNDWATER FLOW DIRECTION
- SHALLOW STATIC WATER ELEVATION (mas)
- GAS PROBE
- MONITORING WELL
- MONITORING WELL / GAS PROBE

NOTES:

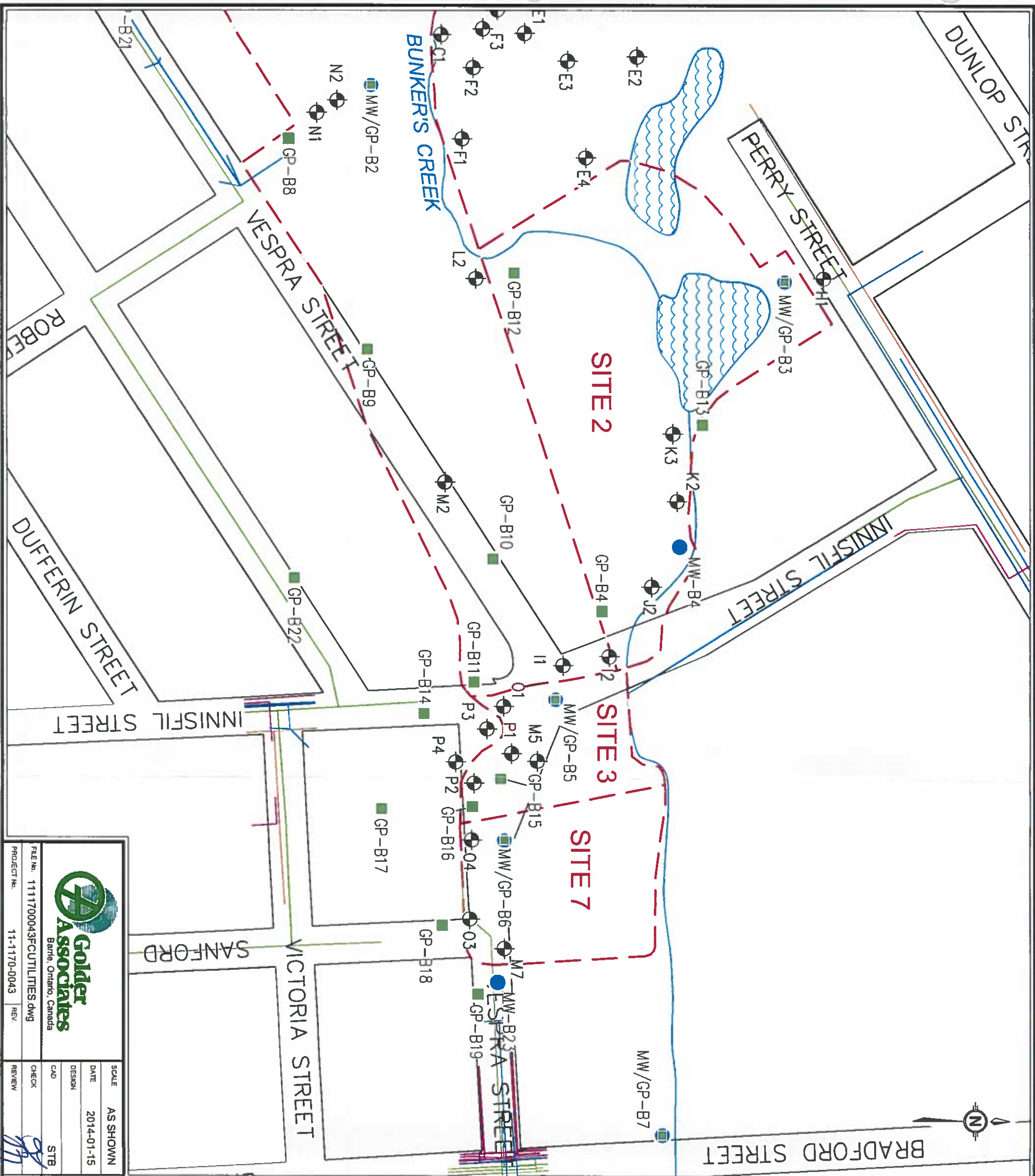
1. DATUM IS NAD83 ZONE 17
2. ALL MAPPED BOUNDARIES, LIMITS, AND INTERPOLATED FEATURES ARE APPROXIMATE
3. CAD BASE DIGITAL 1:2000 MUNICIPAL MAPPING
4. COURTESY CITY OF BARRIE
22. 2013



GROUNDWATER ELEVATIONS SUMMER 2013

HISTORICAL WASTE DISPOSAL SITES CITY OF BARRIE

4
FIGURE

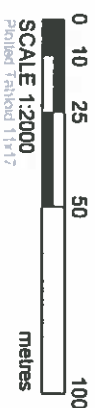


LEGEND:

- ESTIMATED WASTE LIMIT
- SANITARY SEWER
- STORM SEWER
- WATER LINE
- GAS LINE
- FIBEROPTIC LINE (BELL)
- TELEPHONE LINE (BELL)
- BOREHOLE
- GAS PROBE
- MONITORING WELL
- MONITORING WELL / GAS PROBE

NOTES:

1. DATUM IS NAD83 ZONE 17
2. ALL MAPPED BOUNDARIES, LIMITS, AND INTERPOLATED FEATURES ARE APPROXIMATE
3. CAD BASE DIGITAL 1:2000 MUNICIPAL MAPPING COURTESY CITY OF BARRIE
4. UTILITY SURVEYS COURTESY CITY OF BARRIE ENGINEERING DEPARTMENT

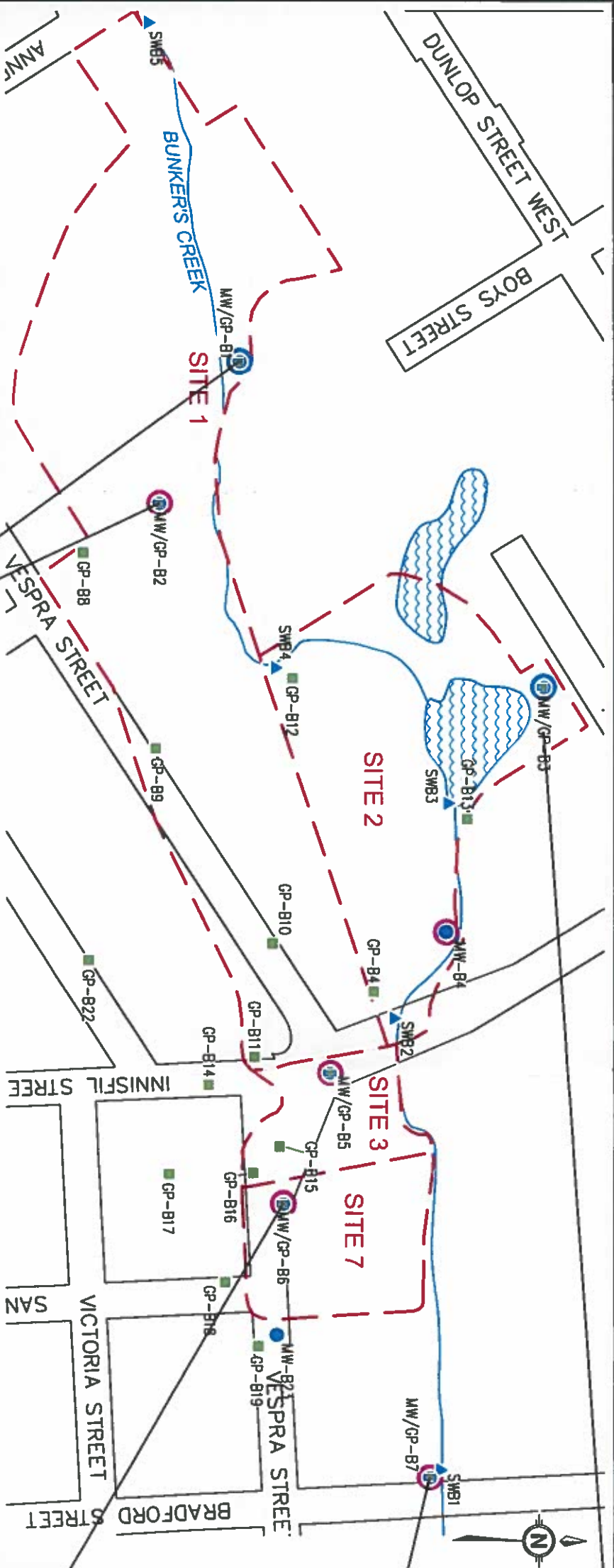


PUBLIC UTILITY LOCATION MAP

Golder Associates
Barrie, Ontario, Canada

SCALE	AS SHOWN
DATE	2014-01-15
DESIGN	
CAD	STB
CHECK	
REVIEW	

HISTORICAL WASTE DISPOSAL SITES
CITY OF BARRIE



MMW-B1						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	1.1	<0.5	4.9
Iron	µg/L	NV	300 (AO)	<10.0	1620	11
Vanadium	µg/L	6.2	N5	5.0	4.5	2.0
Chloride	mg/L	790	250 (AO)	805	777	240
Sodium	mg/L	490	200 (AO)	394	402	164
Ammonia as N	mg/L	NV	N5	<0.02	<0.02	<0.02

MMW-B4						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	4.6	5.4	3.5
Iron	µg/L	NV	300 (AO)	6500	6500	4490
Vanadium	µg/L	6.2	N5	3.0	2.4	5
Chloride	mg/L	790	250 (AO)	614	608	558
Sodium	mg/L	490	200 (AO)	270	267	293
Ammonia as N	mg/L	NV	N5	145	155	123

MMW-B2						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	3.9	2.3	2.0/1.9
Iron	µg/L	NV	300 (AO)	3140	2390	1420/3300
Vanadium	µg/L	6.2	N5	3.0	2.3	5.0/4.0
Chloride	mg/L	790	250 (AO)	397	359	360/380
Sodium	mg/L	490	200 (AO)	214	206	220/232
Ammonia as N	mg/L	NV	N5	13.6	14.7	13.4/13.4

MMW-B25						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	1.21	0.12	0.12
Iron	µg/L	NV	300 (AO)	3340	4790	3340
Vanadium	µg/L	6.2	N5	3.6	1.4	1.4
Chloride	mg/L	790	250 (AO)	921	952	952
Sodium	mg/L	490	200 (AO)	457	469	469
Ammonia as N	mg/L	NV	N5	1.70	1.84	1.84

MMW-B3						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	0.7	<0.5	4.0
Iron	µg/L	NV	300 (AO)	255	275	299
Vanadium	µg/L	6.2	N5	1.0	1.10	1.44
Chloride	mg/L	790	250 (AO)	310	310	344
Sodium	mg/L	490	200 (AO)	140	140	128
Ammonia as N	mg/L	NV	N5	0.04	<0.02	0.04

MMW-B7						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	4.4	1.7	0.8
Iron	µg/L	NV	300 (AO)	3570	2890	3490
Vanadium	µg/L	6.2	N5	2.3	2.2	2.0
Chloride	mg/L	790	250 (AO)	520	438	443
Sodium	mg/L	490	200 (AO)	239	235	301
Ammonia as N	mg/L	NV	N5	6.42	7.60	7.87

MMW-B6						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	14.2	7.6	2.6
Iron	µg/L	NV	300 (AO)	32900	42900	23500
Vanadium	µg/L	6.2	N5	3.6	1.4	1.3
Chloride	mg/L	790	250 (AO)	939	608	423
Sodium	mg/L	490	200 (AO)	428	225	78
Ammonia as N	mg/L	NV	N5	46.2	78.8	18.8

MMW-B5						
Parameter	Units	MOE Standard	ODWS	Results		
Metals						
Cobalt	µg/L	3.8	N5	8.5	2.1	1.5
Iron	µg/L	NV	300 (AO)	18100	19500	33100
Vanadium	µg/L	6.2	N5	3.42	3.05	3.18
Chloride	mg/L	790	250 (AO)	542	528	547
Sodium	mg/L	490	200 (AO)	286	305	333
Ammonia as N	mg/L	NV	N5	0.72	0.599	2.2



- LEGEND:
- ESTIMATED WASTE LIMIT
 - GAS PROBE
 - MONITORING WELL
 - SURFACE WATER SAMPLING LOCATION
 - INORGANICS
 - > ODWS OR MOE TABLE 2

- NOTES:
- DATUM IS NAD83 ZONE 17
 - ALL MAPPED BOUNDARIES, LIMITS, AND INTERPOLATED FEATURES ARE APPROXIMATE
 - CAD BASE DIGITAL 1:2000 MUNICIPAL MAPPING COURTESY CITY OF BARRIE
 - AMMONIA CONCENTRATION FOR REFERENCE PURPOSES ONLY

Golder Associates
Barrie, Ontario, Canada

SCALE AS SHOWN

DATE 2014-01-15

DESIGN

CAD

CHECK

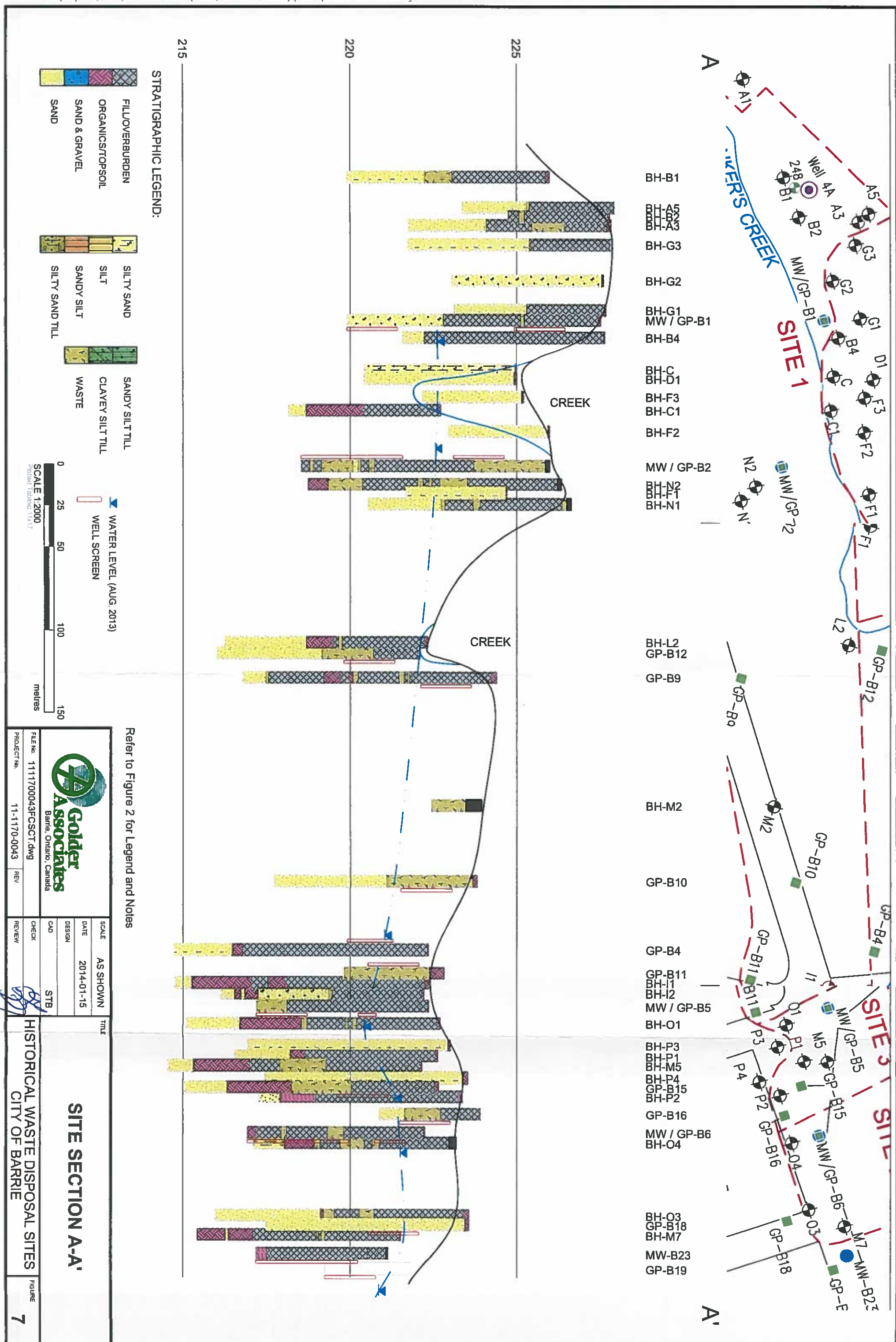
REVIEW

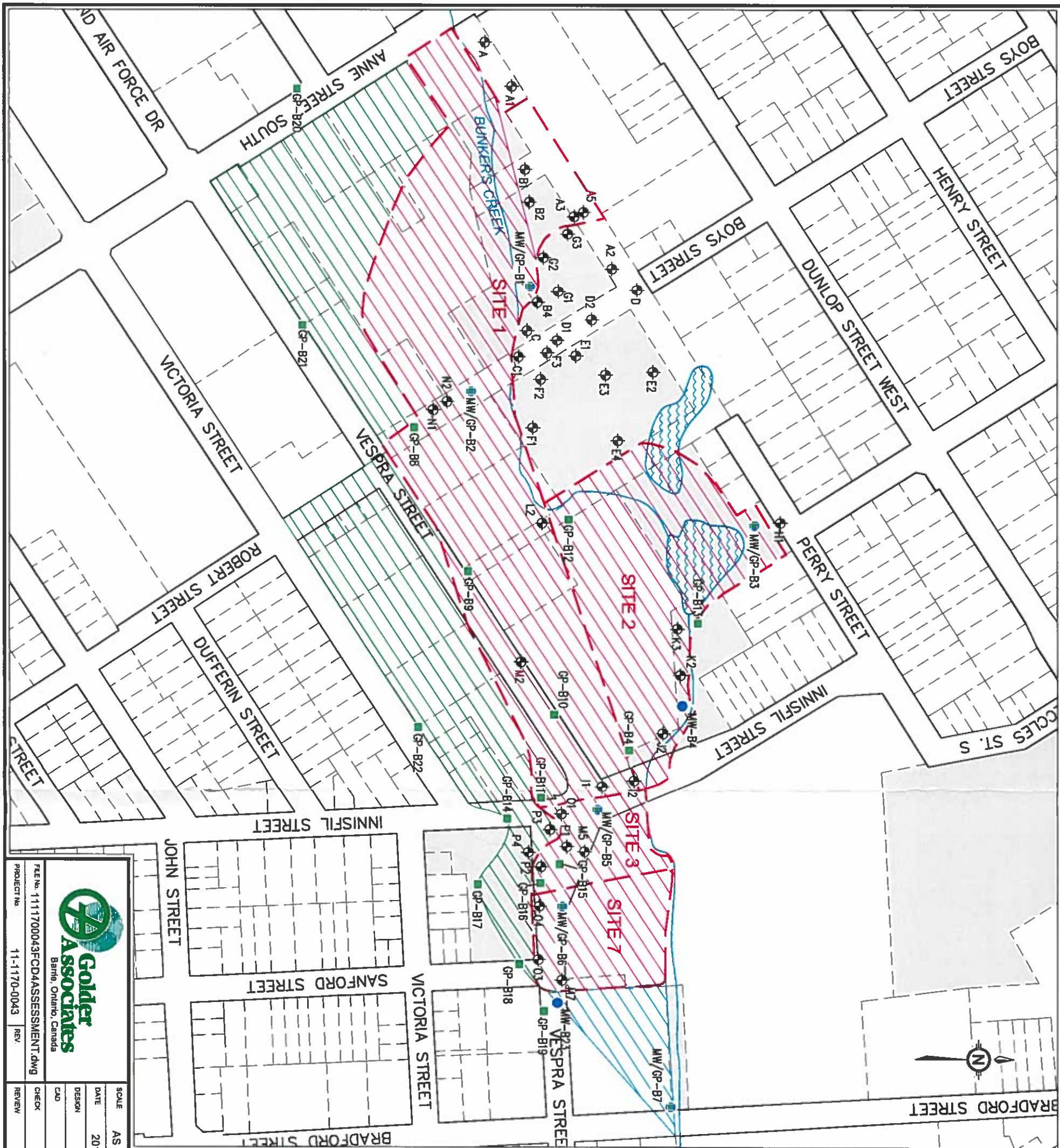
STB

HISTORICAL WASTE DISPOSAL SITES

CITY OF BARRIE

FIGURE 6



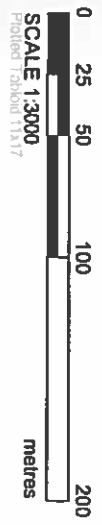


LEGEND:

- ESTIMATED WASTE LIMIT
- GAS PROBE
- MONITORING WELL
- MONITORING WELL / GAS PROBE
- CITY OF BARRIE OWNED PROPERTY
- D4 ASSESSMENT REQUIRED DUE TO POSSIBLE LANDFILL GAS
- D4 ASSESSMENT REQUIRED DUE TO POSSIBLE GROUNDWATER IMPACTS
- D4 ASSESSMENT REQUIRED DUE TO LANDFILL WASTE / LANDFILL GAS

NOTES:

1. DATUM IS NAD83 ZONE 17
2. ALL MAPPED BOUNDARIES, LIMITS, AND INTERPOLATED FEATURES ARE APPROXIMATE
3. CAD BASE DIGITAL 1:2000 MUNICIPAL MAPPING COURTESY CITY OF BARRIE
4. POSSIBLE LANDFILL GAS LIMITS TO BE VERIFIED THROUGH FURTHER INVESTIGATION
5. CITY OWNED PROPERTY PROVIDED BY CITY OF BARRIE



Barrie, Ontario, Canada

PROJECT No.	11-1170-0043	REV.	
FILE No.	1111700043FCD4ASSESSMENT.dwg	CHECK	STB
DATE	2014-11-25	DESIGN	
CAD		STB	

D4 ASSESSMENT AREAS

HISTORICAL WASTE DISPOSAL SITES
CITY OF BARRIE



SUPPLEMENTAL ENVIRONMENTAL INVESTIGATIONS, CITY OF BARRIE BUNKER'S CREEK HISTORICAL LANDFILLS

TABLES

Table 1
Landfill Gas Concentrations (% methane by volume)
Bunker's Creek Landfills

Well ID	Water (mbgs)	Site	Sample Date	Landfill Gas Readings - GEM 2000			
				CH4 (%)	CO2 (%)	O2 (%)	Bal. (%)
GP-B1	Dry	Site 1	28-Jun-12	0.0	5.6	13.7	80.4
GP-B1	-	Site 1	18-Oct-12	0.0	6.6	13.7	79.7
GP-B1	Dry	Site 1	3-Dec-12	0.0	7.8	11.9	80.3
GP-B1	Dry	Site 1	18-Dec-12	0.0	6.0	13.8	80.2
GP-B1	Dry	Site 1	4-Apr-13	0.0	5.3	13.1	81.6
GP-B1	Dry	Site 1	20-Jun-13	0.0	5.7	13.5	80.8
GP-B1	Dry	Site 1	22-Aug-13	0.0	6.0	15.4	78.6
GP-B1	Dry	Site 1	10-Oct-13	0.1	6.6	14.9	78.4
GP-B1	Dry	Site 1	12-Dec-13	0.0	3.3	20.5	76.0
GP-B1	Dry	Site 1	12-Feb-14	0.0	8.0	15.9	76.1
GP-B2	-	Site 1	18-Oct-12	12.6	3.7	9.0	74.7
GP-B2	-	Site 1	24-Oct-12	15.4	4.0	6.7	74.0
GP-B2	1.77	Site 1	3-Dec-12	19.9	3.9	3.7	72.5
GP-B2	Dry	Site 1	18-Dec-12	21.5	4.2	1.6	72.6
GP-B2	Dry	Site 1	23-Apr-13	15.3	2.9	6.6	75.4
GP-B2	NA	Site 1	20-Jun-13	Well Damaged- No Reading Taken			
GP-B2	Dry	Site 1	22-Aug-13	15.3	4.1	7.4	73.4
GP-B2	Dry	Site 1	10-Oct-13	21.4	5.4	3.0	70.1
GP-B2	Dry	Site 1	12-Dec-13	4.5	1.0	18.8	75.8
GP-B2	-	Site 1	12-Feb-14	Well Buried- No Reading Taken			
GP-B3	Dry	Site 2	28-Jun-12	0.0	1.3	18.1	80.1
GP-B3	-	Site 2	18-Oct-12	0.0	1.7	18.7	79.6
GP-B3	Dry	Site 2	3-Dec-12	0.0	2.1	19.2	78.7
GP-B3	Dry	Site 2	18-Dec-12	0.0	2.2	19.0	78.8
GP-B3	Dry	Site 2	4-Apr-13	0.0	2.5	17.1	80.2
GP-B3	Dry	Site 2	20-Jun-13	0.0	2.8	18.2	79.0
GP-B3	Dry	Site 2	22-Aug-13	0.0	3.6	18.3	78.1
GP-B3	Dry	Site 2	10-Oct-13	0.0	0.5	21.4	78.1
GP-B3	Dry	Site 2	12-Dec-13	0.0	3.0	20.5	76.5
GP-B3	Dry	Site 2	12-Feb-14	0.0	3.0	20.2	76.8
GP-B4	0.81	Site 2	21-Mar-12	0.0	0.4	19.1	80.5
GP-B4	1.22	Site 2	28-Jun-12	0.0	5.9	12.0	81.6
GP-B4	-	Site 2	18-Oct-12	0.0	4.1	15.2	80.7
GP-B4	0.78	Site 2	3-Dec-12	0.0	0.1	21.2	78.7
GP-B4	0.90	Site 2	18-Dec-12	0.0	0.3	21.1	78.6
GP-B4	0.78	Site 2	4-Apr-13	0.0	0.0	21.5	78.5
GP-B4	1.11	Site 2	20-Jun-13	0.0	4.1	15.6	80.3
GP-B4	1.38	Site 2	22-Aug-13	0.0	6.3	14.8	78.9
GP-B4	1.02	Site 2	10-Oct-13	0.0	6.1	15.1	78.8
GP-B4	1.02	Site 2	12-Dec-13	0.0	1.6	20.5	77.9
GP-B4	1.25	Site 2	12-Feb-14	0.0	5.9	16.1	78.0

Table 1
Landfill Gas Concentrations (% methane by volume)
Bunker's Creek Landfills

Well ID	Water (mbgs)	Site	Sample Date	Landfill Gas Readings - GEM 2000			
				CH4 (%)	CO2 (%)	O2 (%)	Bal. (%)
GP-B5	1.85	Site 3	21-Mar-12	0.0	1.4	16.9	81.6
GP-B5	-	Site 3	22-Mar-12	0.0	2.1	14.1	83.8
GP-B5	-	Site 3	28-Jun-12	0.0	1.0	17.3	81.7
GP-B5	-	Site 3	18-Oct-12	2.1	8.7	1.1	88.1
GP-B5	-	Site 3	19-Oct-12	0.1	7.6	3.3	88.9
GP-B5	-	Site 3	24-Oct-12	1.5	8.5	0.0	90.0
GP-B5	1.91	Site 3	3-Dec-12	1.2	6.4	1.5	90.9
GP-B5	1.88	Site 3	18-Dec-12	1.3	6.2	1.2	91.3
GP-B5	1.83	Site 3	4-Apr-13	0.0	4.9	0.3	94.8
GP-B5	1.92	Site 3	20-Jun-13	0.0	3.5	12.8	83.7
GP-B5	Dry	Site 3	22-Aug-13	0.5	10.1	0.9	88.5
GP-B5	1.91	Site 3	10-Oct-13	0.0	1.1	19.2	79.7
GP-B5	1.93	Site 3	12-Dec-13	1.7	6.1	8.1	84.1
GP-B5	2.02	Site 3	12-Feb-14	0.0	5.0	2.9	92.1
GP-B6	0.41	Site 7	21-Mar-12	0.2	0.0	16.9	82.8
GP-B6	-	Site 7	22-Mar-12	0.1	0.0	15.8	84.1
GP-B6	-	Site 7	28-Jun-12	0.0	0.7	18.4	80.8
GP-B6	-	Site 7	18-Oct-12	61.8	11.4	6.3	20.5
GP-B6	-	Site 7	19-Oct-12	82.3	14.8	1.4	1.5
GP-B6	-	Site 7	24-Oct-12	84.0	15.6	0.3	0.1
GP-B6	0.65	Site 7	3-Dec-12	33.2	0.8	12.9	53.1
GP-B6	0.51	Site 7	18-Dec-12	14.4	1.8	17.8	66.0
GP-B6	0.32	Site 7	4-Apr-13	1.6	0.2	20.3	78.0
GP-B6	0.59	Site 7	20-Jun-13	0.1	4.5	15.4	80.1
GP-B6	Dry	Site 7	22-Aug-13	0.0	3.5	16.7	79.8
GP-B6	0.76	Site 7	10-Oct-13	19.5	5.6	14.5	60.3
GP-B6	0.71	Site 7	12-Dec-13	3.2	3.6	14.5	78.7
GP-B6	0.86	Site 7	12-Feb-14	71.3	9.1	2.0	17.6
GP-B7	-	Site 7	28-Jun-12	0.0	0.9	18.2	80.9
GP-B7	-	Site 7	18-Oct-12	0.0	1.9	19.2	78.9
GP-B7	1.10	Site 7	3-Dec-12	0.0	1.8	19.8	78.4
GP-B7	1.12	Site 7	18-Dec-12	0.0	1.2	20.1	78.7
GP-B7	1.11	Site 7	4-Apr-13	0.0	0.4	20.4	79.2
GP-B7	1.07	Site 7	20-Jun-13	0.0	2.3	17.9	79.8
GP-B7	0.85	Site 7	22-Aug-13	0.0	1.9	19.5	78.6
GP-B7	0.83	Site 7	10-Oct-13	0.0	0.2	21.7	78.1
GP-B7	1.01	Site 7	12-Dec-13	0.0	0.7	20.9	78.4
GP-B7	1.02	Site 7	12-Feb-14	0.0	0.7	20.7	78.6

Table 1
Landfill Gas Concentrations (% methane by volume)
Bunker's Creek Landfills

Well ID	Water (mbgs)	Site	Sample Date	Landfill Gas Readings - GEM 2000			
				CH4 (%)	CO2 (%)	O2 (%)	Bal. (%)
GP-B8	3.43	Site 1	3-Dec-12	0.0	12.6	0.5	86.9
GP-B8	3.40	Site 1	18-Dec-12	0.0	2.0	18.0	80.0
GP-B8	3.34	Site 1	4-Apr-13	0.0	10.2	1.2	88.6
GP-B8	3.34	Site 1	20-Jun-13	0.0	2.6	16.8	80.5
GP-B8	N/A	Site 1	22-Aug-13	Not Accessible- No Reading Taken			
GP-B8	3.45	Site 1	10-Oct-13	0.1	3.4	17.2	79.3
GP-B8	3.42	Site 1	12-Dec-13	0.1	11.8	8.2	80.0
GP-B8	3.53	Site 1	13-Feb-14	0.0	8.6	9.5	81.9
GP-B9	1.15	Site 1	3-Dec-12	0.4	0.1	19.9	79.6
GP-B9	1.21	Site 1	18-Dec-12	1.0	0.3	15.4	83.3
GP-B9	1.03	Site 1	4-Apr-13	0.0	0.2	20.3	79.5
GP-B9	1.17	Site 1	20-Jun-13	1.8	1.7	13.1	83.4
GP-B9	1.26	Site 1	22-Aug-13	1.0	0.9	16.7	81.3
GP-B9	1.13	Site 1	10-Oct-13	0.0	0.8	18.3	80.9
GP-B9	1.12	Site 1	12-Dec-13	0.0	0.4	22.1	77.5
GP-B9	1.18	Site 1	25-Feb-14	6.1	0.8	17.8	75.7
GP-B9	1.02	Site 1	31-Mar-14	0.2	0.5	19.3	80.0
GP-B10	1.13	Site 1	3-Dec-12	46.9	4.6	2.1	46.4
GP-B10	1.10	Site 1	18-Dec-12	37.9	5.0	4.3	52.8
GP-B10	1.01	Site 1	4-Apr-13	32.5	2.9	9.8	54.9
GP-B10	1.13	Site 1	20-Jun-13	35.2	5.2	4.3	55.6
GP-B10	1.32	Site 1	22-Aug-13	35.2	6.4	3.7	54.5
GP-B10	1.21	Site 1	10-Oct-13	28.6	7.0	2.9	61.4
GP-B10	1.19	Site 1	12-Dec-13	38.4	4.7	13.0	53.9
GP-B10	1.33	Site 1	12-Feb-14	27.3	4.1	1.2	67.4
GP-B11	1.41	Site 1	3-Dec-12	0.0	3.2	13.7	83.1
GP-B11	1.41	Site 1	18-Dec-12	0.1	2.9	14.6	82.4
GP-B11	1.30	Site 1	4-Apr-13	0.0	2.1	14.6	83.2
GP-B11	1.40	Site 1	20-Jun-13	0.0	5.7	3.7	90.7
GP-B11	1.50	Site 1	22-Aug-13	0.0	7.5	6.6	86.0
GP-B11	1.44	Site 1	10-Oct-13	0.0	6.6	4.3	89.1
GP-B11	1.50	Site 1	12-Dec-13	0.0	3.0	19.6	77.4
GP-B11	1.63	Site 1	12-Feb-14	0.0	2.1	19.8	78.1
GP-B12	0.77	Site 2	3-Dec-12	0.0	0.1	21.2	78.7
GP-B12	0.84	Site 2	18-Dec-12	0.0	0.1	21.3	78.6
GP-B12	0.75	Site 2	4-Apr-13	0.5	0.1	21.4	78.0
GP-B12	0.86	Site 2	20-Jun-13	0.3	0.2	19.9	79.7
GP-B12	0.90	Site 2	22-Aug-13	4.4	2.0	18.7	74.7
GP-B12	0.83	Site 2	10-Oct-13	6.4	2.5	18.8	72.5
GP-B12	0.88	Site 2	12-Dec-13	0.0	0.1	21.1	78.8
GP-B12	0.91	Site 2	12-Feb-14	0.0	0.3	20.7	79.0

Table 1
Landfill Gas Concentrations (% methane by volume)
Bunker's Creek Landfills

Well ID	Water (mbgs)	Site	Sample Date	Landfill Gas Readings - GEM 2000			
				CH4 (%)	CO2 (%)	O2 (%)	Bal. (%)
GP-B13	-	Site 2	28-Jun-12	0.0	0.2	18.8	81.0
GP-B13	-	Site 2	18-Oct-12	0.0	0.0	20.6	79.4
GP-B13	0.18	Site 2	3-Dec-12	0.0	0.0	21.2	78.8
GP-B13	0.19	Site 2	18-Dec-12	0.0	0.0	21.3	78.7
GP-B13	0.18	Site 2	4-Apr-13	0.0	0.0	21.4	78.6
GP-B13	0.27	Site 2	20-Jun-13	0.0	0.1	20.4	79.5
GP-B13	0.32	Site 2	22-Aug-13	0.0	0.0	21.0	79.0
GP-B13	0.28	Site 2	10-Oct-13	0.0	0.0	21.8	78.2
GP-B13	0.29	Site 2	12-Dec-13	0.0	0.1	21.7	78.2
GP-B13	0.31	Site 2	12-Feb-14	0.0	0.2	20.9	78.9
GP-B14	1.57	Site 3	3-Dec-12	0.0	0.4	20.5	79.1
GP-B14	1.56	Site 3	18-Dec-12	0.0	0.4	20.5	79.1
GP-B14	1.42	Site 3	4-Apr-13	0.0	0.5	20.3	79.2
GP-B14	1.54	Site 3	20-Jun-13	0.0	1.1	19.3	79.6
GP-B14	1.70	Site 3	22-Aug-13	0.0	0.7	20.5	78.8
GP-B14	1.59	Site 3	10-Oct-13	0.0	0.7	20.7	78.6
GP-B14	1.57	Site 3	12-Dec-13	0.0	0.5	20.9	78.6
GP-B14	1.72	Site 3	12-Feb-14	0.0	0.6	21.0	78.4
GP-B15	1.27	Site 3	28-Jun-12	8.8	4.2	16.3	70.6
GP-B15	-	Site 3	18-Oct-12	2.7	1.6	19.8	76.9
GP-B15	-	Site 3	24-Oct-12	13.3	2.9	18.8	65.0
GP-B15	1.27	Site 3	3-Dec-12	4.0	1.8	20.0	74.2
GP-B15	1.19	Site 3	18-Dec-12	18.2	5.1	16.8	59.9
GP-B15	1.12	Site 3	4-Apr-13	2.5	0.8	20.3	76.6
GP-B15	1.26	Site 3	20-Jun-13	5.8	2.3	18.3	73.5
GP-B15	1.32	Site 3	22-Aug-13	5.4	2.6	18.9	71.5
GP-B15	1.29	Site 3	10-Oct-13	10.9	4.8	18.4	64.1
GP-B15	1.27	Site 3	12-Dec-13	1.8	1.4	22.8	74.0
GP-B15	1.38	Site 3	12-Feb-14	13.0	3.4	20.1	63.5
GP-B16	1.77	Site 3	3-Dec-12	49.3	9.9	0.1	41.6
GP-B16	1.73	Site 3	18-Dec-12	45.2	8.7	0.4	55.7
GP-B16	1.57	Site 3	23-Apr-13	17.3	7.8	0.0	74.9
GP-B16	1.66	Site 3	20-Jun-13	15.1	8.1	1.5	75.3
GP-B16	N/A	Site 3	22-Aug-13	Could Not Locate- No Reading Taken			
GP-B16	1.76	Site 3	10-Oct-13	40.5	8.6	1.1	49.7
GP-B16	1.71	Site 3	12-Dec-13	38.0	5.5	3.7	52.8
GP-B16	-	Site 3	12-Feb-14	Well Buried- No Reading Taken			
GP-B16	1.72	Site 3	19-Mar-14	23.7	4.8	1.6	69.9

Table 1
Landfill Gas Concentrations (% methane by volume)
Bunker's Creek Landfills

Well ID	Water (mbgs)	Site	Sample Date	Landfill Gas Readings - GEM 2000			
				CH4 (%)	CO2 (%)	O2 (%)	Bal. (%)
GP-B17	2.59	Site 3	3-Dec-12	0.0	1.0	20.5	78.5
GP-B17	2.57	Site 3	18-Dec-12	0.0	0.9	20.8	78.3
GP-B17	2.39	Site 3	4-Apr-13	0.0	1.0	18.1	80.9
GP-B17	2.48	Site 3	20-Jun-13	0.0	1.5	19.1	79.4
GP-B17	2.70	Site 3	22-Aug-13	0.0	1.1	20.3	78.6
GP-B17	2.61	Site 3	10-Oct-13	0.0	1.4	20.5	78.1
GP-B17	2.53	Site 3	12-Dec-13	0.0	0.9	20.8	78.3
GP-B17	2.74	Site 3	12-Feb-14	0.0	1.1	22.8	76.1
GP-B18	-	Site 7	28-Jun-12	0.0	0.2	19.0	80.8
GP-B18	-	Site 7	18-Oct-12	0.0	1.3	18.9	79.8
GP-B18	1.69	Site 7	3-Dec-12	0.1	0.8	20.2	78.9
GP-B18	1.69	Site 7	18-Dec-12	0.1	0.8	20.0	79.1
GP-B18	1.54	Site 7	4-Apr-13	0.0	0.9	20.0	79.1
GP-B18	1.64	Site 7	20-Jun-13	0.0	2.1	17.5	80.4
GP-B18	Dry	Site 7	22-Aug-13	0.0	1.5	19.8	78.7
GP-B18	1.76	Site 7	10-Oct-13	0.0	1.7	20.0	78.3
GP-B18	1.69	Site 7	12-Dec-13	0.0	0.7	20.8	78.5
GP-B18	1.86	Site 7	12-Feb-14	0.0	0.9	22.7	76.4
GP-B19	-	Site 7	28-Jun-12	0.0	0.1	18.9	81.0
GP-B19	-	Site 7	18-Oct-12	0.0	0.0	20.5	79.5
GP-B19	0.51	Site 7	3-Dec-12	0.0	0.0	21.2	78.8
GP-B19	0.55	Site 7	18-Dec-12	0.0	0.1	21.5	78.4
GP-B19	0.59	Site 7	4-Apr-13	0.0	0.0	20.8	79.2
GP-B19	0.67	Site 7	20-Jun-13	0.0	0.0	19.7	80.3
GP-B19	0.98	Site 7	22-Aug-13	0.0	0.9	19.2	79.9
GP-B19	0.82	Site 7	10-Oct-13	0.0	0.1	21.5	78.4
GP-B19	0.80	Site 7	12-Dec-13	0.0	0.1	21.2	78.7
GP-B19	0.85	Site 7	12-Feb-14	0.0	0.2	21.1	78.7
GP-B20	3.66	Site 1	22-Aug-13	0.0	1.1	19.1	79.8
GP-B20	3.67	Site 1	10-Oct-13	0.0	0.8	20.4	78.9
GP-B20	3.66	Site 1	12-Dec-13	0.0	0.3	22.8	77.2
GP-B20	3.80	Site 1	25-Feb-14	0.0	0.6	21.6	77.8
GP-B21	3.83	Site 1	22-Aug-13	0.0	1.0	19.9	79.1
GP-B21	3.80	Site 1	10-Oct-13	0.0	0.7	20.8	78.5
GP-B21	3.39	Site 1	12-Dec-13	0.0	0.5	22.7	76.8
GP-B21	3.89	Site 1	12-Feb-14	0.0	0.6	22.6	76.8
GP-B22	2.09	Site 1	22-Aug-13	0.0	1.1	19.7	79.2
GP-B22	2.03	Site 1	10-Oct-13	0.1	0.2	21.6	78.1
GP-B22	1.96	Site 1	12-Dec-13	0.0	0.2	20.9	78.9
GP-B22	2.12	Site 1	25-Feb-14	0.0	0.5	22.0	77.5

Notes:

bold and shaded indicates a methane concentration above 5%, the lower explosive limit of methane

**Soil Analytical Results
BTEX and Petroleum Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites**

Sample I.D.	B23 - 1		
Borehole Number	B23		
Site Number	Site 7		
Sampling Depth (m below grade)	0.00 - 1.52		
Combustible Gas Meter Reading (ppm)	490		
Photoionization Detector Reading (ppm)	34		
Sampling Date	16-Jul-13		
Parameter	Units	RDL	MOE Table 2 Res/park/inst Standard
VOCs			
Benzene	µg/g	0.02	0.17
Ethylbenzene	µg/g	0.05	1.6
Toluene	µg/g	0.08	6
Xylene Mixture	µg/g	0.05	25
Petroleum Hydrocarbons			
C6 - C10 (PHC F1 minus BTEX)	µg/g	5	65
C>10 - C16 (PHC F2)	µg/g	10	150
C>16 - C34 (PHC F3)	µg/g	50	1300
C>34 - C50 (PHC F4)	µg/g	50	5600
			66

Notes:

1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene
3. µg/g = Microgram per Gram
4. RDL = Laboratory Reportable Detection Limit
5. NM = not measured
6. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, April 15, 2011" full depth generic site condition standards for residential/parkland/institutional land use, potable groundwater condition, coarse textured soil
7. Bold type and shaded indicates an exceedance of the MOE Table 2 site condition standard

Table 3
Groundwater Analytical Results
Metals and Inorganics
City of Barrie Bunker's Creek Historical Waste Site

Monitoring Well Location	Parameter	Units	RDL	ODWS	MOE Table 2 Standards	MW-B1					MW-B2					MW-B3				
						28-Jun-12	21-Aug-12	22-Apr-13	21-Aug-13	10-Dec-13	21-Aug-12	6-Sep-12	22-Apr-13	20-Aug-13	10-Dec-13	29-Jun-12	21-Aug-12	22-Apr-13	21-Aug-13	10-Dec-13
Sampling Date	Combustible Gas Meter Reading (ppm)					210°	nm	nm	nm	0	nm	6450°	nm	nm	260	<25°	nm	nm	nm	<25
Photoionization Detector Reading (ppm)*						0°	nm	nm	nm	1	nm	2°	nm	nm	0	0°	nm	nm	nm	0
Dissolved Metals																				
Arsenic	µg/L	0.5	6	6		-	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	0.2	<0.5	-	<0.5	<0.5	<0.1	<0.5
Beryllium	µg/L	1.0	25	25		-	2.5	<1	0.2	<1	3.4	3.0	3	3.5	3.0	-	1.0	<1	0.2	<0.5
Boron	µg/L	2.0	1000	1000		228	220	160	223	223	389	357	320	190	321	120	146	130	141	165
Cadmium	µg/L	0.5	NS	NS		<0.5	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5
Chromium (Total Dissolved)	µg/L	10.0	5000	5000		57.4	48.7	40	50	59	215	227	240	191	219	<10.0	<10.0	<10	<5	12
Cobalt	µg/L	0.2	5	5		<0.2	<0.2	<0.1	0.02	<0.1	<0.2	<0.2	<0.1	0.61	<0.1	<0.2	<0.2	<0.1	0.05	0.1
Copper	µg/L	2.0	NS	NS		6.4	4.6	5	<2	13	9	17	8	<2	11	4	<0.5	0.4	<2	6
Iron	µg/L	1.0	1000 (AO)	87		<10.0	<10.0	1620	<2	1.6	3.9	2.3	2.0	1.5	1.7	0.7	<1.0	2	<2	4.5
Lead	µg/L	10.0	300 (AO)	NV		<10.0	<10.0	1620	11	<100	31400	23500	34600	133	30000	<10.0	<10.0	<30	25	<100
Molybdenum	µg/L	0.02	10	10		<0.5	<0.5	<1	0.10	<0.1	<0.5	<0.5	<1	<5	<0.1	<0.5	<0.5	<1	0.28	<0.1
Nickel	µg/L	0.5	NS	NS		0.9	0.5	<5	0.4	<5	2.6	<0.5	<5	0.9	<5	<0.5	<0.5	<5	<10	6
Selenium	µg/L	1.0	NS	NS		5.4	1.1	<5	<10	6	<10	1.7	<5	<10	6	2.4	<10	<10	<10	6
Silver	µg/L	1.0	10	10		-	<1.0	<1	<1	<1	<1.0	<1.0	1	<1	<1	-	<1.0	<1	<1	<1
Thallium	µg/L	0.2	NS	NS		<0.2	<0.2	<0.1	<0.02	<0.1	<0.2	<0.2	<0.1	0.11	<0.1	<0.2	<0.1	<0.02	<0.1	<0.1
Uranium	µg/L	0.3	NS	NS		<0.3	<0.3	<0.1	<0.05	<0.1	<0.3	<0.3	<0.1	0.05	<0.1	<0.3	<0.3	<0.05	<0.1	<0.1
Vanadium	µg/L	0.5	20	20		1.6	0.9	<1	0.39	0.4	<0.5	<0.5	<1	0.36	<0.1	1.0	0.9	<1	0.51	0.5
Zinc	µg/L	0.4	NS	NS		6.2	4.5	2	1.9	7.9	3.0	2.3	5	4.9	15.0	1.5	1.5	1	1.7	4.5
Inorganics	µg/L	5.0	5000 (AO)	1100		119	8.4	<10	<5	<5	<5.0	687	<10	6	<5	11.7	11.8	<10	8	26
Electrical Conductivity	µS/cm	2	NS	NV		3080	-	1730	2920	3740	-	2000	2160	1840	1970	1270	-	1380	1180	1300
pH	units	NA	6.5-8.5 (OG)	5-9		8.06	-	7.39	7.14	6.96	-	8.03	7.21	6.83	6.62	8.13	-	7.75	7.18	6.84
Alkalinity (as CaCO3)	mg/L	5	30-500 (OG)	NV		359	-	541	363	373	-	548	585	559	586	252	-	312	295	281
Chloride	mg/L	0.10	250 (AO)	790		865	727	240	859	885	387	393	383	360	370	255	275	239	242	31
Sulfate	mg/L	0.10	500 (AO)	NV		95.6	88.2	16	79	80	<0.20	3.62	<3	<1	2	25.6	24.4	24	24	34
Ammonia as N	mg/L	0.02	NS	NV		<0.02	<0.02	1.86	<0.03	0.10	13.6	14.7	13.6	13.5	12.9	0.04	<0.02	0.04	0.07	0.48
Calcium	mg/L	0.05	NS	NV		192	179	194	192	246	178	181	201	203	198	111	131	135	183	152
Magnesium	mg/L	0.05	NS	NV		15.1	15.2	16	17.3	23.3	16.3	16.9	17	17.0	17.1	13.6	15.8	16	21.6	21.2
Chromium III	mg/L	0.003	NS	NV		6.4	-	<0.005	-	0.013	-	-	<0.005	<0.005	0.011	3.8	-	<0.005	-	<0.01
Chromium VI	mg/L	0.005	NS	0.025		<0.005	<0.005	<0.005	<0.01	<0.010	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.01	<0.01	<0.01
Sodium	mg/L	0.05	200 (AO)	490		394	402	164	516	647	214	206	232	267	233	100	-	<0.005	144	148
Mercury	mg/L	0.0001	0.001	0.00029		-	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.00018	0.0002	-	<0.0001	<0.0001	<0.0002	<0.0001
Cyanide, Free	mg/L	0.002	0.2	0.086		-	<0.002	<0.005	<0.005	<0.002	<0.002	<0.002	<0.005	<0.005	<0.002	-	<0.002	<0.005	<0.005	<0.002
Phenols	mg/L	0.001	NS	0.890		<0.001	-	<0.005	<0.004	0.004	-	0.002	<0.001	0.007	0.010	<0.001	-	<0.001	0.025	0.108
Potassium	mg/L	0.05	NS	NV		7.53	7.59	6	10.1	10.2	12.3	12.2	12	13.2	11.5	1.74	2.46	2	4.7	16.8
Total Hardness (as CaCO3)	mg/L	10	80-100 (OG)	NV		514	7.57	550	551	710	-	522	572	574	577	333	-	403	545	465
Nitrite as N	mg/L	0.10	10.0	NV		-	<0.10	<0.10	7.3	6.0	<0.10	<0.10	<0.10	<0.1	<0.1	-	<0.05	<0.10	<0.1	5.4
Nitrate as N	mg/L	0.10	1.5	NV		-	<0.10	<0.10	<0.1	<0.05	<0.10	<0.10	<0.10	0.2	<0.1	-	<0.05	<0.10	<0.1	4.82
Fluoride	mg/L	0.10	NS	NV		-	<0.10	<0.25	<0.4	0.2	<0.10	<0.10	<0.25	0.4	0.3	-	<0.05	<0.25	<0.4	<0.1
Bromide	mg/L	0.10	NS	NV		-	<0.10	<0.01	0.02	<1	<0.20	<0.20	<0.01	0.05	<1	-	<0.10	<0.01	0.05	<1
Phosphate as P	mg/L	0.10	NS	NV		-	<0.20	<0.01	0.02	<1	<0.20	<0.20	<0.01	0.05	<1	-	<0.10	<0.01	0.05	<1

Notes:

* Readings obtained on different date

** Readings obtained from gas probe GP-84 due to high water table in the vicinity of MW-B4

1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane

2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene

3. NV = No value

4. NS = No standard

5. µg/L = Microgram per Litre

6. mg/L = Milligram per Litre

7. - = Not analyzed

8. RDL = Laboratory Reportable Detection Limit

9. na = Not applicable

10. nm = not measured

11. Table 2 Standard = Ministry of Environment (MOE) Soil, Groundwater, and Sediment Standards, Part XV.1

12. ODWS = Ontario Drinking Water Standard, 2006

13. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard

14. Shaded indicates an exceedance of the ODWS

Table 3
Groundwater Analytical Results
Metals and Inorganics
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location					MW-B4**				MW-B5				MW-B6								
Sampling Date	Parameter	Units	RDL	ODWS	MOE Table 2 Standards	2-Mar-12	27-Jun-12	22-Apr-13	20-Aug-13	12-Dec-13	2-Mar-12	27-Jun-12	22-Apr-13	20-Aug-13	10-Dec-13	2-Mar-12	27-Jun-12	22-Apr-13	20-Aug-13	10-Dec-13	Field Duplicate of MW-B6
Combustible Gas Meter Reading (ppm)						1350°	nm	nm	nm	48% LEL	500°	nm	nm	nm	0	1300°	nm	nm	nm	6% LEL	
Photoionization Detector Reading (ppm)*						0°	nm	nm	nm	0	0°	nm	nm	nm	0	0°	nm	nm	nm	0	
Dissolved Metals																					
Antimony	µg/L	6	0.5	6	6	0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	0.1	<0.5	<0.5
Arsenic	µg/L	25	1.7	25	25	1.7	1.8	<10	4.3	1	6.3	7.5	<10	3.1	8.0	2.4	1.7	<1	3.0	1.5	<1
Barium	µg/L	1000	409	1000	1000	409	381	350	489	360	212	215	140	265	200	467	301	110	259	190	192
Beryllium	µg/L	NS	0.5	NS	4.0	<0.5	<0.5	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/L	5000	323	5000	5000	323	354	340	377	366	32.1	32.2	20	44	36	252	239	100	157	110	153
Cadmium	µg/L	5	0.2	5	2.7	<0.2	<0.2	<0.1	0.95	<0.1	<0.2	<0.2	<0.1	0.26	<0.1	<0.2	<0.2	<0.1	0.78	<0.1	<0.1
Chromium (Total Dissolved)	µg/L	50	8	50	50	8	8	7	7	28	9	<2.0	3	3	7	23	3	10	4	12	16
Cobalt	µg/L	NS	4.6	NS	3.6	4.6	5.4	3.5	3.3	3.5	8.5	2.1	1.5	0.6	0.8	14.2	7.6	2.6	1.7	6.5	2.4
Copper	µg/L	1000 (AO)	<1.0	1000 (AO)	87	<1.0	<1.0	<1	26	0.6	<1.0	1.2	<1	17	<0.5	<1.0	1.2	<1	30	1.5	1.4
Iron	µg/L	100	65000	100	NV	65000	68500	58800	44900	70500	18100	31800	19500	33100	23700	32900	42500	23500	97800	9780	31000
Lead	µg/L	10	<0.5	10	10	<0.5	<0.5	<1	66.9	0.1	<0.5	<0.5	<1	1.85	<0.1	<0.5	<0.5	<1	6.71	1.3	<0.5
Molybdenum	µg/L	NS	<0.5	NS	70	<0.5	<0.5	<5	0.7	<0.5	1.2	0.8	<5	0.2	0.7	1.3	0.7	<5	1.9	<0.5	<0.5
Nickel	µg/L	100	<1.0	NS	100	<1.0	5.0	<5	<10	7	<1.0	2.4	<5	10	4	2.9	6.7	<5	10	20	8
Selenium	µg/L	10	3.1	10	10	3.1	<1.0	<1	2	<1	1.0	<1.0	<1	<1	<1	3.0	<1.0	<1	<1	<1	1
Silver	µg/L	NS	<0.2	NS	1.5	<0.2	<0.2	<0.1	<0.02	<0.1	<0.2	<0.2	<0.1	0.18	<0.1	<0.2	<0.2	<0.1	0.69	<0.1	<0.1
Thallium	µg/L	NS	<0.3	NS	2	<0.3	<0.3	<0.1	<0.05	<0.1	<0.3	<0.3	<0.1	<0.05	<0.1	<0.3	<0.3	<0.1	<0.05	<0.1	<0.1
Uranium	µg/L	20	<0.5	NS	20	<0.5	<0.5	<1	0.48	<0.1	0.8	<0.5	<1	1.6	<0.1	1.6	<0.5	<1	0.39	<0.1	<0.1
Vanadium	µg/L	NS	6.2	NS	6.2	3.0	2.4	<5	9.8	37.3	6.1	1.4	1	1.6	6.0	3.6	1.4	5	1.3	8.8	18.1
Zinc	µg/L	5000 (AO)	<5.0	5000 (AO)	1100	<5.0	<5.0	<10	458	<5	18.2	28.6	60	319	17	<5.0	7.9	<10	143	139	<5
Inorganics																					
Electrical Conductivity	µS/cm	NS	3510	NS	NV	3510	3220	3500	2450	3460	2120	2050	2370	1900	1950	4030	2780	2290	1590	3290	3410
pH	pH Units	NA	7.28	5-9	5-9	7.28	7.50	7.11	6.63	6.48	7.70	7.81	7.54	6.99	6.78	7.28	7.58	7.16	6.62	6.35	6.34
Alkalinity (as CaCO3)	mg/L	5	949	30-500 (OG)	NV	949	-	948	951	1040	302	-	299	308	298	779	-	551	615	592	575
Chloride	mg/L	0.10	614	250 (AO)	750	614	608	558	552	590	542	598	567	547	510	939	608	423	395	916	938
Sulphate	mg/L	0.10	15.5	500 (AO)	NV	15.5	2.39	11	2	2	6.51	<0.20	<3	<1	1	<0.10	<0.20	<3	<1	2	2
Ammonia as N	mg/L	NS	145	NS	NV	145	155	123	116	149	0.72	0.999	2.20	2.29	2.26	46.2	78.8	18.8	36.4	30.3	30.0
Calcium	mg/L	NS	230	NS	NV	230	-	241	215	248	144	-	143	123	145	277	-	275	270	310	324
Magnesium	mg/L	NS	22.9	NS	NV	22.9	-	22	25.6	24.3	14.2	-	14	10.2	12.2	34.4	-	29	30.0	31.7	37.0
Chromium III	mg/L	NS	0.028	NS	NV	0.028	-	0.006	-	0.028	0.009	-	<0.005	-	<0.01	0.023	-	<0.005	-	0.012	0.016
Chromium VI	mg/L	NS	<0.005	NS	0.025	<0.005	<0.005	<0.0005	<0.01	<0.01	<0.005	<0.005	<0.0005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01
Sodium	mg/L	0.05	270	200 (AO)	490	270	247	293	269	339	286	306	318	333	332	428	225	78	178	381	367
Mercury	mg/L	0.0001	-	0.001	0.00029	-	-	<0.0001	0.00030	<0.0001	-	-	<0.0001	<0.00002	<0.0001	-	-	<0.0001	<0.00002	<0.0001	<0.0001
Cyanide, Free	mg/L	0.002	-	0.2	0.066	-	-	<0.005	<0.005	<0.002	-	-	<0.005	<0.005	<0.002	-	-	<0.005	<0.002	<0.002	<0.002
Phenols	mg/L	0.001	0.025	NS	0.890	0.025	-	<0.001	0.056	0.028	0.010	-	0.028	0.006	0.006	0.009	-	<0.01	0.018	0.015	0.011
Potassium	mg/L	0.05	19.3	NS	NV	19.3	-	17	23.1	19	2.83	-	2	3.3	25.8	24.0	-	7	13.9	9.2	13.1
Total Hardness (as CaCO3)	mg/L	10	669	80-100 (OG)	NV	669	-	892	642	716	418	-	415	349	412	833	-	806	798	907	963
Nitrate as N	mg/L	0.10	-	10.0	NV	-	<0.10	<0.10	0.1	<0.1	-	<0.10	<0.10	<0.1	<0.1	-	<0.10	<0.10	<0.1	<0.1	<0.1
Nitrite as N	mg/L	0.10	-	1.0	NV	-	<0.10	<0.10	<0.1	<0.05	-	<0.10	<0.10	<0.1	<0.05	-	<0.10	<0.10	<0.1	<0.05	<0.05
Fluoride	mg/L	1.5	-	NS	NV	-	<0.10	<0.10	0.2	<0.1	-	<0.10	<0.10	0.2	<0.1	-	<0.10	<0.10	0.2	<0.1	<0.1
Bromide	mg/L	NS	-	NS	NV	-	<0.10	<0.25	0.9	0.5	-	<0.10	<0.25	<0.4	<0.1	-	<0.10	<0.25	0.6	0.7	0.7
Phosphate as P	mg/L	0.10	-	NS	NV	-	<0.2	<0.01	0.04	<1	-	<0.20	<0.01	0.04	<1	-	<0.20	0.02	0.06	<1	<1

Notes:
* Readings obtained on different date
** Readings obtained from gas probe GP-B4 due to high water table in the vicinity of MW-B4
1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylenes
3. NV = No value
4. NS = No standard
5. µg/L = Microgram per Litre
6. mg/L = Milligram per Litre
7. - = Not analysed
8. RDL = Laboratory Reportable Detection Limit
9. na = Not applicable
10. nm = not measured
11. Table 2 Standard = Ministry of Environment (MOE) "Soil Groundwater and Sediment Standards, Part XV 1 Environment Protection Act, April 15, 2011" full depth generic site condition standards for all types of land uses, possible groundwater condition, coarse textured soil
12. ODWS = Ontario Drinking Water Standard, 2006
13. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
14. Shaded indicates an exceedance of the ODWS

Golder Associates

- Readings obtained on different date
- Readings obtained from gas probe GP-B4 due to high water table in the vicinity of MM-B4
- 1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
- 2. Photofluorescent Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene
- 3. NV = No value
- 4. NS = No standard
- 5. $\mu\text{g/L}$ = Microgram per Litre
- 6. mg/L = Milligrams per Litre
- 7. -- = Not analyzed
- 8. RDL = Laboratory Reportable Detection Limit
- 9. na = Not applicable
- 10. nm = not measured
- 11. Table 2 Standard = Ministry of Environment (MOE) "Soil Groundwater, and Sediment Standards, Part XV.1 Environmental Protection Act, April 15, 2011" full depth generic site condition standards for all types of land uses
- 12. groundwater protection condition: coarse textured soil
- 13. ODWS = Ontario Drinking Water Standard, 2006
- 13. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
- 14. Shaded indicates an exceedance of the ODWS

Notes:

- * Readings obtained on different date
- ** Readings obtained from gas probe GP-J1 due to high water table in the vicinity of MW K1
1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
2. Photoluminescent Detector Reading - measured in ppm (parts per million by volume), calibrated to acetylene
3. na = not applicable
4. nm = not measured
5. NV = No value
6. NS = No standard
7. µg/L = Microgram per Liter
8. = not analyzed
9. RDL = Laboratory Reportable Detection Limit
10. Table 2 Standard = Ministry of Environment (MOE) Soil, Groundwater and Sediment Standards, Part XV.1 Environmental Protection Act, April 15, 2011. Full depth generic site condition standards for all types of land uses, possible groundwater condition, coarse textured soil
11. ODWS = Ontario Drinking Water Standards, 2006.
12. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
13. Shaded indicates an exceedance of the ODWS

Table 4
Groundwater Analytical Results
VOC and Petroleum Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location					MW-B5										MW-B6										MW-B7										MW-B23																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Sampling Date					2-Mar-12					27-Jun-12					22-Aug-12					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13					10-Dec-13					28-Jun-12					22-Aug-12					22-Aug-13					21-Aug-13				

Notes:

- * Readings obtained on different date
- ** Readings obtained from gas probe GP J1 due to high water table in the vicinity of MW-1
- 1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
- 2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to toluene
- 3. na = not applicable
- 4. nm = not measured
- 5. NV = No value
- 6. NS = No standard
- 7. µg/L = Microgram per Liter
- 8. RDL = Laboratory Reportable Detection Limit
- 9. RDL = Laboratory Reportable Detection Limit
- 10. Table 2 Standard's Ministry of Environment (MOE) S4 Groundwater and Sediment Standards, Part XV, 1 Environmental Protection Act, April 15, 2011. All depth generic site condition standards for all types of land uses, possible groundwater condition, coarse textured soil
- 11. ODWS = Ontario Drinking Water Standards, 2006.
- 12. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
- 13. Shaded indicates an exceedance of the ODWS

Table 4

Notes:

1. Readings obtained on different date
2. Readings obtained from gas probe GP J1 due to high water table in the vicinity of MW K1
3. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to measure methane
4. Photooxidation Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene
5. na = not applicable
6. sim = not measurable
7. NV = No value
8. NS = No standard
9. ug/L = Microgram per Litre
10. - = not analysed
11. RDL = Laboratory Reportable Detection Limit
12. Table 2 Standard - Ministry of Environment (MOE) "Soil Groundwater and Sediment Standards, Part XV 1 Environmental Protection Act, April 15, 2011" full depth generic site condition standards for all types of land uses, potable groundwater condition, coarse textured soil
13. ODWS - Ontario Drinking Water Standards, 2006
14. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
15. Shaded indicates an exceedance of the ODWS

Prepared by *CLB*
Checked by *JTF* *96*

Table 5
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location				MMW-B1										MMW-B2										MMW-B3									
Sampling Date				28-Jun-12	21-Aug-12	22-Apr-13	21-Aug-13	10-Dec-13	21-Aug-12	6-Sep-12	22-Apr-13	20-Aug-13	10-Dec-13	29-Jun-12	21-Aug-12	22-Apr-13	21-Aug-13	10-Dec-13															
Combustible Gas Meter Reading (ppm)				210°	nm	nm	nm	0	nm	6450°	nm	nm	260	<25°	nm	nm	nm	0															
Photoionization Detector Reading (ppm)				0°	nm	nm	nm	1	nm	2°	nm	nm	0°	nm	nm	nm	nm	0															
Parameter	Units	RDL	ODWS	MOE Table 2 Standards							Field Duplicate of MMW-B2																						
Polycyclic Aromatic Hydrocarbons																																	
Naphthalene	µg/L	0.20	NS	11	<0.20	<0.20	<0.1	<0.05	<0.05	110	62	24.4	14.2	0.31	36.2	<0.20	<0.20	<0.1															
Acenaphthylene	µg/L	0.20	NS	1	<0.20	<0.20	<0.1	<0.05	<0.05	<0.20	<0.20	<0.5	<0.1	0.41	<0.05	<0.20	<0.20	<0.1															
Acenaphthene	µg/L	0.20	NS	4.1	<0.20	<0.20	<0.1	<0.05	<0.05	1.6	1.6	1.7	0.8	0.78	2.02	<0.20	<0.20	<0.1															
Fluorene	µg/L	0.20	NS	120	<0.20	<0.20	<0.1	<0.05	<0.05	1.5	1.1	1.2	0.5	0.93	1.05	<0.20	<0.20	<0.1															
Phenanthrene	µg/L	0.10	NS	1	<0.10	<0.10	<0.1	<0.05	<0.05	3.9	2.6	5.6	1.0	2.69	2.32	<0.10	<0.10	<0.1															
Anthracene	µg/L	0.10	NS	2.4	<0.10	<0.10	<0.1	<0.05	<0.01	0.76	0.60	1.2	0.1	0.88	0.40	<0.10	<0.10	<0.1															
Fluoranthene	µg/L	0.20	NS	0.41	<0.20	<0.20	<0.1	<0.05	<0.01	0.93	0.87	6.6	0.3	3.83	1.20	<0.20	<0.20	<0.1															
Pyrene	µg/L	0.20	NS	4.1	<0.20	<0.20	<0.1	<0.05	<0.01	0.77	0.74	6.2	0.3	3.46	1.07	<0.20	<0.20	<0.1															
Benz(a)anthracene	µg/L	0.20	NS	1.0	<0.20	<0.20	<0.1	<0.05	<0.01	<0.20	<0.20	2.6	<0.1	0.98	0.40	<0.20	<0.20	<0.1															
Chrysene	µg/L	0.10	NS	0.1	<0.10	<0.10	<0.05	<0.05	<0.05	0.13	0.20	2.6	<0.05	1.60	0.41	<0.10	<0.10	<0.05															
Benz(b)fluoranthene	µg/L	0.10	NS	0.1	<0.10	<0.10	<0.05	<0.05	<0.05	0.10	0.12	2.4	<0.05	1.71	0.44	<0.10	<0.10	<0.05															
Benz(k)fluoranthene	µg/L	0.10	NS	0.1	<0.10	<0.10	<0.05	<0.05	<0.05	<0.10	<0.10	2.2	<0.05	0.83	0.22	<0.10	<0.10	<0.05															
Benz(a)pyrene	µg/L	0.01	NS	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	0.12	2.69	0.02	1.66	0.28	<0.01	<0.01	<0.01															
Indeno(1,2,3-cd)pyrene	µg/L	0.20	NS	0.2	<0.20	<0.20	<0.1	<0.05	<0.05	<0.20	<0.20	1.7	<0.1	0.78	0.15	<0.20	<0.20	<0.1															
Dibenz(a,h)anthracene	µg/L	0.20	NS	0.2	<0.20	<0.20	<0.1	<0.05	<0.05	<0.20	<0.20	<0.5	<0.1	<0.3	<0.05	<0.20	<0.20	<0.1															
Benzofl. h. lipylene	µg/L	0.20	NS	0.2	<0.20	<0.20	<0.1	<0.05	<0.05	<0.20	<0.20	1.7	<0.1	1.09	0.21	<0.20	<0.20	<0.1															
Biphenyl	µg/L	0.05	NS	0.05	-	-	-	-	<0.05	-	-	-	-	-	0.16	-	-	<0.05															
2-and 1-methyl Naphthalene	µg/L	0.20	NS	3.2	<0.20	<0.20	<0.2	<0.10	<0.10	3.5	3.1	2.7	1.5	0.31	3.82	<0.20	<0.20	<0.2															
																		<0.10															

Notes:

* Readings obtained on different date

** Readings obtained from gas probe GP J1 due to high water table in the vicinity of MMW-K1

1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane

2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene

3. NS = no standard

4. µg/L = Microgram per Liter

5. RDL = Laboratory Reportable Detection Limit

6. na = not applicable

7. nm = not measured

8. Table 2 Standard = Ministry of Environment (MOE) Soil, Groundwater, and Sediment Standards, Part XV.1

9. ODYS = Ontario Drinking Water Standard, 2006

10. Bold type and outlined indicates an exceedance of the ODYS

11. Shaded indicates an exceedance of the ODYS

Table 5
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location		MW-B4					MW-B5					MW-B6										
		21-Mar-12	27-Jun-12	22-Apr-13	20-Aug-13	12-Dec-13	21-Mar-12	27-Jun-12	22-Apr-13	20-Aug-13	10-Dec-13	2-Mar-12	27-Jun-12	22-Apr-13	20-Aug-13	10-Dec-13						
		Combustible Gas Meter Reading (ppm)	nm	nm	nm	48% LEL	500	nm	nm	nm	0	1300*	nm	nm	nm	6% LEL						
		Photoionization Detector Reading (ppm)	nm	nm	nm	0	0	nm	nm	nm	0	0*	nm	nm	nm	0						
Parameter		Units	RDL	ODWS	MOE Table 2 Standards											Field Duplicate of MW-B6						
Polycyclic Aromatic Hydrocarbons																						
Naphthalene	µg/L	0.20	NS	11			9.1	3.7	2.4	1.71	7.28	<0.20	0.41	0.2	0.39	0.54	10	5.9	0.5	<0.3	2.10	2.21
Acenaphthylene	µg/L	0.20	NS	1			<0.20	<0.20	<0.1	<0.2	<0.05	<0.20	<0.20	<0.1	0.06	<0.05	<0.20	<0.20	<0.1	<0.3	0.09	0.07
Acenaphthene	µg/L	0.20	NS	4.1			<0.20	<0.20	<0.1	<0.2	<0.05	<0.20	0.31	0.1	0.50	0.65	0.48	0.34	<0.1	<0.3	0.12	0.12
Fluorene	µg/L	0.20	NS	120			<0.20	<0.20	<0.1	0.24	0.12	<0.20	<0.20	<0.1	0.11	0.11	0.67	0.39	<0.1	<0.3	0.15	0.16
Phenanthrene	µg/L	0.10	NS	1			0.32	0.25	0.1	0.58	0.31	0.68	0.44	<0.1	0.50	0.12	1.2	0.67	0.3	0.56	0.87	0.93
Anthracene	µg/L	0.10	NS	2.4			<0.10	<0.10	<0.1	<0.2	<0.01	0.18	0.10	<0.1	0.12	<0.01	0.22	0.17	<0.1	<0.3	0.23	0.19
Fluoranthene	µg/L	0.20	NS	0.41			<0.20	<0.20	<0.1	0.34	0.07	0.86	0.51	<0.1	0.72	0.09	0.37	<0.20	<0.1	1.39	1.01	0.86
Pyrene	µg/L	0.20	NS	4.1			<0.20	<0.20	<0.1	0.34	<0.01	0.82	0.47	<0.1	0.64	0.08	0.31	<0.20	<0.1	1.08	0.84	0.71
Benz(a)anthracene	µg/L	0.20	NS	1.0			<0.20	<0.20	<0.1	<0.2	<0.01	0.38	0.28	<0.1	0.48	<0.01	<0.20	<0.20	<0.1	0.67	0.41	0.33
Chrysene	µg/L	0.10	NS	0.1			<0.10	<0.10	<0.05	0.24	<0.05	0.41	0.24	<0.05	0.29	<0.05	<0.10	<0.10	<0.05	0.56	0.39	0.33
Benzofluoranthene	µg/L	0.10	NS	0.1			<0.10	<0.10	<0.05	<0.2	<0.05	0.46	0.57	<0.05	0.42	<0.05	0.11	<0.10	<0.05	0.62	0.61	0.49
Benzofluoranthene	µg/L	0.10	NS	0.1			<0.10	<0.10	<0.05	<0.2	<0.05	0.28	0.11	<0.05	0.12	<0.05	<0.10	<0.10	<0.05	<0.3	0.28	0.23
Benzofluoranthene	µg/L	0.10	NS	0.1			<0.10	<0.10	<0.05	<0.05	<0.01	0.52	0.15	<0.01	0.271	<0.01	<0.01	<0.01	<0.01	0.462	0.35	0.28
Benzo(a)pyrene	µg/L	0.20	NS	0.01			<0.01	<0.01	<0.01	<0.05	<0.01	0.25	<0.20	<0.1	0.18	<0.05	<0.20	<0.20	<0.1	<0.3	0.21	0.16
Indeno(1,2,3-cd)pyrene	µg/L	0.20	NS	0.2			<0.20	<0.20	<0.1	<0.2	<0.05	<0.20	<0.20	<0.1	<0.05	<0.05	<0.20	<0.20	<0.1	<0.3	<0.05	<0.05
Dibenz(a,h)anthracene	µg/L	0.20	NS	0.2			<0.20	<0.20	<0.1	<0.2	<0.05	0.37	<0.20	<0.1	0.15	<0.05	<0.20	<0.20	<0.1	0.26	0.25	<0.05
Benzo(g,h,i)perylene	µg/L	0.05	NS	0.05			-	-	-	-	<0.05	-	-	-	-	<0.05	-	-	-	-	<0.05	<0.05
Biphenyl	µg/L	0.20	NS	3.2			1.2	0.65	0.4	0.63	1.01	<0.20	<0.20	<0.2	0.25	0.26	4.4	3.2	0.3	<0.6	0.90	0.90
2-and 1-methyl Naphthalene	µg/L	0.20	NS																			

Notes:

- * Readings obtained on different date
- ** Readings obtained from gas probe GP J1 due to high water table in the vicinity of MW/K1
- 1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
- 2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene
- 3. NS = no standard
- 4. µg/L = Microgram per Litre
- 5. RDL = Laboratory Reportable Detection Limit
- 6. na = not applicable
- 7. nm = not measured
- 8. Table 2 Standard = Ministry of Environment (MOE) "Soil, Groundwater, and Sediment Standards, Part XV.1 Environment Protection Act, April 15, 2011" full depth generic site condition standards for all types of land uses, potable groundwater condition, coarse textured soil
- 9. ODWS = Ontario Drinking Water Standard, 2006
- 10. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
- 11. Shaded indicates an exceedance of the ODWS

Table 5
Groundwater Analytical Results
Polynuclear Aromatic Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location				MW-B7				MW-B23				Field Blank				Field Blank			
Sampling Date	Combustible Gas Meter Reading (ppm)	Photoionization Detector Reading (ppm)		29-Jun-12	22-Aug-12	22-Apr-13	21-Aug-13	10-Dec-13	21-Aug-13	10-Dec-13	22-Apr-13	21-Aug-13	10-Dec-13	11-Dec-13	22-Apr-13	21-Aug-13			
				125*	nm	nm	nm	80	nm	380	na	na	na	na	na	na			
				0*	nm	nm	nm	0	nm	0	na	na	na	na	na	na			
Parameter	Units	RDL	ODWS	MOE Table 2 Standards		Field Duplicate of MW-B7					Field Blank	Field Blank	Field Blank	Field Blank	Trip Blank	Trip Blank			
Polycyclic Aromatic Hydrocarbons																			
Naphthalene	µg/L	0.20	NS	<0.20	<0.20	<0.1	<0.2	<0.05	0.40	0.11	<0.1	0.07	<0.05	<0.05	<0.1	0.24			
Acenaphthylene	µg/L	0.20	NS	<0.20	<0.20	<0.1	0.22	<0.05	<0.4	<0.05	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Acenaphthene	µg/L	0.20	NS	0.74	0.91	0.5	1.22	0.91	<0.4	<0.05	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Fluorene	µg/L	0.20	NS	0.37	0.40	0.2	0.59	0.31	<0.4	<0.05	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Phenanthrene	µg/L	0.10	NS	0.45	0.37	0.3	1.37	0.52	0.72	0.07	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Anthracene	µg/L	0.10	NS	<0.10	0.13	<0.1	0.33	0.13	<0.4	0.03	<0.1	<0.05	<0.01	<0.01	<0.1	<0.05			
Fluoranthene	µg/L	0.20	NS	<0.20	0.26	<0.1	1.44	0.34	1.21	0.12	<0.1	<0.05	<0.01	<0.01	<0.1	<0.05			
Pyrene	µg/L	0.20	NS	<0.20	0.21	<0.1	1.51	0.33	1.13	0.11	<0.1	<0.05	<0.01	<0.01	<0.1	<0.05			
Benz(a)anthracene	µg/L	0.20	NS	<0.20	<0.20	<0.1	0.59	0.10	0.72	0.07	<0.1	<0.05	<0.01	<0.01	<0.1	<0.05			
Chrysene	µg/L	0.10	NS	<0.10	<0.10	<0.05	0.63	0.40	0.56	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Benz(b)fluoranthene	µg/L	0.10	NS	<0.10	<0.10	<0.05	0.66	0.49	0.72	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Benz(k)fluoranthene	µg/L	0.10	NS	<0.10	<0.10	<0.05	0.30	0.07	<0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Benz(a)pyrene	µg/L	0.01	0.01	<0.01	<0.01	<0.01	0.480	0.08	0.483	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			
Indeno(1,2,3-cd)pyrene	µg/L	0.20	NS	<0.20	<0.20	<0.1	0.30	<0.05	0.48	<0.05	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Dibenz(a,h)anthracene	µg/L	0.20	NS	<0.20	<0.20	<0.1	<0.2	<0.05	<0.4	<0.05	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Benz(a,h)perylene	µg/L	0.20	NS	<0.20	<0.20	<0.1	0.33	0.31	0.48	0.06	<0.1	<0.05	<0.05	<0.05	<0.1	<0.05			
Biphenyl	µg/L	0.05	NS	-	-	-	-	<0.05	-	<0.05	-	-	<0.05	<0.05	-	-			
2-and 1-methyl Naphthalene	µg/L	0.20	NS	<0.20	0.21	<0.2	<0.4	<0.10	<0.8	0.11	<0.2	<0.10	<0.10	<0.10	<0.2	0.23			

Notes:

- * Readings obtained on different date
- ** Readings obtained from gas probe GP J1 due to high water table in the vicinity of MW K1
- 1. Combustible Gas Meter Reading - measured in ppm (parts per million by volume), calibrated to hexane
- 2. Photoionization Detector Reading - measured in ppm (parts per million by volume), calibrated to isobutylene
- 3. NS = no standard
- 4. µg/L = Microgram per Liter
- 5. RDL = Laboratory Reportable Detection Limit
- 6. na = not applicable
- 7. nm = not measured
- 8. Table 2 Standard = Ministry of Environment (MOE) Soil, Groundwater, and Sediment Standards, Part XV/1 Environment Protection Act, April 15, 2011 * full depth generic site condition standards for all types of land uses, potable groundwater condition, coarse textured soil
- 9. ODWS = Ontario Drinking Water Standard, 2006
- 10. Bold type and outlined indicates an exceedance of the MOE Table 2 site condition standard
- 11. Shaded indicates an exceedance of the ODWS

Table 6
Surface Water Analytical Results
Metals and Inorganics
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location					SWB1				SWB2				SWB3			
Sampling Date		Units	RDL	PWQO	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13
Parameter																
Dissolved Metals																
Aluminum	mg/L		0.004	0.075	<0.004	0.04	0.04	0.008	<0.004	0.06	0.04	0.004	<0.004	0.05	0.04	0.004
Antimony	mg/L		0.003	0.020	<0.003	<0.0005	0.0002	<0.0005	<0.003	<0.0005	<0.0001	<0.0005	<0.003	<0.0005	0.0001	<0.0005
Arsenic	mg/L		0.003	0.1	<0.003	<0.001	0.0003	<0.001	0.003	<0.001	0.0003	<0.001	0.003	<0.001	0.0004	<0.001
Barium	mg/L		0.002	NO	0.116	0.14	0.163	0.138	0.122	0.14	0.173	0.139	0.116	0.15	0.181	0.156
Beryllium	mg/L		0.001	0.011	<0.001	<0.0005	<0.0001	<0.0005	<0.001	<0.0005	<0.0001	<0.0005	<0.001	<0.0005	<0.0001	<0.0005
Boron	mg/L		0.010	0.20	0.013	0.01	0.019	0.021	0.016	0.019	0.018	0.018	0.017	0.01	0.019	0.018
Cadmium	mg/L		0.0001	0.0002	<0.0001	<0.0001	0.00013	<0.0001	<0.0001	<0.0001	0.00008	<0.0001	<0.0001	<0.0001	0.00008	<0.0001
Chromium	mg/L		0.003	NO	0.014	0.003	0.0033	0.008	0.012	0.003	0.0021	0.008	0.014	0.003	0.0025	0.009
Cobalt	mg/L		0.0005	0.0009	<0.0005	0.0004	0.0002	<0.0005	<0.0005	0.0004	<0.0001	<0.0005	<0.0005	0.0004	0.0001	<0.0005
Copper	mg/L		0.002	0.005	<0.002	0.002	0.0091	0.0048	<0.002	0.002	0.0053	0.0028	0.002	0.002	0.0069	0.0032
Iron	mg/L		0.010	0.3	0.884	1.11	0.675	1.48	0.831	1.01	0.731	1.03	1.27	1.20	1.20	1.42
Lead	mg/L		0.001	0.005	0.001	<0.001	0.00207	0.0017	0.001	<0.001	0.00083	0.0008	0.001	<0.001	0.00162	0.0013
Manganese	mg/L		0.002	NO	0.073	0.11	0.077	0.10	0.07	0.10	0.030	0.08	0.095	0.13	0.098	0.106
Molybdenum	mg/L		0.002	0.04	<0.002	<0.005	0.0008	<0.0005	<0.002	<0.005	0.0007	<0.0005	<0.002	<0.005	0.0007	<0.0005
Nickel	mg/L		0.003	0.025	<0.003	<0.005	<0.01	0.004	<0.003	<0.005	<0.01	0.004	<0.003	<0.005	<0.01	0.004
Selenium	mg/L		0.004	0.1	<0.004	<0.001	<0.001	<0.001	<0.004	<0.001	<0.001	<0.001	<0.004	<0.001	<0.001	<0.001
Silver	mg/L		0.0001	0.0001	<0.0001	<0.0001	0.00002	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001
Strontium	mg/L		0.005	NO	0.432	0.607	0.490	0.454	0.471	0.615	0.519	0.431	0.53	0.715	0.530	0.559
Thallium	mg/L		0.0003	0.0003	<0.0003	<0.0001	<0.00005	<0.0001	<0.0003	<0.0001	<0.00005	<0.0001	<0.0003	<0.0001	<0.00005	<0.0001
Titanium	mg/L		0.002	NO	0.002	<0.01	<0.005	<0.005	0.003	<0.01	<0.005	<0.005	0.005	<0.01	0.010	0.006
Tungsten	mg/L		0.010	0.03	<0.010	<0.005	0.02	<0.01	<0.010	<0.005	0.02	<0.01	<0.010	<0.005	0.01	<0.01
Uranium	mg/L		0.002	0.005	<0.002	0.001	0.00110	0.0009	<0.002	0.001	0.00134	0.0009	<0.002	0.001	0.00146	0.0011
Vanadium	mg/L		0.002	0.005	0.005	0.001	0.0004	0.0027	0.006	0.002	0.0005	0.0023	0.007	0.001	0.0008	0.0034
Zinc	mg/L		0.005	0.03	0.006	<0.01	0.015	0.015	0.007	<0.01	0.014	0.011	0.019	<0.01	0.029	0.018
Zirconium	mg/L		0.004	0.004	<0.004	<0.002	<0.003	<0.001	<0.004	<0.002	<0.003	<0.001	<0.004	<0.002	<0.003	<0.001
Dissolved Mercury	mg/L		0.0001	0.0002	<0.0001	<0.0001	<0.00002	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001	<0.0001	<0.0001	<0.00002	<0.0001
Inorganics																
Electrical Conductivity	uS/cm		2	NO	1450	2150	1400	2110	1430	2180	1380	2130	1560	2400	1390	2300
pH	pH Units		NA	6.5-8.5	8.33	7.96	7.70	7.68	8.35	7.99	7.72	7.70	8.32	7.95	7.76	7.66
Total Hardness (as CaCO3)	mg/L		0.5	NO	359	389	340	428	348	389	335	384	374	380	347	461
Alkalinity (as CaCO3)	mg/L		5	NO	263	267	264	279	258	264	269	302	259	264	259	292
Chloride	mg/L		0.10	NO	343	511	312	467	340	526	370	478	426	589	394	522
Sulphate	mg/L		0.10	NO	28.8	32	30	30	29.4	32	30	40	32.7	35	30	40
Ammonia as N	mg/L		0.02	NO	-	0.72	0.29	0.96	-	0.54	0.11	0.66	-	0.54	0.11	0.56
Ionized Ammonia (calculated)	mg/L		NA	0.020	-	0.005	0.001	<0.001	-	0.002	<0.001	0.001	-	0.002	<0.001	0.001
Calcium	mg/L		0.05	NO	120	131	123	145	116	131	132	127	127	129	136	156
Magnesium	mg/L		0.05	NO	14.4	15	14.6	15.8	14.2	15	15.7	16.1	13.9	14	16.0	17
Sodium	mg/L		0.05	NO	173	288	170	318	166	315	179	301	227	382	180	414
Potassium	mg/L		0.05	NO	2.96	3	2.6	2.73	2.97	3	2.7	2.67	3.46	3	2.8	3.04

Notes:
1. NO = No objective
2. mg/L = Milligrams per Litre
3. RDL = Laboratory Reportable Detection Limit
4. PWQO = Provincial Water Quality Objectives, July, 1994
5. Bold type and italicized indicates an exceedance of the PWQO

Table 6
Surface Water Analytical Results
Metals and Inorganics
City of Barrie Bunker's Creek Historical Waste Sites

Monitoring Well Location					SWB4					SWB5				
Sampling Date	Parameter	Units	RDL	PWQO	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13		8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13	
Dissolved Metals														
	Aluminum	mg/L	0.004	0.075	<0.004	0.03	0.04	0.006		<0.004	0.05	0.04	0.004	
	Antimony	mg/L	0.003	0.020	<0.003	<0.0005	0.0002	<0.0005		<0.003	<0.0005	<0.0001	<0.0005	
	Arsenic	mg/L	0.003	0.1	0.003	<0.001	0.0006	<0.001		<0.003	<0.001	0.0004	<0.001	
	Barium	mg/L	0.002	NO	0.121	0.14	0.163	0.137		0.102	0.12	0.154	0.127	
	Beryllium	mg/L	0.001	0.011	<0.001	<0.0005	<0.0001	<0.0005		<0.001	<0.0005	<0.0001	<0.0005	
	Boron	mg/L	0.010	0.20	0.017	0.01	0.022	0.018		0.011	<0.01	0.016	0.015	
	Cadmium	mg/L	0.0001	0.0002	<0.0001	0.0001	0.00010	<0.0001		<0.0001	<0.0001	0.00012	<0.0001	
	Chromium	mg/L	0.003	NO	0.012	0.003	0.0026	0.009		0.012	0.003	0.0049	0.008	
	Cobalt	mg/L	0.0005	0.0009	<0.0005	0.0004	0.0001	<0.0005		<0.0005	0.0004	0.0001	<0.0005	
	Copper	mg/L	0.002	0.005	0.002	0.002	0.0089	0.0018		<0.002	0.002	0.0100	0.0011	
	Iron	mg/L	0.010	0.3	1.26	1.19	1.01	1.33		0.604	0.54	0.605	0.611	
	Lead	mg/L	0.001	0.005	<0.001	<0.001	0.00541	0.0003		0.001	<0.001	0.00142	0.0001	
	Manganese	mg/L	0.002	NO	0.101	0.12	0.079	0.118		0.081	0.10	0.064	0.095	
	Molybdenum	mg/L	0.002	0.04	<0.002	<0.005	0.0008	<0.0005		<0.002	<0.005	0.0015	<0.0005	
	Nickel	mg/L	0.003	0.025	<0.003	<0.005	<0.01	0.004		<0.003	<0.005	<0.01	0.004	
	Selenium	mg/L	0.004	0.1	<0.004	<0.001	<0.001	<0.001		<0.004	<0.001	<0.001	<0.001	
	Silver	mg/L	0.0001	0.0001	<0.0001	0.00002	0.00002	<0.0001		<0.0001	<0.0001	0.00002	<0.0001	
	Strontium	mg/L	0.005	NO	0.573	0.763	0.690	0.614		0.521	0.684	0.636	0.568	
	Thallium	mg/L	0.0003	0.0003	<0.0003	<0.0001	<0.00005	<0.0001		<0.0003	<0.0001	<0.00005	<0.0001	
	Titanium	mg/L	0.002	NO	0.002	<0.01	<0.005	<0.005		0.004	<0.01	<0.005	<0.005	
	Tungsten	mg/L	0.010	0.03	<0.010	<0.005	0.02	<0.01		<0.010	<0.005	0.02	<0.01	
	Uranium	mg/L	0.002	0.005	<0.002	0.001	0.00144	0.0013		<0.002	0.001	0.00172	0.0014	
	Vanadium	mg/L	0.002	0.005	0.007	0.001	0.0006	0.0044		0.008	0.001	0.0008	0.0042	
	Zinc	mg/L	0.005	0.03	0.008	0.02	0.013	0.006		0.016	<0.01	0.013	<0.005	
	Zirconium	mg/L	0.004	0.004	<0.004	<0.002	<0.003	<0.001		<0.004	<0.002	<0.003	<0.001	
	Dissolved Mercury	mg/L	0.0001	0.0002	<0.0001	<0.0001	<0.00002	<0.0001		<0.0001	<0.0001	<0.00002	<0.0001	
Inorganics														
	Electrical Conductivity	uS/cm	2	NO	1600	2580	1450	2310		1520	2560	1410	2260	
	pH	pH Units	NA	6.5-8.5	8.35	7.95	7.72	7.73		8.38	8.00	7.80	7.78	
	Total Hardness (as CaCO3)	mg/L	0.5	NO	332	377	335	459		327	366	359	449	
	Alkalinity (as CaCO3)	mg/L	5	NO	257	262	288	295		252	254	259	298	
	Chloride	mg/L	0.10	NO	404	649	414	505		389	642	358	469	
	Sulphate	mg/L	0.10	NO	326	37	30	40		33.5	38	40	40	
	Ammonia as N	mg/L	0.02	NO	-	0.40	0.15	0.51		-	0.14	<0.03	0.25	
	Ionized Ammonia (calculated)	mg/L	NA	0.020	-	-	0.002	0.001		-	0.001	<0.001	0.001	
	Calcium	mg/L	0.05	NO	113	128	130	156		110	125	133	151	
	Magnesium	mg/L	0.05	NO	12.2	14	15.1	16.9		12.6	13	15.6	17.2	
	Sodium	mg/L	0.05	NO	216	428	221	369		192	416	212	355	
	Potassium	mg/L	0.05	NO	3.11	3	2.8	3.19		2.69	3	2.7	3.1	

- Notes:
1. NO = No objective
 2. mg/L = Milligrams per Litre
 3. RDL = Laboratory Reportable Detection Limit
 4. PWQO = Provincial Water Quality Objectives, July, 1994
 5. Bold type and italicized indicates an exceedance of the PWQO

Table 7
Surface Water Analytical Results
VOC and Petroleum Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Surface Water Location		SWB1				SWB2				SWB3						
Sampling Date	Parameter	Units	RDL	PWQO	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13	8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13
VOC																
	Acetone	µg/L	1.0	NO	<1.0	<50	<30	<5.0	<1.0	<50	<30	<5.0	<1.0	<50	<30	<5.0
Bromodichloromethane	Benzene	µg/L	0.20	100	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5
	Bromodichloromethane	µg/L	0.20	200	<0.20	<0.3	<2	<0.3	<0.20	<0.3	<2	<0.3	<0.20	<0.3	<2	<0.3
	Bromoform	µg/L	0.10	60	<0.10	<0.4	<5	<0.5	<0.10	<0.4	<5	<0.5	<0.10	<0.4	<5	<0.5
Bromomethane	Bromomethane	µg/L	0.20	0.9	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5
	Carbon Tetrachloride	µg/L	0.20	NO	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2	<0.2
	Chlorobenzene	µg/L	0.10	15	<0.10	<0.2	<0.5	<0.5	<0.10	<0.2	<0.5	<0.5	<0.10	<0.2	<0.5	<0.5
Chloroethane	Chloroethane	µg/L	0.20	NO	<0.20	<0.2	-	<1.0	<0.20	<0.2	-	<1.0	<0.20	<0.2	-	<1.0
	Chloroform	µg/L	0.20	NO	<0.20	<0.5	<1	<0.5	<0.20	<0.5	<1	<0.5	<0.20	<0.5	<1	<0.5
	Chloromethane	µg/L	0.40	700	<0.40	<0.2	-	<3.0	<0.40	<0.2	-	<3.0	<0.40	<0.2	-	<3.0
Dibromochloromethane	1,2-Dichlorobenzene	µg/L	0.10	40	<0.10	<0.3	<2	<0.5	<0.10	<0.3	<2	<0.5	<0.10	<0.3	<2	<0.5
	1,2-Dichlorobenzene	µg/L	0.10	2.5	<0.10	<0.4	<0.5	<0.5	<0.10	<0.4	<0.5	<0.5	<0.10	<0.4	<0.5	<0.5
	1,3-Dichlorobenzene	µg/L	0.10	2.5	<0.10	<0.4	<0.5	<0.5	<0.10	<0.4	<0.5	<0.5	<0.10	<0.4	<0.5	<0.5
1,4-Dichlorobenzene	1,4-Dichlorobenzene	µg/L	0.10	4	<0.10	<0.4	<0.5	<0.5	<0.10	<0.4	<0.5	<0.5	<0.10	<0.4	<0.5	<0.5
	Dichlorodifluoromethane	µg/L	0.20	NO	<0.20	<0.5	<2	<1.0	<0.20	<0.5	<2	<1.0	<0.20	<0.5	<2	<1.0
	1,1-Dichloroethane	µg/L	0.30	200	<0.30	<0.4	<0.5	<0.5	<0.30	<0.4	<0.5	<0.5	<0.30	<0.4	<0.5	<0.5
1,2 - Dichloroethane	1,2 - Dichloroethane	µg/L	0.20	100	<0.20	<0.2	<0.5	<0.5	<0.20	<0.2	<0.5	<0.5	<0.20	<0.2	<0.5	<0.5
	1,1 Dichloroethylene	µg/L	0.30	40	<0.30	<0.5	<0.5	<0.5	<0.30	<0.5	<0.5	<0.5	<0.30	<0.5	<0.5	<0.5
	cis- 1,2-Dichloroethylene	µg/L	0.20	200	0.98	<0.4	<0.5	<0.5	<0.20	<0.4	<0.5	<0.5	<0.20	<0.4	<0.5	<0.5
trans- 1,2-Dichloroethylene	trans- 1,2-Dichloroethylene	µg/L	0.20	200	<0.20	<0.4	<0.5	<0.5	<0.20	<0.4	<0.5	<0.5	<0.20	<0.4	<0.5	<0.5
	1,2-Dichloropropane	µg/L	0.20	0.7	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5
	1,3-Dichloropropene (Cis + Trans)	µg/L	0.30	NO	<0.30	<0.4	<0.5	<0.5	<0.30	<0.4	<0.5	<0.5	<0.30	<0.4	<0.5	<0.5
Ethylbenzene	Ethylbenzene	µg/L	0.10	8	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5
	Ethylene Dibromide	µg/L	0.10	5	<0.10	<0.2	<0.2	<0.2	<0.10	<0.2	<0.2	<0.2	<0.10	<0.2	<0.2	<0.2
	n-Hexane	µg/L	0.20	NO	<0.20	<5	<5	<1.0	<0.20	<5	<5	<1.0	<0.20	<5	<5	<1.0
Methylene Chloride	Methylene Chloride	µg/L	0.30	100	<0.30	<4.0	<5	<5.0	<0.30	<4.0	<5	<5.0	<0.30	<4.0	<5	<5.0
	Methyl Isobutyl Ketone	µg/L	1.0	NO	<1.0	<10	<20	<5.0	<1.0	<10	<20	<5.0	<1.0	<10	<20	<5.0
	Methyl Ethyl Ketone	µg/L	1.0	400	<1.0	<10	<20	<5.0	<1.0	<10	<20	<5.0	<1.0	<10	<20	<5.0
Methyl tert-butyl ether	Methyl tert-butyl ether	µg/L	0.20	200	<0.20	<10	<2	<2.0	<0.20	<10	<2	<2.0	<0.20	<10	<2	<2.0
	Styrene	µg/L	0.10	4	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5
	1,1,1,2-Tetrachloroethane	µg/L	0.10	20	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	µg/L	0.10	70	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5
	Tetrachloroethylene	µg/L	0.20	50	<0.20	<0.3	<0.5	<0.5	<0.20	<0.3	<0.5	<0.5	<0.20	<0.3	<0.5	<0.5
	Toluene	µg/L	0.20	0.8	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5	<0.20	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	1,1,1-Trichloroethane	µg/L	0.30	10	<0.30	<0.4	<0.5	<0.5	<0.30	<0.4	<0.5	<0.5	<0.30	<0.4	<0.5	<0.5
	1,1,2-Trichloroethane	µg/L	0.20	800	<0.20	<0.4	<0.5	<0.5	<0.20	<0.4	<0.5	<0.5	<0.20	<0.4	<0.5	<0.5
	Trichloroethylene	µg/L	0.20	20	<0.20	<0.3	<0.5	<0.5	<0.20	<0.3	<0.5	<0.5	<0.20	<0.3	<0.5	<0.5
1,3,5-Trimethylbenzene	1,3,5-Trimethylbenzene	µg/L	0.3	3	-	<0.3	-	<0.5	-	<0.3	-	<0.5	-	<0.3	-	<0.5
	Vinyl Chloride	µg/L	0.17	600	<0.17	<0.2	<0.5	<0.5	<0.17	0.9	<0.5	<0.5	<0.17	<0.2	<0.5	<0.5
	m & p-Xylene	µg/L	0.20	32	<0.20	<0.5	<1.0	<0.5	<0.20	<0.5	<1.0	<0.5	<0.20	<0.5	<1.0	<0.5
o-Xylene	o-Xylene	µg/L	0.10	40	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5	<0.10	<0.5	<0.5	<0.5
	Xylene Mixture (Total)	µg/L	0.20	NO	<0.20	<1.0	<1.1	<0.5	<0.20	<1.0	<1.1	<0.5	<0.20	<1.0	<1.1	<0.5
	Trichlorofluoromethane	µg/L	0.40	NO	<0.40	<0.5	<5	<1.0	<0.40	<0.5	<5	<1.0	<0.40	<0.5	<5	<1.0
Petroleum Hydrocarbons																
	F1 (C6 to C10) minus BTEX	mg/L	0.1	NO	-	<0.1	<50	<25.0	-	<0.1	<50	<25.0	-	<0.1	<50	<25.0
	F2 (C10 to C16) minus Naphthalene	mg/L	0.1	NO	-	<0.1	<50	<100	-	<0.1	<50	<100	-	<0.1	<50	<100
	F3 (C16 to C34) minus PAHs	mg/L	0.2	NO	-	<0.2	<400	<100	-	<0.2	<400	<100	-	<0.2	<400	<100
	F4 (C34 to C50)	mg/L	0.2	NO	-	<0.2	<400	<100	-	<0.2	<400	<100	-	<0.2	<400	<100

Notes:
1. NO = No objective
2. µg/L = Microgram per Litre
4. RDL = Laboratory Reportable Detection Limit
5. PWQO = Provincial Water Quality Objectives, July, 1994
6. Bold type and italicized indicates an exceedance of the PWQO

Table 7
Surface Water Analytical Results
VOC and Petroleum Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Surface Water Location				SWB4					SWB5				
Sampling Date				8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13		8-Nov-12	23-Apr-13	23-Aug-13	10-Dec-13	
Parameter	Units	RDL	PWQO										
VOC													
Acetone	µg/L	1.0	NO	<1.0	<50	<30	<5.0		<1.0	<50	<30	<5.0	
Benzene	µg/L	0.20	100	<0.20	<0.5	<0.5	<0.5		<0.20	<0.5	<0.5	<0.5	
Bromodichloromethane	µg/L	0.20	200	<0.20	<0.3	<2	<0.5		<0.20	<0.3	<2	<0.5	
Bromoform	µg/L	0.10	60	<0.10	<0.4	<5	<0.5		<0.10	<0.4	<5	<0.5	
Bromomethane	µg/L	0.20	0.9	<0.20	<0.5	<0.5	<0.5		<0.20	<0.5	<0.5	<0.5	
Carbon Tetrachloride	µg/L	0.20	NO	<0.20	<0.2	<0.2	<0.2		<0.20	<0.2	<0.2	<0.2	
Chlorobenzene	µg/L	0.10	15	<0.10	<0.2	<0.5	<1.0		<0.10	<0.2	<0.5	<1.0	
Chloroethane	µg/L	0.20	NO	<0.20	<0.2	-	<0.5		<0.20	<0.2	<0.5	<1.0	
Chloroform	µg/L	0.20	NO	<0.20	<0.5	<1	<0.5		<0.20	<0.5	<1	<0.5	
Chloromethane	µg/L	0.40	700	<0.40	<0.2	-	<3.0		<0.40	<0.2	-	<3.0	
Dibromochloromethane	µg/L	0.10	40	<0.10	<0.3	<2	<0.5		<0.10	<0.3	<2	<0.5	
1,2-Dichlorobenzene	µg/L	0.10	2.5	<0.10	<0.4	<0.5	<0.5		<0.10	<0.4	<0.5	<0.5	
1,3-Dichlorobenzene	µg/L	0.10	2.5	<0.10	<0.4	<0.5	<0.5		<0.10	<0.4	<0.5	<0.5	
1,4-Dichlorobenzene	µg/L	0.10	4	<0.10	<0.4	<0.5	<0.5		<0.10	<0.4	<0.5	<0.5	
Dichlorodifluoromethane	µg/L	0.20	NO	<0.20	<0.5	<2	<1.0		<0.20	<0.5	<2	<1.0	
1,1-Dichloroethane	µg/L	0.30	200	<0.30	<0.4	<0.5	<0.5		<0.30	<0.4	<0.5	<0.5	
1,2 - Dichloroethane	µg/L	0.20	100	<0.20	<0.2	<0.5	<0.5		<0.20	<0.2	<0.5	<0.5	
1,1 Dichloroethylene	µg/L	0.30	40	<0.30	<0.5	<0.5	<0.5		<0.30	<0.5	<0.5	<0.5	
cis- 1,2-Dichloroethylene	µg/L	0.20	200	<0.20	<0.4	<0.5	<0.5		<0.20	<0.4	<0.5	<0.5	
trans- 1,2-Dichloroethylene	µg/L	0.20	200	<0.20	<0.4	<0.5	<0.5		<0.20	<0.4	<0.5	<0.5	
1,2-Dichloropropane	µg/L	0.20	0.7	<0.20	<0.5	<0.5	<0.5		<0.20	<0.5	<0.5	<0.5	
1,3-Dichloropropene (Cis + Trans)	µg/L	0.30	NO	<0.30	<0.4	<0.5	<0.5		<0.30	<0.4	<0.5	<0.5	
Ethylbenzene	µg/L	0.10	8	<0.10	<0.5	<0.5	<0.5		<0.10	<0.5	<0.5	<0.5	
Ethylene Dibromide	µg/L	0.10	5	<0.10	<0.2	<0.2	<0.2		<0.10	<0.2	<0.2	<0.2	
n-Hexane	µg/L	0.20	NO	<0.20	<5	<5	<1.0		<0.20	<5	<5	<1.0	
Methylene Chloride	µg/L	0.30	100	<0.30	<4.0	<5	<5.0		<0.30	<4.0	<5	<5.0	
Methyl Isobutyl Ketone	µg/L	1.0	NO	<1.0	<10	<20	<5.0		<1.0	<10	<20	<5.0	
Methyl Ethyl Ketone	µg/L	1.0	400	<1.0	<10	<20	<5.0		<1.0	<10	<20	<5.0	
Methyl tert-butyl ether	µg/L	0.20	200	<0.20	<10	<2	<2.0		<0.20	<10	<2	<2.0	
Styrene	µg/L	0.10	4	<0.10	<0.5	<0.5	<0.5		<0.10	<0.5	<0.5	<0.5	
1,1,1,2-Tetrachloroethane	µg/L	0.10	20	<0.10	<0.5	<0.5	<0.5		<0.10	<0.5	<0.5	<0.5	
1,1,2,2-Tetrachloroethane	µg/L	0.10	70	<0.10	<0.5	<0.5	<0.5		<0.10	<0.5	<0.5	<0.5	
Tetrachloroethylene	µg/L	0.20	50	<0.20	<0.3	<0.5	<0.5		<0.20	<0.3	<0.5	<0.5	
Toluene	µg/L	0.20	0.8	<0.20	<0.5	<0.5	<0.5		<0.20	<0.5	<0.5	<0.5	
1,1,1-Trichloroethane	µg/L	0.30	10	<0.30	<0.4	<0.5	<0.5		<0.30	<0.4	<0.5	<0.5	
1,1,2-Trichloroethane	µg/L	0.20	800	<0.20	<0.4	<0.5	<0.5		<0.20	<0.4	<0.5	<0.5	
Trichloroethylene	µg/L	0.20	20	<0.20	<0.3	<0.5	<0.5		<0.20	<0.3	<0.5	<0.5	
1,3,5-Trimethylbenzene	µg/L	0.3	3	-	<0.3	-	<0.5		-	<0.3	-	<0.5	
Vinyl Chloride	µg/L	0.17	600	<0.17	<0.2	<0.5	<0.5		<0.17	<0.2	<0.5	<0.5	
m & p-Xylene	µg/L	0.20	32	<0.20	<0.5	<1.0	<0.5		<0.20	<0.5	<1.0	<0.5	
o-Xylene	µg/L	0.10	40	<0.10	<0.5	<0.5	<0.5		<0.10	<0.5	<0.5	<0.5	
Xylene Mixture (Total)	µg/L	0.20	NO	<0.20	<1.0	<1.1	<0.5		<0.20	<1.0	<1.1	<0.5	
Trichlorofluoromethane	µg/L	0.40	NO	<0.40	<0.5	<5	<1.0		<0.40	<0.5	<5	<1.0	
Petroleum Hydrocarbons													
F1 (C6 to C10) minus BTEX	mg/L	0.1	NO	-	<0.1	60	<25.0		-	<0.1	<50	<25.0	
F2 (C10 to C16) minus Naphthalene	mg/L	0.1	NO	-	<0.1	<50	<100		-	<0.1	<50	<100	
F3 (C16 to C34) minus PAHs	mg/L	0.2	NO	-	<0.2	<400	<100		-	<0.2	<400	<100	
F4 (C34 to C50)	mg/L	0.2	NO	-	<0.2	<400	<100		-	<0.2	<400	<100	

- Notes:
1. NO = No objective
 2. µg/L = Microgram per Liter
 4. RDL = Laboratory Reportable Detection Limit
 5. PWQO = Provincial Water Quality Objectives, July, 1994
 6. Bold type and italicized indicates an exceedance of the PWQO

Surface Water Analytical Results
Polynuclear Aromatic Hydrocarbons
City of Barric Bunker's Creek Historical Waste Sites

Surface Water Location		SWB1				SWB2	
Sampling Date	Parameter	Units	RDL	PWQO	23-Apr-13	23-Aug-13	10-Dec-13
	VOC						
	Naphthalene	ug/L	0.1	7	<0.1	<0.05	<0.05
	Acenaphthylene	ug/L	0.1	NO	<0.1	<0.05	<0.05
	Acenaphthene	ug/L	0.1	NO	<0.1	<0.05	<0.05
	Fluorene	ug/L	0.1	0.2	<0.1	<0.05	<0.05
	Phenanthrene	ug/L	0.1	0.03	<0.1	<0.05	<0.05
	Anthracene	ug/L	0.1	0.0008	<0.1	<0.05	<0.01
	Fluoranthene	ug/L	0.1	0.0008	<0.1	<0.05	<0.01
	Pyrene	ug/L	0.1	NO	<0.1	<0.05	<0.01
	Benz(a)anthracene	ug/L	0.1	0.0004	<0.1	<0.05	<0.01
	Chrysene	ug/L	0.05	0.0001	<0.05	<0.05	<0.05
	Benzo(b)fluoranthene	ug/L	0.05	NO	<0.05	<0.05	<0.05
	Benzo(k)fluoranthene	ug/L	0.05	0.0002	<0.05	<0.05	<0.05
	Benzo(a)pyrene	ug/L	0.01	NO	<0.01	<0.01	<0.01
	Indeno(1,2,3-cd)pyrene	ug/L	0.1	NO	<0.1	<0.05	<0.05
	Dibenz(a,h)anthracene	ug/L	0.1	0.002	<0.1	<0.05	<0.05
	Benzo(g,h,i)perylene	ug/L	0.1	0.00002	<0.1	<0.05	<0.05
	Biphenyl	ug/L	0.05	2	-	-	<0.05
	1-methylnaphthalene	ug/L	0.1	2	<0.1	<0.05	<0.05
	2-methylnaphthalene	ug/L	0.1	2	<0.1	<0.05	<0.05

Notes:

1. NO = No objective
2. ug/L = Microgram per Litre
4. RDL = Laboratory Reportable Detection Limit
5. PWQO = Provincial Water Quality Objectives, July, 1994
6. Bold type and shaded indicates an exceedance of the PWQO
7. Italicized indicates the RDL is above the PWQO

Surface Water Analytical Results
Polynuclear Aromatic Hydrocarbons
City of Barrie Bunker's Creek Historical Waste Sites

Surface Water Location					SWB3			SWB4		
Sampling Date	Parameter	Units	RDL	PWQO	23-Apr-13	23-Aug-13	10-Dec-13	23-Apr-13	23-Aug-13	10-Dec-13
	VOC									
	Naphthalene	ug/L	0.1	7	0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Acenaphthylene	ug/L	0.1	NO	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Acenaphthene	ug/L	0.1	NO	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Fluorene	ug/L	0.1	0.2	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Phenanthrene	ug/L	0.1	0.03	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Anthracene	ug/L	0.1	0.0008	<0.1	< 0.05	<0.01	<0.1	< 0.05	<0.01
	Fluoranthene	ug/L	0.1	0.0008	<0.1	0.09	<0.01	<0.1	< 0.05	<0.01
	Pyrene	ug/L	0.1	NO	<0.1	< 0.05	<0.01	<0.1	< 0.05	<0.01
	Benz(a)anthracene	ug/L	0.1	0.0004	<0.1	< 0.05	<0.01	<0.1	< 0.05	<0.01
	Chrysene	ug/L	0.05	0.0001	<0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05
	Benzo(b)fluoranthene	ug/L	0.05	NO	<0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05
	Benzo(k)fluoranthene	ug/L	0.05	0.0002	<0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05
	Benzo(a)pyrene	ug/L	0.01	NO	<0.01	< 0.01	<0.01	<0.01	< 0.01	<0.01
	Indeno(1,2,3-cd)pyrene	ug/L	0.1	NO	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Dibenz(a,h)anthracene	ug/L	0.1	0.002	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Benzo(g,h,i)perylene	ug/L	0.1	0.00002	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	Biphenyl	ug/L	0.05	2	-	-	<0.05	-	-	<0.05
	1-methylnaphthalene	ug/L	0.1	2	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05
	2-methylnaphthalene	ug/L	0.1	2	<0.1	< 0.05	<0.05	<0.1	< 0.05	<0.05

Notes:

1. NO = No objective
2. ug/L = Microgram per Litre
4. RDL = Laboratory Reportable Detection Limit
5. PWQO = Provincial Water Quality Objectives, July, 1994
6. Bold type and shaded indicates an exceedance of the PWQO
7. Italicized indicates the RDL is above the PWQO

Surface Water Location		SWB5			
Parameter	Sampling Date	Units	RDL	PWQO	23-Apr-13
VOC					
Naphthalene		ug/L	0.1	7	<0.1
Acenaphthylene		ug/L	0.1	NO	<0.05
Acenaphthene		ug/L	0.1	NO	<0.05
Fluorene		ug/L	0.1	0.2	<0.05
Phenanthrene		ug/L	0.1	0.03	<0.05
Anthracene		ug/L	0.1	0.0008	<0.05
Fluoranthene		ug/L	0.1	0.0008	<0.05
Pyrene		ug/L	0.1	NO	<0.05
Benz(a)anthracene		ug/L	0.1	0.0004	<0.05
Chrysene		ug/L	0.05	0.0001	<0.05
Benzo(b)fluoranthene		ug/L	0.05	NO	<0.05
Benzo(k)fluoranthene		ug/L	0.05	0.0002	<0.05
Benzo(a)pyrene		ug/L	0.01	NO	<0.01
Indeno(1,2,3-cd)pyrene		ug/L	0.1	NO	<0.05
Dibenz(a,h)anthracene		ug/L	0.1	0.002	<0.1
Benzo(g,h,i)perylene		ug/L	0.1	0.00002	<0.1
Biphenyl		ug/L	0.05	2	-
1-methylnaphthalene		ug/L	0.1	2	<0.1
2-methylnaphthalene		ug/L	0.1	2	<0.1

Notes:

1. NO = No objective
2. ug/L = Microgram per Litre
4. RDL = Laboratory Reportable Detection Limit
5. PWQO = Provincial Water Quality Objectives, July, 1994
6. Bold type and shaded indicates an exceedance of the PWQO
7. Italicized indicates the RDL is above the PWQO



APPENDIX A

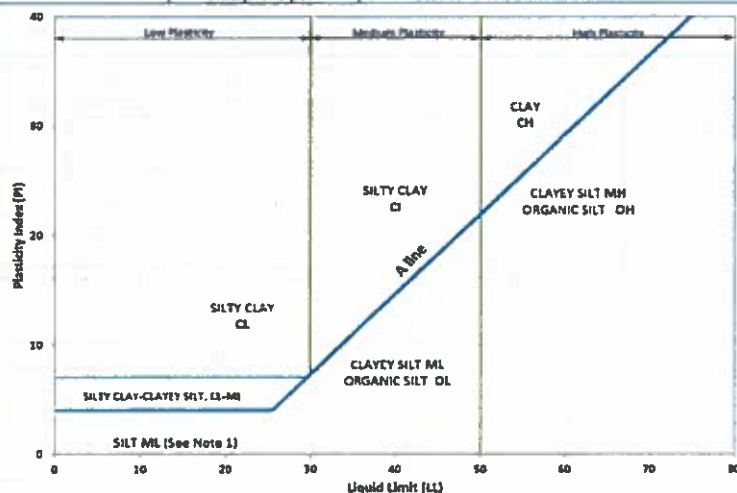
Record of Borehole Log Sheets



METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation on Plasticity	$C_u = \frac{D_{60}}{D_{10}}$	$a_c = \frac{(D_{10})^2}{D_{10} \times D_{60}}$			Organic Content	USCS Group Symbol	Group Name				
INORGANIC (Organic Content $\leq 30\%$ by mass)	COARSE-GRAINED SOILS ($> 50\%$ by mass is larger than 0.075 mm)	GRAVELS ($> 50\%$ by mass of coarse fraction is larger than 4.75 mm)	Gravels with $\leq 12\%$ fines (by mass)	Poorly Graded	< 4	≤ 1 or ≥ 3			$\leq 30\%$	GP	GRAVEL				
				Well Graded	≥ 4	1 to 3				GW	GRAVEL				
			Gravels with $> 12\%$ fines (by mass)	Below A Line	n/a			GM		SILTY GRAVEL					
				Above A Line	n/a			GC		CLAYEY GRAVEL					
		SANDS ($\geq 50\%$ by mass of coarse fraction is smaller than 4.75 mm)	Sands with $\leq 12\%$ fines (by mass)	Poorly Graded	< 6	≤ 1 or ≥ 3				SP	SAND				
				Well Graded	≥ 6	1 to 3				SW	SAND				
			Sands with $> 12\%$ fines (by mass)	Below A Line	n/a			SM		SILTY SAND					
				Above A Line	n/a			SC		CLAYEY SAND					
			Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name	
			INORGANIC (Organic Content $\leq 30\%$ by mass)	FINE-GRAINED SOILS ($\geq 50\%$ by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PL and LL plot below A-Line on Plasticity Chart below)	Liquid Limit < 50	Rapid	None		None	> 6 mm	N/A (can't roll 3 mm thread)	$< 5\%$	ML	SILT
Slow	None to Low	Dull					3 mm to 6 mm	None to low	$< 5\%$	ML	CLAYEY SILT				
Slow to very slow	Low to medium	Dull to slight					3 mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT				
Liquid Limit ≥ 50	Slow to very slow	Low to medium				Slight	3 mm to 6 mm	Low to medium	$< 5\%$	MH	CLAYEY SILT				
	None	Medium to high				Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT				
CLAYS (PL and LL plot above A-Line on Plasticity Chart below)	Liquid Limit < 30	None			Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY				
	Liquid Limit 30 to 50	None			Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY				
	Liquid Limit ≥ 50	None			High	Shiny	< 1 mm	High		CH	CLAY				
HIGHLY ORGANIC SOILS (Organic Content $> 30\%$ by mass)		Peat and mineral soil mixtures									30% to 75%	PT	SILTY PEAT, SANDY PEAT		
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat									75% to 100%		PEAT		



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.

Note 2 – For soils with $< 5\%$ organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.

For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.

For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.

A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to or indicates a range of similar soil types within a stratum.



ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse	19 to 75	0.75 to 3
	Fine	4.75 to 19	(4) to 0.75
SAND	Coarse	2.00 to 4.75	(10) to (4)
	Medium	0.425 to 2.00	(40) to (10)
	Fine	0.075 to 0.425	(200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (i.e., SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N_6

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.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

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

Dynamic Cone Penetration Resistance (DCPT); N_{60}

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

NON-COHESIVE (COHESIONLESS) SOILS

Compactness²

Term	SPT 'N' (blows/0.3m) ¹
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.

2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N' (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

Water Content

Term	Description
$w < PL$	Material is estimated to be drier than the Plastic Limit.
$w = PL$	Material is estimated to be close to the Plastic Limit.
$w > PL$	Material is estimated to be wetter than the Plastic Limit.

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL, w_p	plastic limit
LL, 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
GS	specific gravity
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 (FV)	field vane (LV-laboratory vane test)
γ	unit weight

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

π	3.1416
$\ln x$	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta \sigma$
ϵ	linear strain
ϵ_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a)	Index Properties
$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index $= (w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index $= (w - w_p) / I_p$
I_C	consistency index $= (w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index $= (e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
C_v	coefficient of consolidation (vertical direction)
C_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio $= \sigma'_p / \sigma'_{vo}$

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction $= \tan \delta$
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
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_t	sensitivity

* Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

Notes: 1
2

$\tau = c' + \sigma' \tan \phi'$
shear strength = (compressive strength)/2



LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of weathering

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

Description	Bedding Plane Spacing
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	Less than 6 mm

JOINT OR FOLIATION SPACING

Description	Spacing
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

Term	Size*
Very Coarse Grained	Greater than 60 mm
Coarse Grained	2 mm to 60 mm
Medium Grained	60 microns to 2 mm
Fine Grained	2 microns to 60 microns
Very Fine Grained	Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)

The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)

The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)

The percentage of solid drill core, greater than 100 mm length, recovered at full diameter, measured relative to the length of the total core run. RQD varied from 0% for completely broken core to 100% for core in solid sticks.

DISCONTINUITY DATA

Fracture Index

A count of the number of discontinuities (physical separations) in the rock core, including both naturally occurring fractures and mechanically induced breaks caused by drilling.

Dip with Respect to Core Axis

The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90° angle is horizontal.

Description and Notes

An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes or mechanically induced features caused by drilling such as ground or shattered core and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

JN Joint	PL Planar
FLT Fault	CU Curved
SH Shear	UN Undulating
VN Vein	IR Irregular
FR Fracture	K Slickensided
SY Stylolite	PO Polished
BD Bedding	SM Smooth
FO Foliation	SR Slightly Rough
CO Contact	RO Rough
AXJ Axial Joint	VR Very Rough
KV Karstic Void	
MB Mechanical Break	

PROJECT: 11-1170-0043

RECORD OF BOREHOLE: GP-B20

SHEET 1 OF 1

LOCATION: N 4914963.0 :E 603260.0

BORING DATE: 15-July-2013

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		CH4 (METHANE) [PPM]				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	PHOTO IONIZATION DETECTOR [PPM]				NOTE:	GP-B20	
								40	80	120	160			
		GROUND SURFACE		228.43								MP Elevation (met)		
0	2" Direct Push Geoprobe, Installation with 8 1/4" Hollow Stem Augers 15-July-2013	Damp, brown, sand and gravel (FILL)		0.00									Cement with steel casing	
				227.82										
		Damp to wet, orange brown to brown, laminated, fine SAND, some silt		0.61	1	DO						710		Bentonite
1														
														#0 Silica Sand
2						2	DO					890		
3														
			Silt lensing at 3.51 m			3	DO					700		10 Slot PVC Screen
4														
					4	DO					680			
5														
6		Moist, grey, SILTY CLAY		222.41										
		End of Borehole		6.10										
7														
8														
9														
10														

BAR ENV SIMPLE 1111770043LOGPHASE III.GPJ GAL-CANADA.GDT 3-5-14 STB

DEPTH SCALE

1 : 50



LOGGED: SMF

CHECKED: CLG

PROJECT: 11-1170-0043

RECORD OF BOREHOLE: GP-B21

SHEET 1 OF 1

LOCATION: N 4914967.0 ; E 603440.0

BORING DATE: 23-July-2013

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				NOTE:	GP-B21	
								Cu, kPa			nat V. + rem V. ⊕ U - ⊙			
								20	40		60			80
0	Daylighting 23-July-2013	GROUND SURFACE		228.71							MAP Elevation (mss)			
		Daylighted, No Sample recovered		0.00								Cement with steel casing		
1												Bentonite		
2												#1 Silica Sand		
3														
4														
4		End of Borehole		224.60								10 Slot PVC Screen		
5				4.11										
6														
7														
8														
9														
10														

Cement with
steel casing

Bentonite

#1 Silica Sand

10 Slot PVC
Screen

BAR ENV SIMPLE 1111770043LOGPHASE III.GPJ GAL-CANADA.GDT 3-5-14 STB

DEPTH SCALE

1 : 50



LOGGED: JTF

CHECKED: SMF

PROJECT: 11-1170-0043

RECORD OF BOREHOLE: GP-B22

SHEET 1 OF 1

LOCATION: N 4915054.0 ; E 603746.0

BORING DATE: 15-July-2013

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		CH4 (METHANE) [PPM]				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	40 80 120 160				NOTE:		
								PHOTO IONIZATION DETECTOR [PPM]						
								2	4	6	8			
0		GROUND SURFACE		225.11									MP Elevation (m)	
	2" Direct Push Geoprobe, Installation with 8 1/4" Hollow Stem Augers 15-July-2013	Damp, greyish brown, sand and gravel, some silt (FILL)		0.00									Cement with steel casing	
				224.50									Bentonite	
				0.61										
1			Damp to wet, brown, laminated, fine SAND, trace silt			1	DO	1	1					
2													#40 Silica Sand	
3					2	DO	2	2					10 Slot PVC Screen	
4		Silt lensing from 3.96 m to 4.57 m											Caved Material	
		End of Borehole		220.54 4.57										
5														
6														
7														
8														
9														
10														

BAR ENV SIMPLE 1111770043LOGPHASE III.GPJ GAL-CANADA.GDT 3-5-14 STB

DEPTH SCALE

1 : 50



LOGGED: SMF

CHECKED: CLG

PROJECT: 11-1170-0043

RECORD OF BOREHOLE: MW-B23

SHEET 1 OF 1

LOCATION: N 4915159.0 ; E 603956.0

BORING DATE: 16-July-2013

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		CH4 (METHANE) [PPM]				ADDITIONAL LAB. TESTING	PIEZOMETER DETAILS			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	PHOTO IONIZATION DETECTOR [PPM]				NOTE:	MW-B23	
								40	80		120			160

Cement with
steel casing
flush mount

Bentonite

#1 Silica Sand

10 Slot PVC
Screen

BAR ENV SIMPLE 1111770043LOGPHASE III.GPJ GAL-CANADA.GDT 3-5-14 STB

DEPTH SCALE

1:50



LOGGED: JTF

CHECKED: SMF



APPENDIX B

MOE Well Records



Ministry of the Environment

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THE CITY OF BARRIE ENVIRONMENTAL CENTRE

All measurements recorded in: ☐ Metric ☐ Imperial
Follow instructions on the front and back of this form.

Well Record for Well Cluster - Part 1 of 3

(Only for Multiple Test Holes or Dewatering Wells)
Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Cluster Location Information																
Address of Well Location (Street Number(s), Name(s), RR, if available)		Geographic Township		County/District/Upper Tier Municipality		Mandatory Attachments/Additional Information										
100 Bradford St.		Barrie		Ontario		☒ Land Owner Consent Form must be attached. ☒ Detailed Drawing of All Well Locations must be attached 1. the person constructing the well, will promptly submit to the Director, on request, any additional information in my custody or control related to any well in the well cluster that I have constructed										
City, Town, Village or Hamlet		GPS Unit Make		Unit Mode of Operation		Signature of Technician/Contractor										
Barrie		Garmin		Unit Mode of Operation		Date (yyyy/mm/dd)										
Well # on Drawing	Zone	Easting	Northing	Hole Depth (mft)	Hole Diameter (cm/in)	Method of Construction	Casing Material; Diameter (cm/in)	Casing From To (mft)	Screen Interval (mft)	Annular Space Material (mft)	From To	Material	Abandonment Filing Material Interval (mft)	Overburden/Bedrock or	Static Water Level (mft)	Date of Completion (yyyy/mm/dd)
1	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6.5	2012/06/12
2	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
3	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
4	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
5	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
6	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
7	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
8	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
9	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
10	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
11	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
12	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
13	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
14	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
15	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
16	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
17	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
18	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
19	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
20	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
21	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
22	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
23	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
24	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
25	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
26	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
27	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
28	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
29	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
30	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
31	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
32	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
33	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
34	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
35	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
36	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
37	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
38	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
39	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
40	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
41	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
42	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
43	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
44	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
45	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
46	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
47	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
48	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
49	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
50	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
51	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
52	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
53	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
54	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
55	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
56	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
57	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
58	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
59	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
60	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
61	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
62	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
63	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
64	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
65	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
66	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
67	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
68	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
69	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
70	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
71	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
72	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
73	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
74	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
75	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
76	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
77	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
78	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
79	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
80	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
81	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
82	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
83	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
84	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
85	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
86	17	61	141	1417	7	1/4"	PVC	2	2	2	2	backfill/sand	0-7	backfill/sand	6	2012/06/12
87	17	61	141	1417	7											

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # A143848

"Well Record for Well Cluster" Audit Number: # C 20705

[illegible]



Ontario

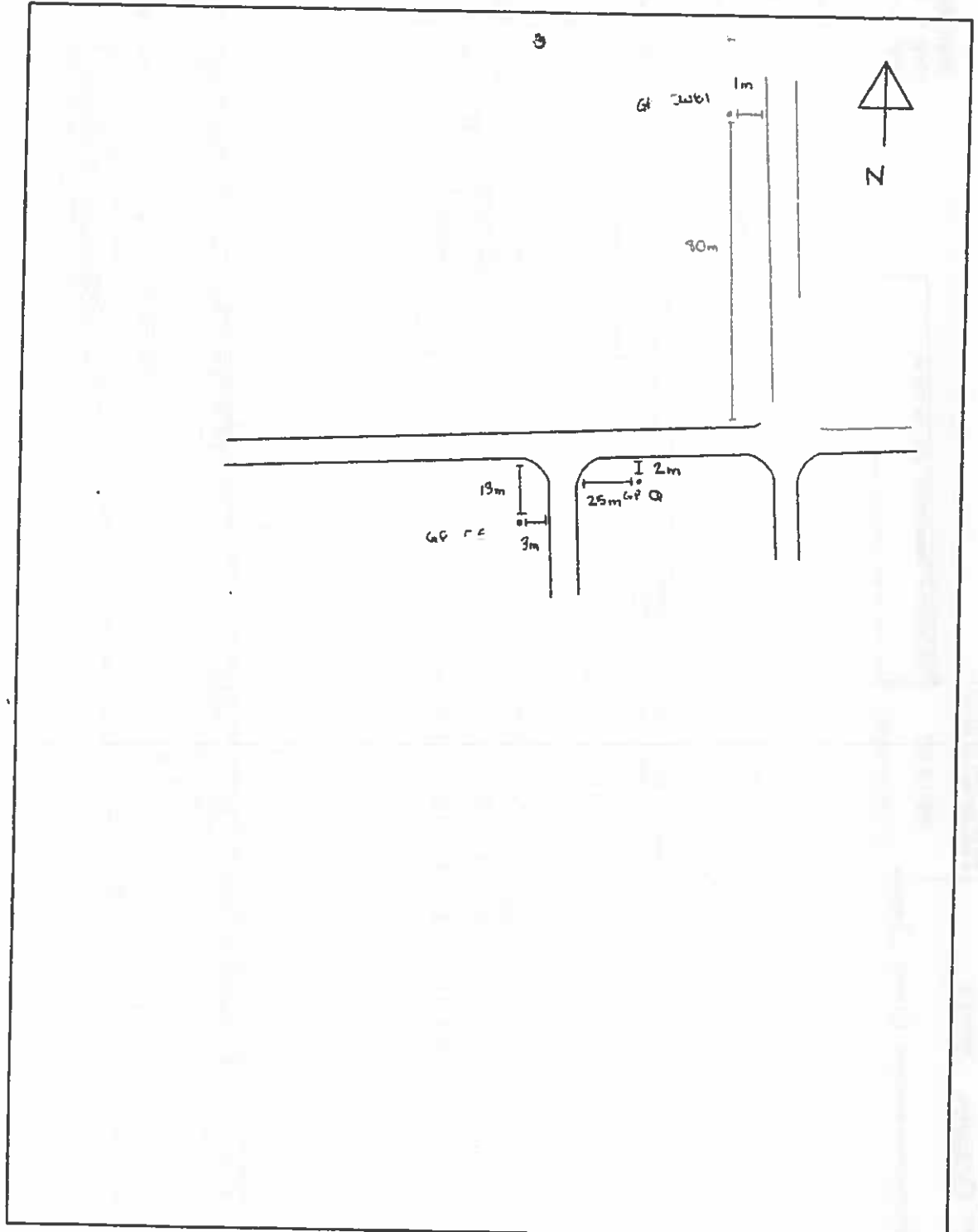
Ministry of
the Environment

Well Record for Well Cluster - Part 3 of 3
Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing. UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A143848

"Well Record for Well Cluster" Form Audit Number: # 60 C 20705



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FEB 20 2015

All measurements recorded in: ☐ Metric ☐ Imperial
Follow instructions on the front and back of this form.
Print clearly in CAPITAL LETTERS

Well Record for Well Cluster - Part 1 of 3
(Only for Multiple Test Holes or Dewatering Wells)
Regulation 903 Ontario Water Resources Act

Well Cluster Location Information

Address of Well Location (Street Number(s) Name(s), RR, if available) **Vespra St.**
City, Town, Village or Hamlet **Barrie**
Province **Ontario**
Concession(s) _____
Geographic Township _____
County/District/Upper Tier Municipality **>**
Unit Mode of Operation ☐ Undifferentiated ☒ Averaged
☐ Differentiated, specify: _____

Mandatory Attachments/Additional Information
☒ Land Owner Consent Form must be attached.
☒ Detailed Drawing of All Well Locations must be attached.
I, the person constructing the well, will promptly submit to the Director, on request, any additional information in my custody or control related to any well in the well cluster that I have constructed.

Page _____ of _____

Well # on Drawing	Zone	Easting	Northing	Hole Depth (m)	Hole Diameter (cm)	Method of Construction	Casing Material (cm)	Casing (m)	Screen Interval (m)	Annular Space (m)	Material	Abandonment Filling Material Intervals (m)	Overburden/Bedrock or Abandonment Filling Material Intervals (m)	Static Water Level (m)	Date of Completion (yyyy/mm/dd)
P5	17	603876	491511	12	8 1/4	boring	"P"			3	0	0-8 backfill/sand			2012/05/12
O2	17	603851	111645	8	8 1/4	boring	"P"				0	0-8 backfill/sand			2012/05/12
M6	17	603899	491511	13	8 1/4	boring	"P"		7	2	0	0-7 backfill/sand			2012/05/12
S2	17	603880	491508	17	8 1/4	boring	"P"				0	0-8 backfill/sand			2012/05/12
S2	17	603830	491512	1	8 1/4	boring	"P"	3	0	3	0	0-8 backfill/sand			2012/05/12

Well Contractor and Well Technician Information
Business Name of Well Contractor **Alfred Drilling**
Business Address **41 Elmlock Hill**
Municipality **Elmira**
Province **ONBusiness Telephone No. **519-212-1313**
Well Contractor's Licence No. **7282**
Signature of Well Technician **Josh Lindsay**
Date Submitted **2013/02/12****

Well Abandonment Information
Date First Well in Cluster Constructed or Abandoned (yyyy/mm/dd) **2012/05/12**
Date Last Well in Cluster Completed (yyyy/mm/dd) **2012/05/12**
Person Abandoning the Wells: **Josh Lindsay**
Name (Print or Type) - See instruction 11 on the back of this form

Ministry Use Only
Date Received (yyyy/mm/dd) **G 20704**
Comments:

Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 18.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # 1143728

"Well Record for Well Cluster" Audit Number: # C 20704

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
GP P5	47 Vespra St Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	2013/02/11
GP P2	47 Vespra St Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	
GP M6	47 Vespra St Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	
GP S3	47 Vespra St Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	
GP S2	47 Vespra St Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	

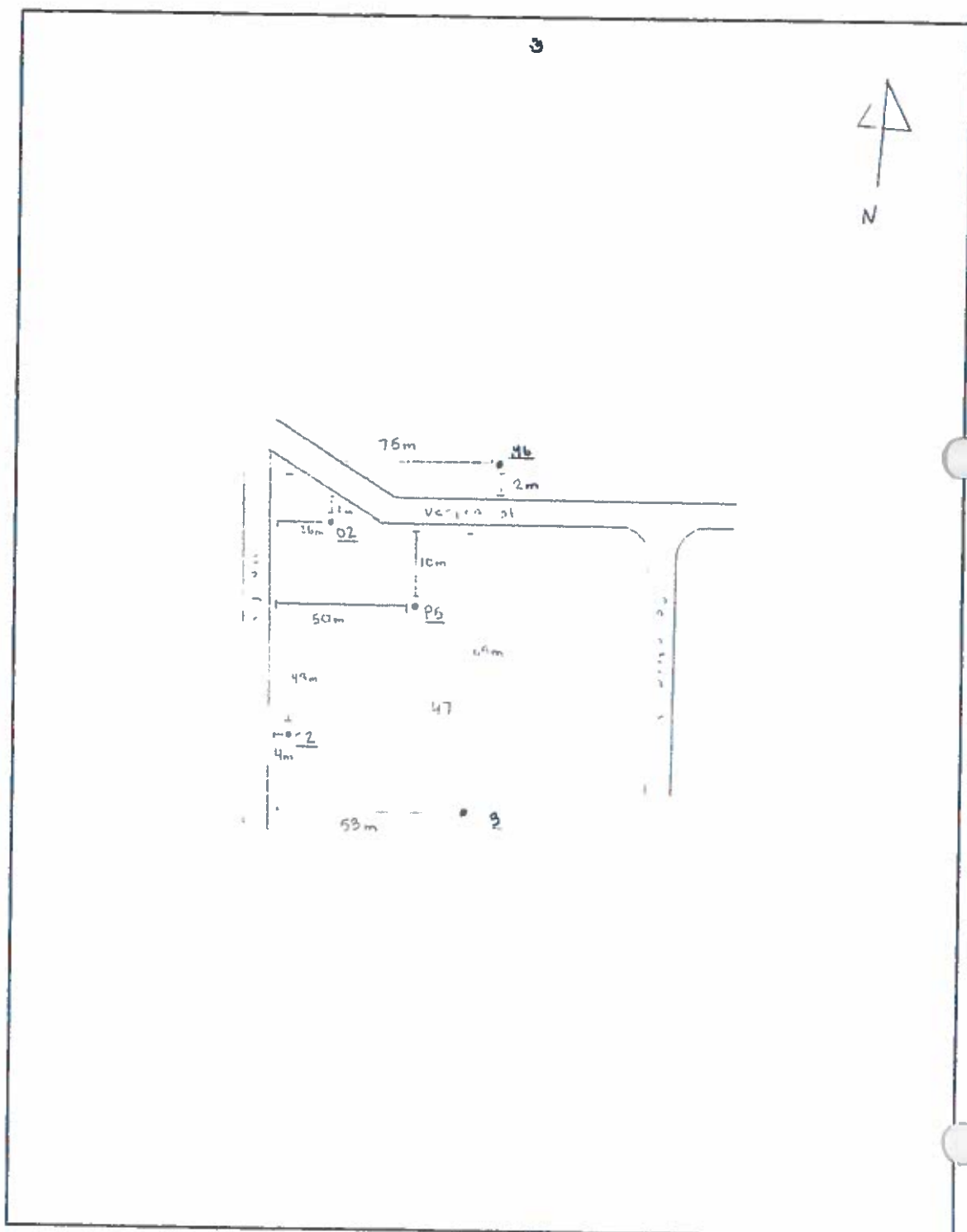


Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.

UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A1438350

"Well Record for Well Cluster" Form Audit Number: # C20704



Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # A143839

"Well Record for Well Cluster" Audit Number: # C20703

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
H3	Innsfil 1 Barre	Diare Moreau for the City of Barre	DM Moreau	203/02/11
S1	Verpist Barre	↓	DM Moreau	↓
H4	Innsfil 1 Barre		DM Moreau	
S1	Innsfil 1 Barre		DM Moreau	

Well Owner's Copy

A143839

04952



Ontario

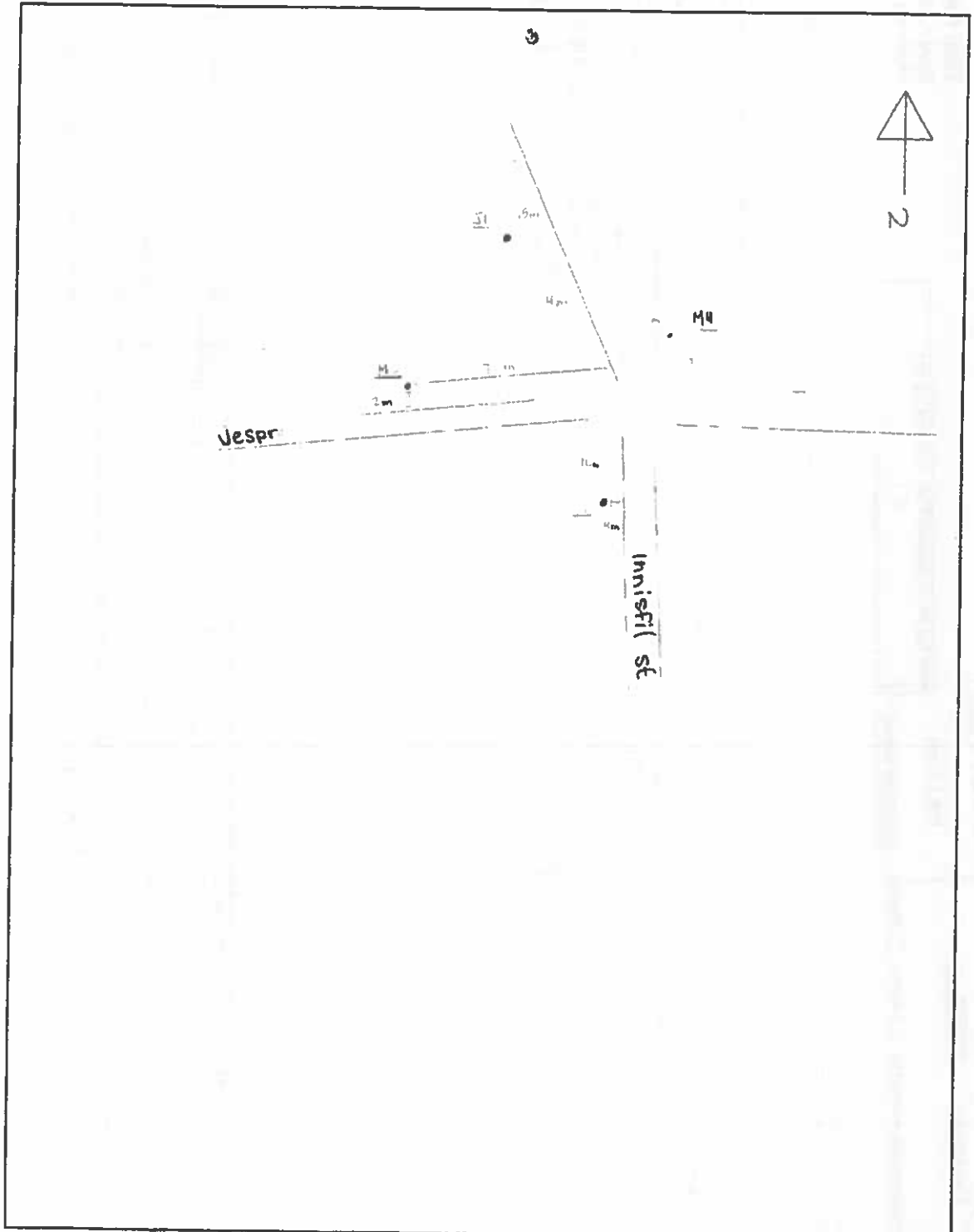
Ministry of
the Environment

Well Record for Well Cluster - Part 3 of 3 Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing. UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing.

Well Tag Number: # A143539

"Well Record for Well Cluster" Form Audit Number: # C20703



Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2: Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # A143847

"Well Record for Well Cluster" Audit Number: # C 20702

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
L3	120 Vespra st. Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	2013/02/11
L1	120 Vespra st. Barrie	↓	<i>D Moreau</i>	↓

Well Owner's Copy A143847 54882



Ontario

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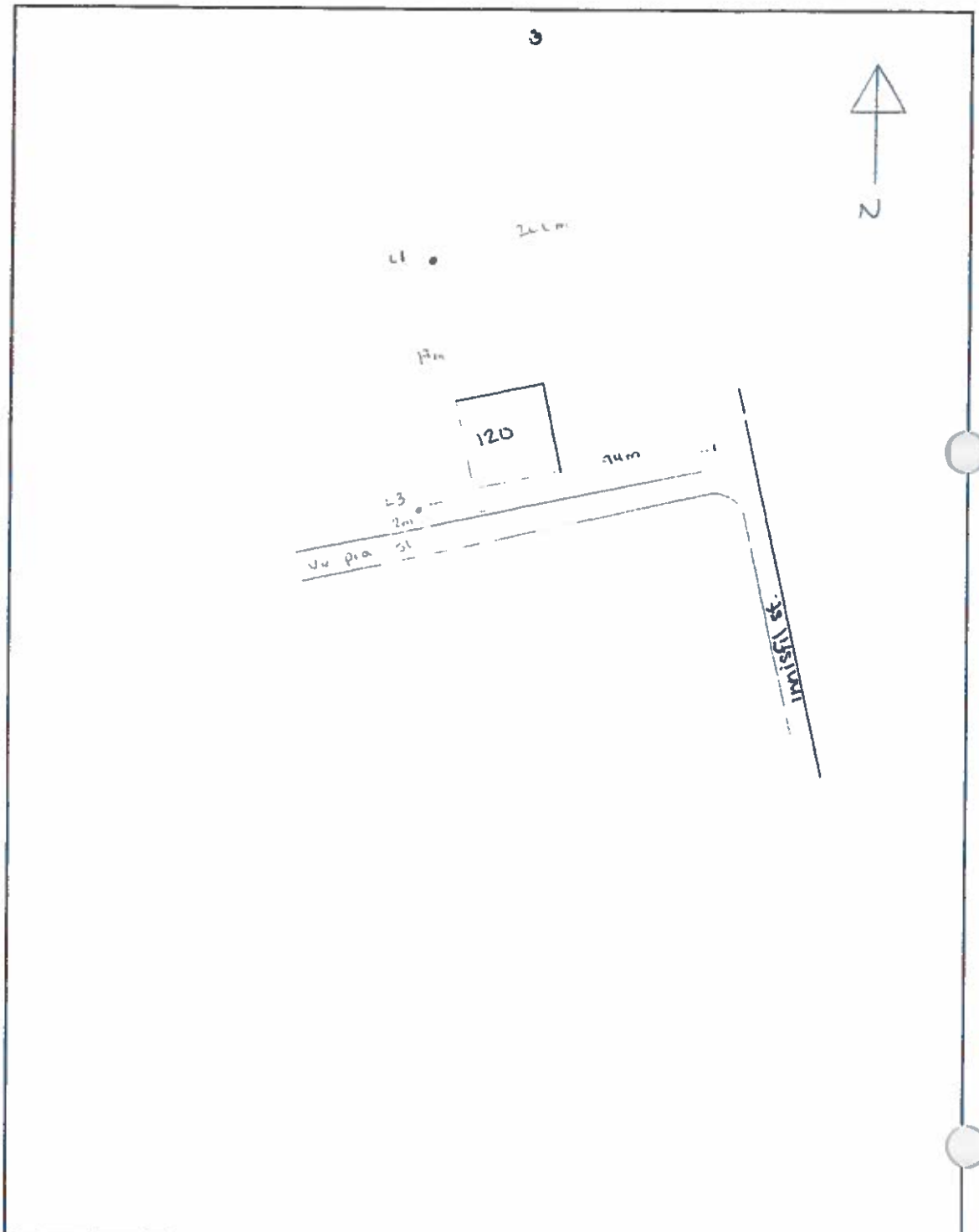
Well Record for Well Cluster - Part 3 of 3
Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.

UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # 0143847

"Well Record for Well Cluster" Form Audit Number: # C 20702



0143847

54882



Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # A143846

"Well Record for Well Cluster" Audit Number: # C 20700

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
N3	140 Vespra St. Barrie	Diane Moreau for the City of Barrie	<i>D Moreau</i>	2013/02/11
N4	140 Vespra St. Barrie	↓	<i>D Moreau</i>	↓
B3	140 Vespra St. Barrie	↓	<i>D Moreau</i>	↓

Well Owner's Copy

1143846 54867.



Ontario

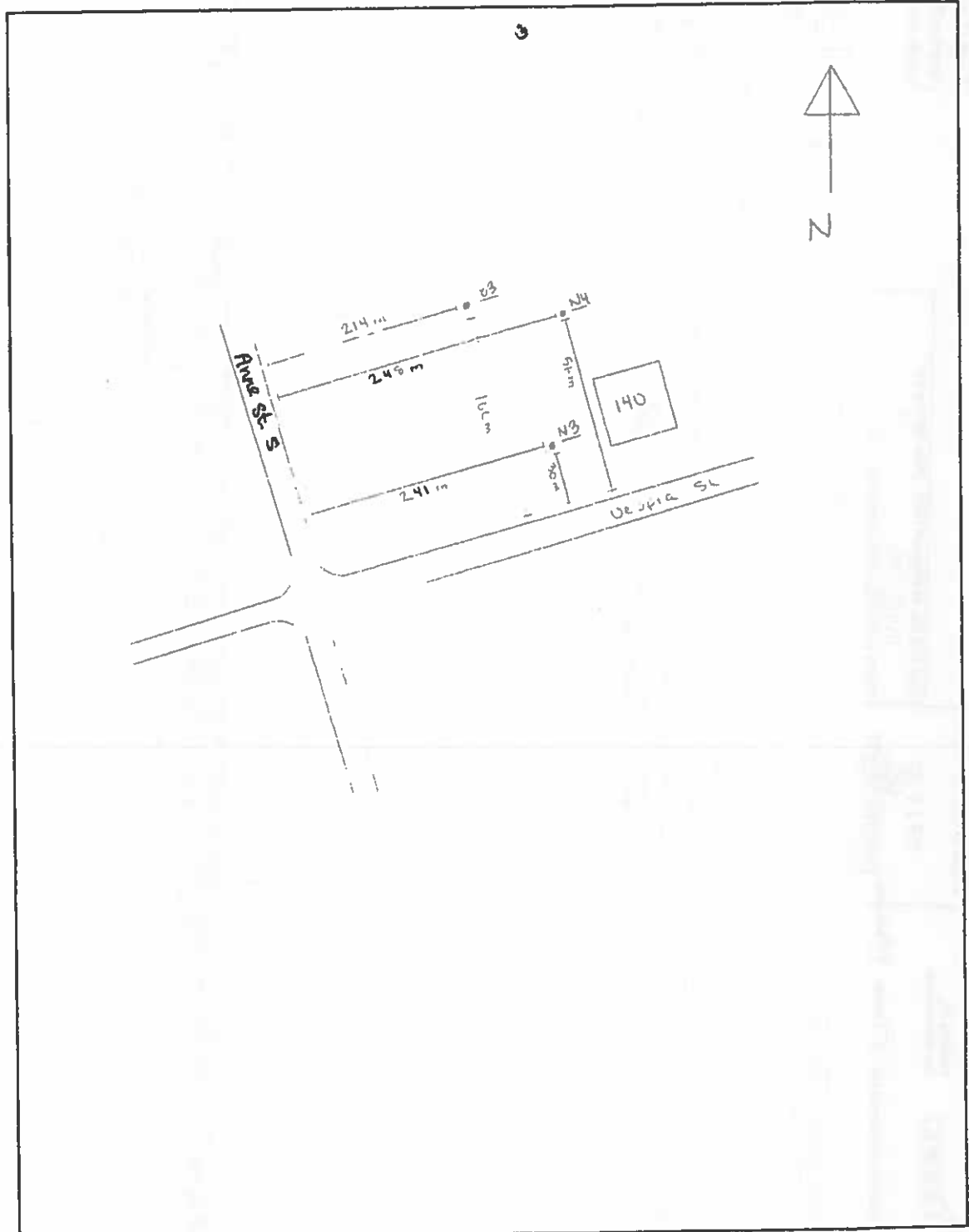
Ministry of
the Environment

Well Record for Well Cluster - Part 3 of 3 Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing. UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing.

Well Tag Number: # A143846

"Well Record for Well Cluster" Form Audit Number: # C 26700





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Well Record for Well Cluster - Part 2 of 3 Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

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This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # 4445

"Well Record for Well Cluster" Audit Number: # C 20701

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
H	37 Perry St. Kaituma (Park)	Diane Morneau for the City of Brampton	DMorneau	2013/02/11
K4	37 Perry St. Kaituma (Park)	↓	DMorneau	↓

Well Owner's Copy



Ontario

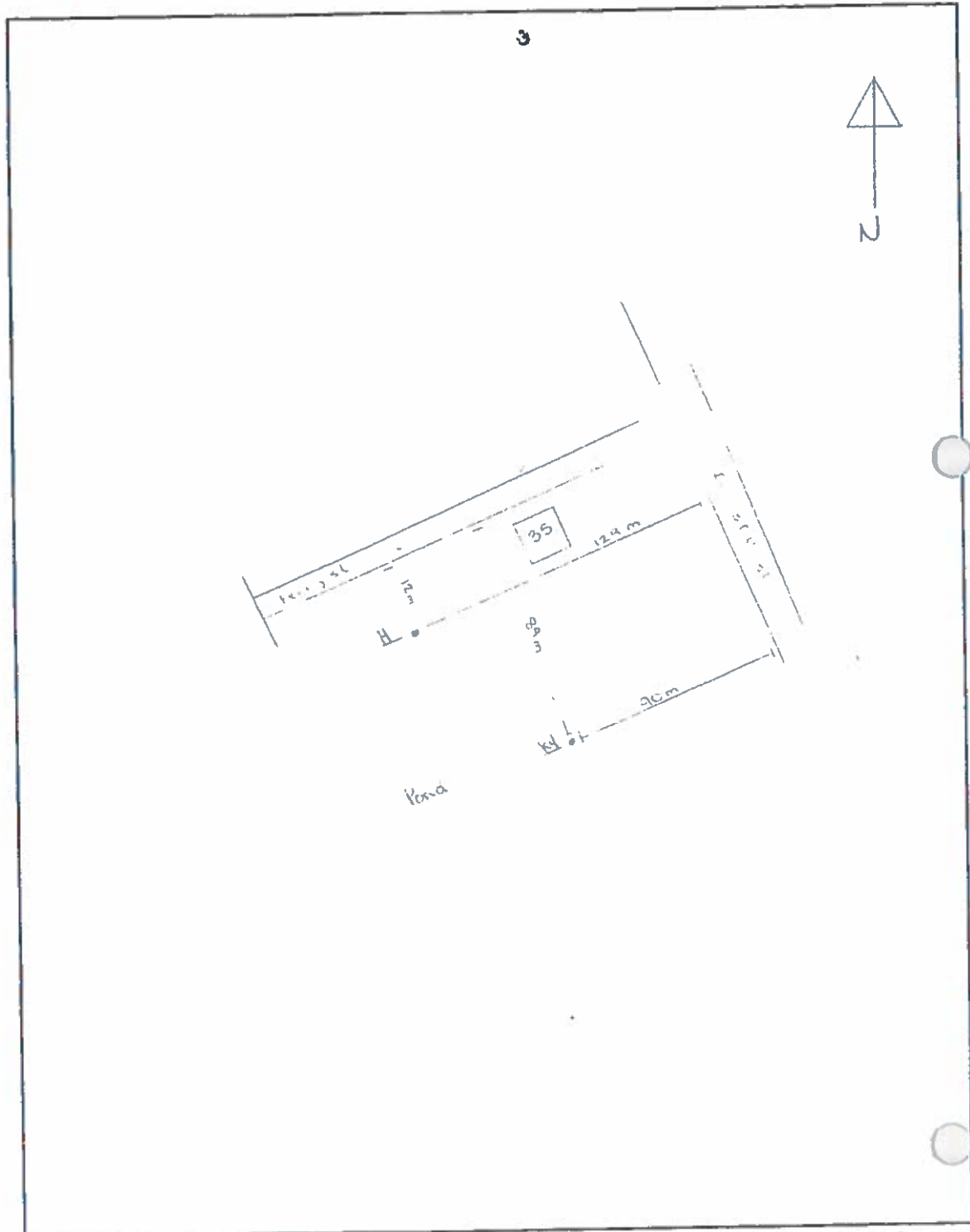
Ministry of
the Environment

Well Record for Well Cluster - Part 3 of 3 Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing. UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing.

Well Tag Number: # A143345

"Well Record for Well Cluster" Form Audit Number: # C 20721





Ministry of
the Environment

FEB 20 2013

All measurements recorded in: ☐ Metric ☐ Imperial THE CITY OF BARRIE
ENVIRONMENTAL CENTRE

Print or Type

Well Cluster Location Information

Address of Well Location (Street Number(s) Name(s), RR, if available)

Frederick St. (Dead end)

Lot(s)

Province

Ontario

Concession(s)

Geographic Township

County/District/Upper Tier Municipality

GPS Unit Make

Model

Unit Mode of Operation

Averaged

Undifferentiated

Differentiated, specify:

Mandatory Attachments/Additional Information

☒ Land Owner Consent Form must be attached.

☒ Detailed Drawing of All Well Locations must be attached
1. the person constructing the well, will promptly submit to the Director, on request, any additional information in my custody or control related to any well in the well cluster that I have constructed.

Signature of Technician/Contractor

Date (yyyy/mm/dd)

Well # on Drawing	Zone	Easting	UTM Coordinates	Nothing	Hole Depth (mft)	Hole Diameter (cm/in)	Method of Construction	Casing Material; Diameter (cm/in)	Casing (mft)	Screen Interval (mft)	Annular Space Material (mft)		Overburden/Bedrock or Abandonment Filling Material Intervals (mft)	Static Water Level (mft)	Date of Completion (yyyy/mm/dd)
											From	To			
1	17	11	12	17	10	8.25	boring	2" AK	0	1			Fill/sand		2012/12/02
2	17	11	12	18	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
3	17	11	12	19	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
4	17	11	12	20	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
5	17	11	12	21	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
6	17	11	12	22	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
7	17	11	12	23	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
8	17	11	12	24	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
9	17	11	12	25	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
10	17	11	12	26	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
11	17	11	12	27	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
12	17	11	12	28	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
13	17	11	12	29	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
14	17	11	12	30	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
15	17	11	12	31	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
16	17	11	12	32	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
17	17	11	12	33	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
18	17	11	12	34	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
19	17	11	12	35	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
20	17	11	12	36	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
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22	17	11	12	38	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
23	17	11	12	39	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
24	17	11	12	40	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
25	17	11	12	41	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
26	17	11	12	42	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
27	17	11	12	43	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
28	17	11	12	44	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
29	17	11	12	45	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
30	17	11	12	46	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
31	17	11	12	47	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
32	17	11	12	48	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
33	17	11	12	49	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
34	17	11	12	50	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
35	17	11	12	51	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
36	17	11	12	52	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
37	17	11	12	53	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
38	17	11	12	54	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
39	17	11	12	55	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
40	17	11	12	56	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
41	17	11	12	57	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
42	17	11	12	58	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
43	17	11	12	59	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
44	17	11	12	60	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
45	17	11	12	61	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
46	17	11	12	62	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
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50	17	11	12	66	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
51	17	11	12	67	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
52	17	11	12	68	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
53	17	11	12	69	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
54	17	11	12	70	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
55	17	11	12	71	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
56	17	11	12	72	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
57	17	11	12	73	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
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61	17	11	12	77	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
62	17	11	12	78	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
63	17	11	12	79	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
64	17	11	12	80	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
65	17	11	12	81	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
66	17	11	12	82	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
67	17	11	12	83	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
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69	17	11	12	85	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
70	17	11	12	86	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
71	17	11	12	87	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
72	17	11	12	88	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
73	17	11	12	89	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
74	17	11	12	90	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
75	17	11	12	91	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
76	17	11	12	92	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
77	17	11	12	93	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
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79	17	11	12	95	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
80	17	11	12	96	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
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82	17	11	12	98	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
83	17	11	12	99	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
84	17	11	12	100	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
85	17	11	12	101	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
86	17	11	12	102	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
87	17	11	12	103	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
88	17	11	12	104	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
89	17	11	12	105	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
90	17	11	12	106	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
91	17	11	12	107	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
92	17	11	12	108	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
93	17	11	12	109	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
94	17	11	12	110	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
95	17	11	12	111	7	8.25		2" AK	1	2			Fill/sand		2012/12/02
96	17	11	12	112	7	8.25		2" AK	1	2			Fill/sand		2012/1



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Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # A143554

"Well Record for Well Cluster" Audit Number: # C. 20742

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
A1-6	Frederick St (road 1)	Diare Moreau for the City of Barrie	DMoreau	2013/02/11
E4-6	Frederick St (road 1)		DMoreau	
E7-6	Frederick St (road 1)		DMoreau	
C2-6	"		DMoreau	
B4-6	"		DMoreau	
E2-6	"		DMoreau	
A2-6	"		DMoreau	

A143554

1302-16



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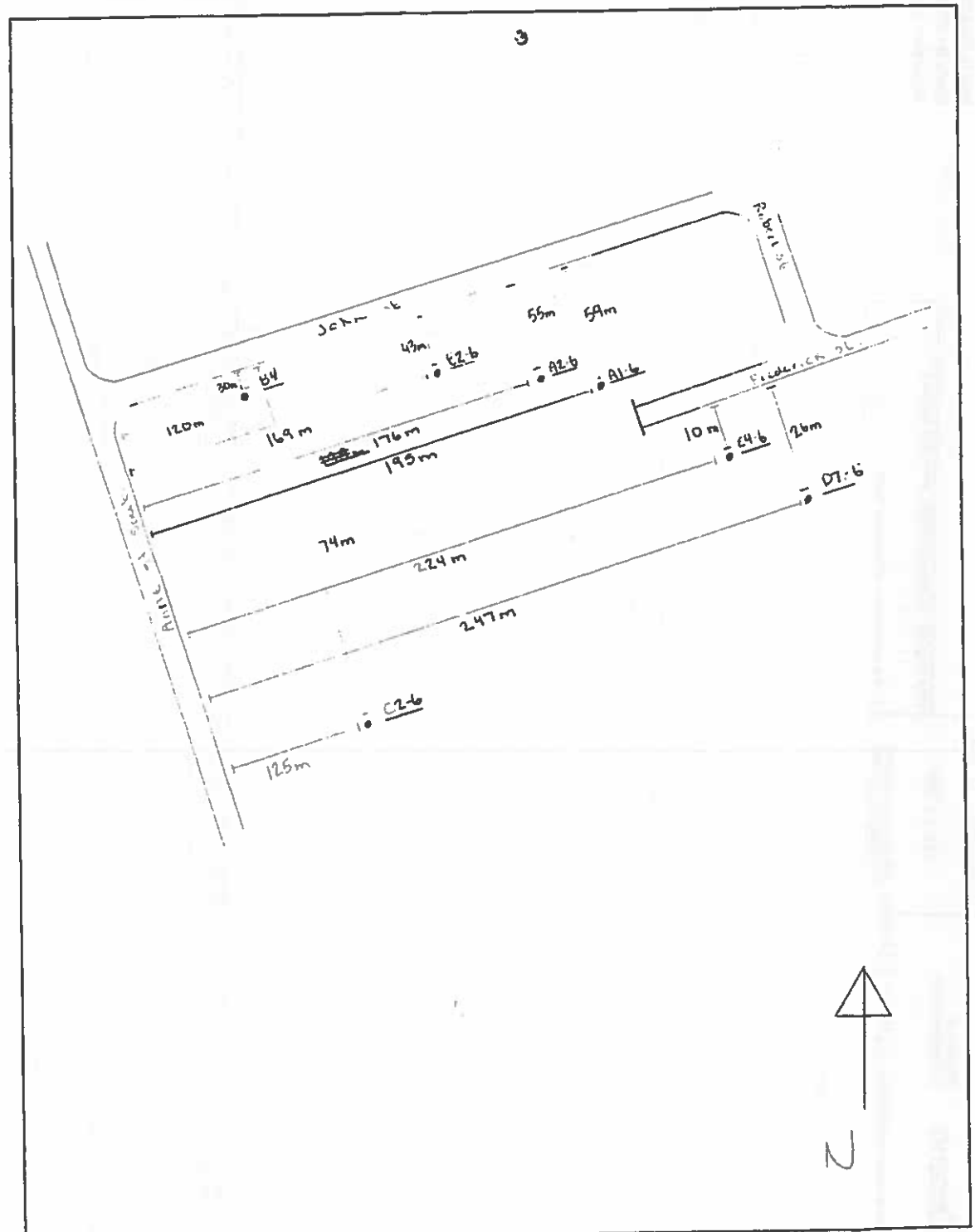
Well Record for Well Cluster - Part 3 of 3
Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.

UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A 143884

"Well Record for Well Cluster" Form Audit Number: # C 20742







Ontario

Ministry of
the Environment

Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # A143543

"Well Record for Well Cluster" Audit Number: # C 20738

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
F1-6	138 Innisfil St.	Diane Morneau for the City of Barnes	DMorneau	2013/02/11
C3-5	138 Innisfil St.		DMorneau	
C2-5	138 Innisfil St.		DMorneau	
D5-6	138 Innisfil St.		DMorneau	
D6-6			DMorneau	

all Owners Consent

A143843

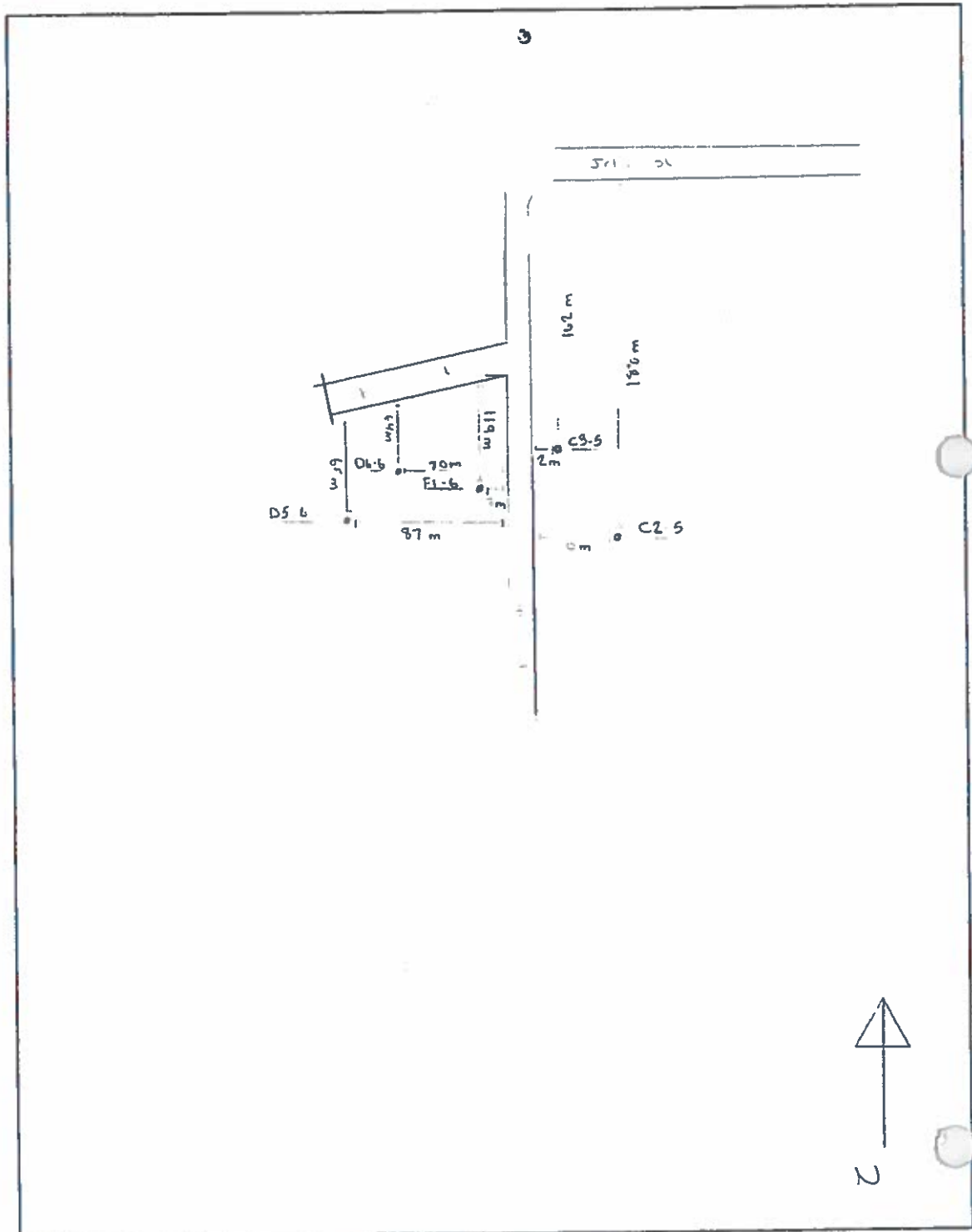
543 2



Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.
UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A143843

"Well Record for Well Cluster" Form Audit Number: # C20738



Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 16.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

* Please PRINT if completing by hand.

Well Tag Number: # 0143842

"Well Record for Well Cluster" Audit Number: # C20739

Well # on Detailed Drawing	Property Location Description	Land Owner's Name	Signature of Land Owner	Date Signed (yyyy/mm/dd)
A1-5	Sandford st. (Park)	Diane Moreau for the City of Barrie	D Moreau	2013/02/11
F2-4	"		D Moreau	
D2-5	"		D Moreau	
B3-5	"		D Moreau	
A5-5	"		D Moreau	



Ontario

Ministry of
the Environment

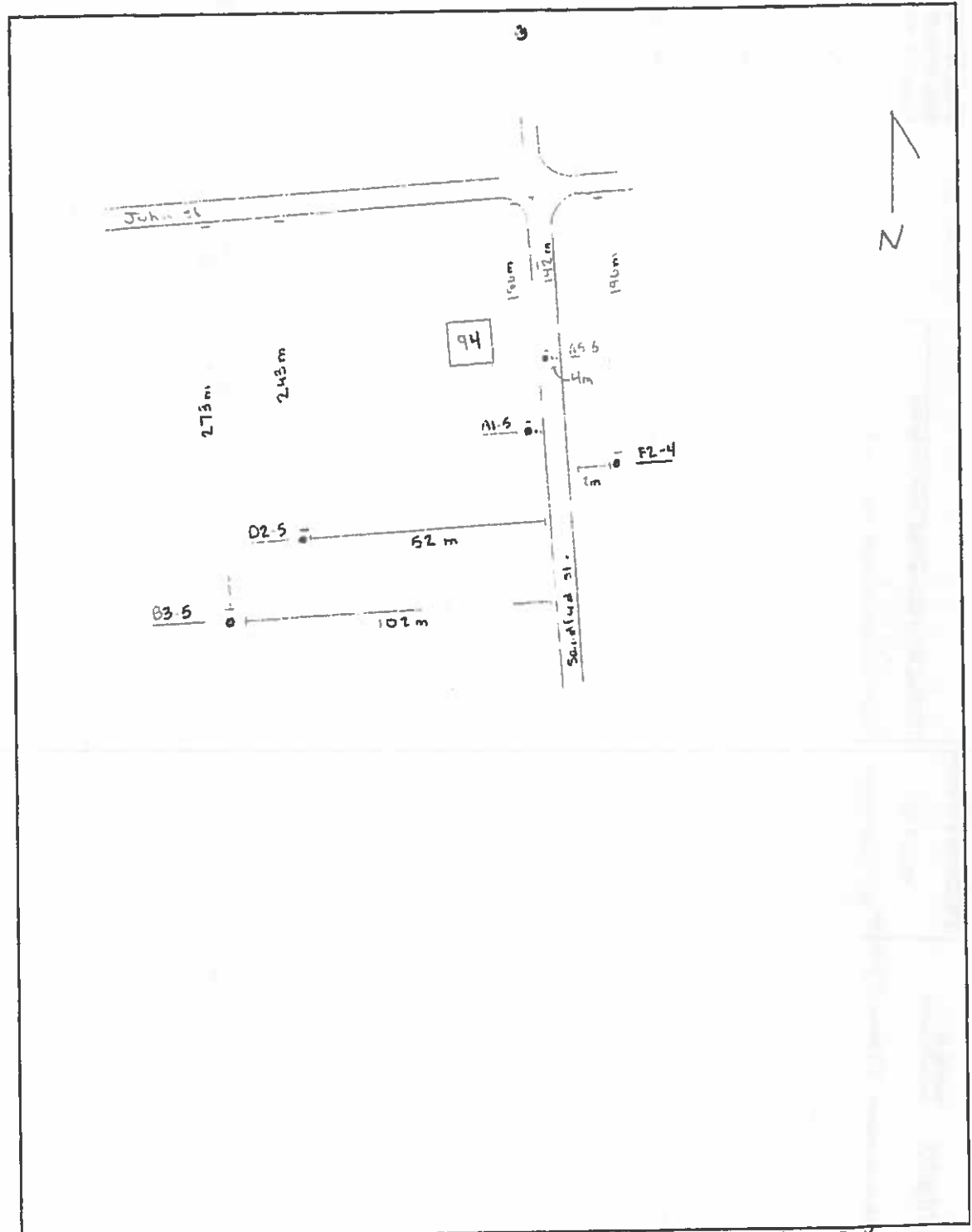
Well Record for Well Cluster - Part 3 of 3
Detailed Drawing of All Well Locations

Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.

UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # 1143842

"Well Record for Well Cluster" Form Audit Number: # C 20739





Well Record for Well Cluster - Part 2 of 3
Land Owner Consent

This form is to be completed by the person who constructs or abandons test holes or dewatering wells that form all or part of a well cluster. If this form is being used to report any well abandonment, these wells must have been previously reported as part of a single well cluster.

Note: For well cluster records, only the owners of the land on which the wells are situated are to give written consent. If the well purchaser (e.g. a consultant who hires the driller) is not the owner of the land, then the well purchaser cannot sign the consent form.

By signing this form, land owners are providing consent to use one well record to report a well cluster of test holes or dewatering wells in accordance with section 18.4 of Regulation 903 made under the *Ontario Water Resources Act*.

This completed Well Record for Well Cluster Part 2 - Land Owner Consent must be attached to Parts 1 and 3.

• Please PRINT if completing by hand.

Well Tag Number: # A143840

"Well Record for Well Cluster" Audit Number: # C 20737

[illegible]

Vehicle Owner's Copy

43540

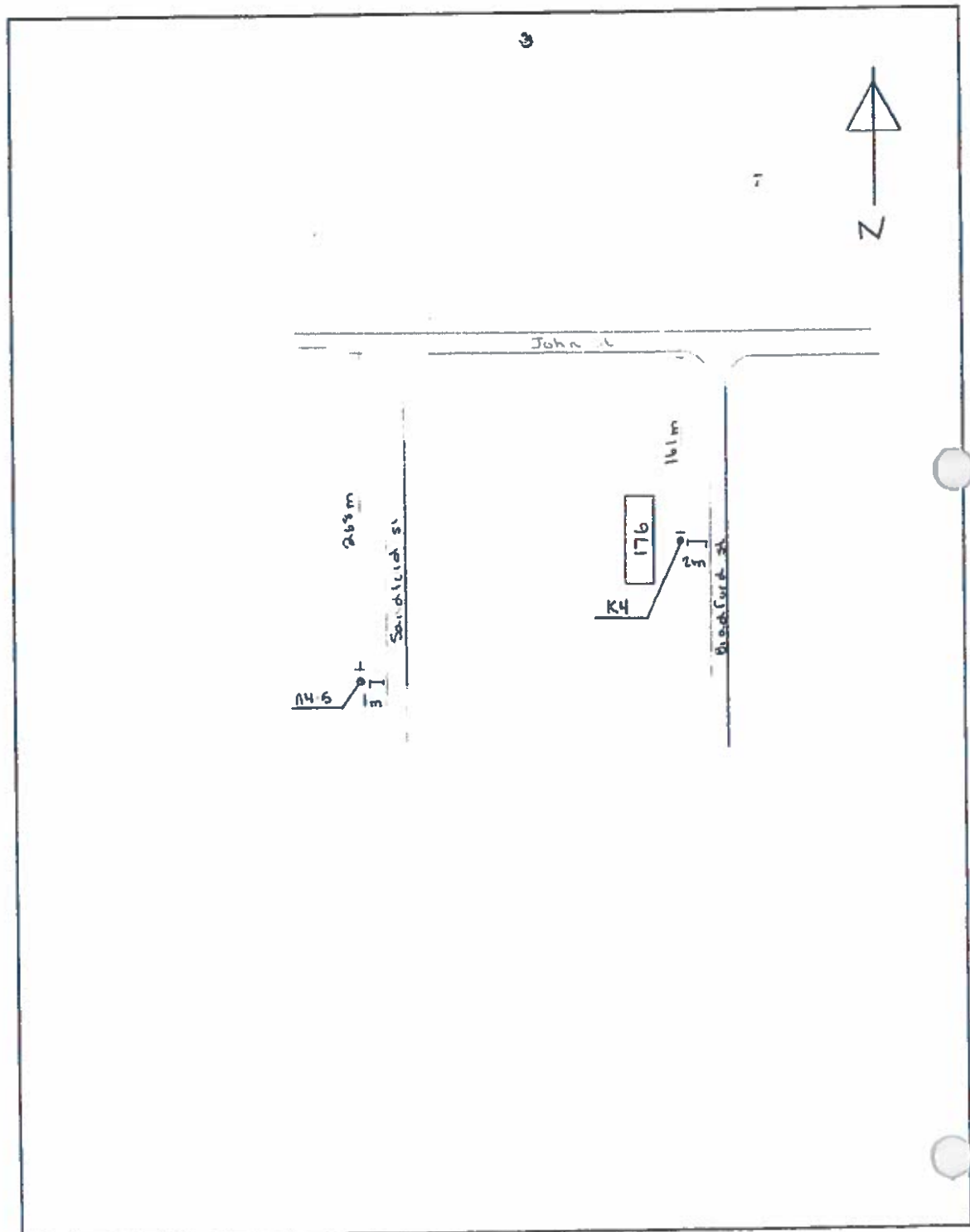
882-16



Note: This Well Record for Well Cluster Part 3 - Detailed Drawing of All Well Locations, must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the Well Record for Well Cluster Parts 1 and 2. The well with the well tag must be clearly identified on the Drawing.
UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A143840

"Well Record for Well Cluster" Form Audit Number: # C. 10137





APPENDIX C

Groundwater Elevations

Table C-1
Groundwater Elevations
Bunker's Creek Historic Landfill Sites

Well ID	Site Number	Monitoring Pipe Elevation (masl)	Ground Elevation (masl)	Depth to Bottom of Well (mbmp)	Depth to Bottom of Well (mbgs)	Screen Length (m)	Top of Screen Elevation (masl)	Base of Well Elevation (masl)	Date	Depth to Groundwater (mbmp)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
MW-B1	1	228.41	227.53	8.22	7.34	1.52	221.71	220.19	6/26/2012	5.79	4.91	222.63
									6/28/2012	5.85	4.97	222.56
									8/21/2012	5.82	4.94	222.59
									9/17/2012	5.80	4.92	222.61
									4/4/2013	5.62	4.74	222.79
									4/22/2013	5.58	4.70	222.83
									6/20/2013	5.69	4.81	222.72
									8/21/2013	5.79	4.91	222.63
									12/10/2013	5.70	4.83	222.71
GP-B1	1	228.52	227.60	3.63	2.72	1.52	226.41	224.89	9/17/2012	dry	dry	NA
									12/3/2012	dry	dry	NA
									12/18/2012	dry	dry	NA
									4/4/2013	dry	dry	NA
									6/20/2013	dry	dry	NA
									8/22/2013	dry	dry	NA
									10/10/2013	dry	dry	NA
									12/12/2013	dry	dry	NA
									2/12/2014	dry	dry	NA
MW-B2	1	225.90	226.00	7.47	7.57	3.05	221.48	218.43	8/21/2012	3.42	3.52	222.48
									9/6/2012	3.43	3.53	222.47
									9/17/2012	3.32	3.42	222.59
									4/22/2013	3.21	3.31	222.69
									6/20/2013	Damaged	NA	NA
									8/20/2013	3.35	3.44	222.56
									12/10/2013	3.23	3.33	222.67
GP-B2	1	225.88	225.98	2.80	2.90	1.52	224.60	223.08	9/17/2012	dry	dry	NA
									12/3/2012	1.67	1.77	224.21
									12/18/2012	dry	dry	NA
									4/23/2013	dry	dry	NA
									6/20/2013	Damaged	NA	NA
									8/22/2013	dry	NA	NA
									10/10/2013	dry	NA	NA
									12/12/2013	dry	NA	NA
									2/12/2014	Buried	NA	NA
MW-B3	2	225.94	224.85	5.24	4.15	3.05	223.76	220.71	6/26/2012	3.43	2.34	222.51
									6/29/2012	3.47	2.38	222.47
									8/21/2012	3.58	2.49	222.36
									9/17/2012	3.44	2.35	222.50
									4/4/2013	3.39	2.30	222.55
									4/22/2013	3.27	2.18	222.68
									6/20/2013	3.25	2.16	222.69
									8/21/2013	3.57	2.48	222.38
									12/10/2013	3.42	2.33	222.53

Table C-1
Groundwater Elevations
Bunker's Creek Historic Landfill Sites

Well ID	Site Number	Monitoring Pipe Elevation (masl)	Ground Elevation (masl)	Depth to Bottom of Well (mbmp)	Depth to Bottom of Well (mbgs)	Screen Length (m)	Top of Screen Elevation (masl)	Base of Well Elevation (masl)	Date	Depth to Groundwater (mbmp)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
GP-B3	2	226.03	225.07	3.09	2.13	1.52	224.46	222.94	9/17/2012	dry	dry	NA
									12/3/2012	dry	dry	NA
									12/18/2012	dry	dry	NA
									4/4/2013	dry	dry	NA
									6/20/2013	dry	dry	NA
									8/22/2013	dry	dry	NA
									10/10/2013	dry	dry	NA
									12/12/2013	dry	dry	NA
									2/12/2014	dry	dry	NA
MW-B4	2	222.35	221.31	4.35	3.31	1.52	219.52	218.00	2/14/2012	1.59	0.55	220.76
									3/2/2012	1.92	0.87	220.44
									3/21/2012	1.90	0.86	220.45
									6/27/2012	2.03	0.99	220.32
									9/17/2012	2.04	0.99	220.32
									4/4/2013	1.87	0.83	220.48
									4/22/2013	1.90	0.86	220.45
									6/20/2013	2.00	0.96	220.35
									8/20/2013	2.06	1.02	220.29
									12/12/2013	1.98	0.93	220.38
GP-B4	2	223.64	222.42	2.44	2.44	1.52	222.72	221.20	3/21/2012	2.03	0.81	221.61
									6/28/2012	2.44	1.22	221.20
									9/17/2012	2.51	1.29	221.13
									12/3/2012	2.00	0.78	221.64
									12/18/2012	2.12	0.90	221.52
									4/4/2013	2.00	0.78	221.64
									6/20/2013	2.33	1.11	221.31
									8/22/2013	2.60	1.38	221.04
									10/10/2013	2.24	1.02	221.40
									12/12/2013	2.24	1.02	221.40
									2/12/2014	2.47	1.25	221.17
MW-B5	3	223.39	222.37	6.32	5.29	1.52	218.60	217.08	2/14/2012	2.92	1.90	220.47
									3/2/2012	2.92	1.90	220.47
									3/21/2012	2.87	1.85	220.52
									6/27/2012	2.97	1.94	220.43
									9/17/2012	2.96	1.94	220.43
									4/4/2013	2.83	1.81	220.56
									4/22/2013	2.81	1.78	220.59
									6/20/2013	2.92	1.89	220.48
									8/20/2013	2.97	1.95	220.42
									12/10/2013	2.90	1.88	220.50

Table C-1
Groundwater Elevations
Bunker's Creek Historic Landfill Sites

Well ID	Site Number	Monitoring Pipe Elevation (masl)	Ground Elevation (masl)	Depth to Bottom of Well (mbmp)	Depth to Bottom of Well (mbgs)	Screen Length (m)	Top of Screen Elevation (masl)	Base of Well Elevation (masl)	Date	Depth to Groundwater (mbmp)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
GP-B5	3	223.38	222.41	3.10	2.13	1.52	221.80	220.28	3/21/2012	2.82	1.85	220.56
									9/17/2012	2.91	1.94	220.47
									12/3/2012	2.88	1.91	220.51
									12/18/2012	2.85	1.88	220.53
									4/4/2013	2.80	1.83	220.58
									6/20/2013	2.89	1.92	220.49
									8/22/2013	dry	dry	NA
									10/10/2013	2.88	1.91	220.50
									12/12/2013	2.90	1.93	220.48
									2/12/2014	2.99	2.02	220.39
MW-B6	7	223.09	222.25	5.82	4.98	3.05	220.31	217.27	2/14/2012	1.44	0.60	221.65
									3/2/2012	1.47	0.63	221.62
									3/21/2012	1.36	0.52	221.73
									6/27/2012	1.54	0.70	221.55
									9/17/2012	1.65	0.81	221.43
									4/4/2013	1.31	0.47	221.78
									4/22/2013	1.38	0.54	221.71
									6/20/2013	1.41	0.57	221.67
									8/20/2013	1.58	0.73	221.51
									12/10/2013	1.46	0.62	221.63
GP-B6	7	223.58	222.32	2.78	1.52	0.91	221.71	220.80	3/21/2012	1.67	0.41	221.91
									9/17/2012	2.13	0.87	221.45
									12/3/2012	1.91	0.65	221.67
									12/18/2012	1.77	0.51	221.82
									4/4/2013	1.58	0.32	222.00
									6/20/2013	1.85	0.59	221.73
									8/22/2013	dry	dry	NA
									10/10/2013	2.02	0.76	221.56
									12/12/2013	1.97	0.71	221.61
									2/12/2014	2.12	0.86	221.47
MW-B7	7	221.38	220.30	6.79	5.71	3.05	217.64	214.59	6/28/2012	2.13	1.05	219.25
									6/29/2012	2.15	1.08	219.23
									8/22/2012	2.15	1.07	219.23
									9/17/2012	2.13	1.05	219.25
									4/4/2013	2.10	1.03	219.28
									4/22/2013	2.15	1.08	219.23
									6/20/2013	2.09	1.01	219.29
									8/21/2013	1.94	0.87	219.44
									12/10/2013	2.03	0.96	219.35

Table C-1
Groundwater Elevations
Bunker's Creek Historic Landfill Sites

Well ID	Site Number	Monitoring Pipe Elevation (masl)	Ground Elevation (masl)	Depth to Bottom of Well (mbmp)	Depth to Bottom of Well (mbgs)	Screen Length (m)	Top of Screen Elevation (masl)	Base of Well Elevation (masl)	Date	Depth to Groundwater (mbmp)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
GP-B7	7	221.43	220.34	3.38	2.29	1.52	219.57	218.05	9/17/2012	2.20	1.11	219.23
									12/3/2012	2.19	1.10	219.23
									12/18/2012	2.21	1.12	219.21
									4/4/2013	2.19	1.11	219.23
									6/20/2013	2.16	1.07	219.26
									8/22/2013	1.94	0.85	219.49
									10/10/2013	1.92	0.83	219.51
GP-B8	1								12/12/2013	2.10	1.01	219.32
									2/12/2014	2.11	1.02	219.32
		226.65	226.75	3.86	3.96	3.05	225.83	222.79	12/3/2012	3.33	3.43	223.32
									12/18/2012	3.30	3.40	223.35
									4/4/2013	3.24	3.34	223.41
									6/20/2013	3.24	3.34	223.41
GP-B9	1								8/22/2013	Not Accessible	NA	NA
									10/10/2013	3.35	3.45	223.30
									12/12/2013	3.32	3.42	223.33
									2/13/2014	3.43	3.53	223.22
GP-B10	1	225.64	224.50	3.43	2.29	1.52	223.73	222.21	12/3/2012	2.18	1.15	223.35
									12/18/2012	2.24	1.21	223.28
									4/4/2013	2.07	1.03	223.46
									6/20/2013	2.20	1.17	223.33
									8/22/2013	2.40	1.26	223.24
									10/10/2013	2.28	1.13	223.36
									12/12/2013	2.27	1.12	223.37
GP-B11	1								2/25/2014	2.33	1.18	223.32
									3/31/2014	2.16	1.02	223.48
		224.94	224.02	3.21	2.29	1.52	223.26	221.73	12/3/2012	2.05	1.13	222.89
									12/18/2012	2.02	1.10	222.92
									4/4/2013	1.93	1.01	223.01
									6/20/2013	2.05	1.13	222.89
GP-B11	1								8/22/2013	2.24	1.32	222.70
									10/10/2013	2.13	1.21	222.81
									12/12/2013	2.11	1.19	222.83
									2/12/2014	2.25	1.33	222.69
GP-B11	1	223.62	222.83	3.09	2.29	1.52	222.06	220.54	12/3/2012	2.20	1.41	221.42
									12/18/2012	2.21	1.41	221.41
									4/4/2013	2.09	1.30	221.53
									6/20/2013	2.20	1.40	221.43
									8/22/2013	2.30	1.50	221.33
									10/10/2013	2.24	1.44	221.39
									12/12/2013	2.30	1.50	221.32
GP-B11	1								2/12/2014	2.43	1.63	221.20

Table C-1
Groundwater Elevations
Bunker's Creek Historic Landfill Sites

Well ID	Site Number	Monitoring Pipe Elevation (masl)	Ground Elevation (masl)	Depth to Bottom of Well (mbmp)	Depth to Bottom of Well (mbgs)	Screen Length (m)	Top of Screen Elevation (masl)	Base of Well Elevation (masl)	Date	Depth to Groundwater (mbmp)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
GP-B12	2	223.04	222.19	3.14	2.29	1.52	221.42	219.90	12/3/2012	1.62	0.77	221.42
									12/18/2012	1.70	0.84	221.34
									4/4/2013	1.60	0.75	221.44
									6/20/2013	1.71	0.86	221.33
									8/22/2013	1.75	0.90	221.29
									10/10/2013	1.69	0.83	221.35
									12/12/2013	1.74	0.88	221.31
									2/12/2014	1.76	0.91	221.28
GP-B13	2	222.74	221.71	1.95	0.91	0.30	221.10	220.80	9/17/2012	1.45	0.41	221.30
									12/3/2012	1.21	0.18	221.53
									12/18/2012	1.23	0.19	221.52
									4/4/2013	1.22	0.18	221.53
									6/20/2013	1.30	0.27	221.44
									8/22/2013	1.35	0.32	221.39
									10/10/2013	1.32	0.28	221.43
									12/12/2013	1.32	0.29	221.42
									2/12/2014	1.34	0.31	221.40
GP-B14	3	224.81	224.06	3.03	2.29	1.52	223.30	221.77	12/3/2012	2.32	1.57	222.49
									12/18/2012	2.30	1.56	222.50
									4/4/2013	2.17	1.42	222.64
									6/20/2013	2.29	1.54	222.52
									8/22/2013	2.45	1.70	222.36
									10/10/2013	2.33	1.59	222.48
									12/12/2013	2.31	1.57	222.50
									2/12/2014	2.46	1.72	222.34
GP-B15	3	223.70	222.66	4.09	3.05	1.52	221.13	219.61	6/28/2012	2.31	1.27	221.39
									9/17/2012	2.36	1.32	221.34
									12/3/2012	2.31	1.27	221.39
									12/18/2012	2.23	1.19	221.47
									4/4/2013	2.16	1.12	221.54
									6/20/2013	2.30	1.26	221.40
									8/22/2013	2.36	1.32	221.34
									10/10/2013	2.33	1.29	221.37
									12/12/2013	2.31	1.27	221.39
									2/12/2014	2.42	1.38	221.28
GP-B16	3	223.81	223.92	2.33	2.44	1.52	223.00	221.48	12/3/2012	1.66	1.77	222.15
									12/18/2012	1.62	1.73	222.19
									4/23/2013	1.46	1.57	222.35
									6/20/2013	1.55	1.66	222.26
									8/22/2013	Not Located	NA	NA
									10/10/2013	1.65	1.76	222.16
									12/12/2013	1.60	1.71	222.21
									2/12/2014	Buried	NA	NA

Table C-1
Groundwater Elevations
Bunker's Creek Historic Landfill Sites

Well ID	Site Number	Monitoring Pipe Elevation (masl)	Ground Elevation (masl)	Depth to Bottom of Well (mbmp)	Depth to Bottom of Well (mbgs)	Screen Length (m)	Top of Screen Elevation (masl)	Base of Well Elevation (masl)	Date	Depth to Groundwater (mbmp)	Depth to Groundwater (mbgs)	Groundwater Elevation (masl)
GP-B17	3	225.85	224.94	3.50	2.59	1.52	223.87	222.35	12/3/2012	3.50	2.59	222.35
									12/18/2012	3.48	2.57	222.37
									4/4/2013	3.29	2.39	222.56
									6/20/2013	3.38	2.48	222.46
									8/22/2013	3.61	2.70	222.24
									10/10/2013	3.52	2.61	222.33
									12/12/2013	3.43	2.53	222.42
GP-B18	7	224.53	223.58	4.00	3.05	1.52	222.05	220.53	2/12/2014	3.65	2.74	222.20
									9/17/2012	2.92	1.97	221.61
									12/3/2012	2.64	1.69	221.89
									12/18/2012	2.64	1.69	221.89
									4/4/2013	2.50	1.54	222.04
									6/20/2013	2.59	1.64	221.94
									8/22/2013	dry	dry	NA
GP-B19	7	222.62	221.84	3.07	2.29	1.52	221.08	219.56	10/10/2013	2.72	1.76	221.82
									12/12/2013	2.65	1.69	221.89
									2/12/2014	2.81	1.86	221.72
									9/17/2012	1.62	0.84	221.00
									12/3/2012	1.29	0.51	221.34
									12/18/2012	1.34	0.55	221.29
									4/4/2013	1.37	0.59	221.26
GP-B20	1	228.29	228.43	4.43	4.57	3.05	226.90	223.85	6/20/2013	1.45	0.67	221.17
									8/22/2013	1.76	0.98	220.86
									10/10/2013	1.60	0.82	221.02
									12/12/2013	1.58	0.80	221.04
									2/12/2014	1.63	0.85	220.99
									8/22/2013	3.52	3.66	224.77
									10/10/2013	3.53	3.67	224.76
GP-B21	1	228.71	227.66	5.17	4.12	3.05	226.59	223.54	12/12/2013	3.52	3.66	224.77
									2/25/2014	3.66	3.80	224.63
									8/22/2013	4.88	3.83	223.83
									10/10/2013	4.86	3.80	223.85
									12/12/2013	4.44	3.39	224.27
									2/12/2014	4.95	3.99	223.76
									8/22/2013	2.00	2.09	223.02
GP-B22	1	225.01	225.11	3.71	3.81	3.05	224.35	221.30	10/10/2013	1.93	2.03	223.08
									12/12/2013	1.86	1.96	223.15
									2/25/2014	2.02	2.12	222.99
									8/20/2013	0.43	0.56	220.58
									12/10/2013	0.19	0.32	220.82
MW-B23	7	221.01	221.14	3.80	3.93	3.05	220.26	217.21				

Notes:
masl = metres above sea level
mbmp = metres below monitoring pipe
mbgs = metres below ground surface



APPENDIX D

Laboratory Certificates of Analysis - Soil

**CLIENT NAME: GOLDER ASSOCIATES LTD.
121 COMMERCE PARK DRIVE, UNIT L
BARRIE, ON L4N8X1
(705) 722-4492**

ATTENTION TO: Christi Groves

PROJECT NO: 11-1170-0043

AGAT WORK ORDER: 13T737226

TRACE ORGANICS REVIEWED BY: Manpreet Sarao, Senior Analyst

DATE REPORTED: Jul 26, 2013

PAGES (INCLUDING COVER): 4

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

***NOTES**

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Results relate only to the items tested and to all the items tested

Page 1 of 4

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

Certificate of Analysis

AGAT WORK ORDER: 13T737226
PROJECT NO: 11-1170-0043

AGAT Laboratories

ATTENTION TO: Christl Groves

CLIENT NAME: GOLDER ASSOCIATES LTD.

O. Reg. 153(511) - PHCs F1 - F4 (Soil)					DATE REPORTED: 2013-07-26	
DATE RECEIVED: 2013-07-17						
SAMPLE DESCRIPTION: B23 - 1						
SAMPLE TYPE: Soil						
DATE SAMPLED: 7/16/2013						
Parameter	Unit	G / S	RDL	4559672		
Benzene	µg/g	0.17	0.02	<0.02		
Toluene	µg/g	6	0.08	<0.08		
Ethylbenzene	µg/g	1.6	0.05	<0.05		
Xylene Mixture	µg/g	25	0.05	<0.05		
F1 (C6 to C10)	µg/g		5	<5		
F1 (C6 to C10) minus BTEX	µg/g	65	5	<5		
F2 (C10 to C16)	µg/g	150	10	<10		
F3 (C16 to C34)	µg/g	1300	50	300		
F4 (C34 to C50)	µg/g	5600	50	66		
Gravimetric Heavy Hydrocarbons	µg/g	5600	50	NA		
Moisture Content	%		0.1	7.0		
Surrogate	Unit	Acceptable Limits				
	%	60-140			86	
Terphenyl						

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard; Refers to T2(RPI,MFT) Current
4559672
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 contributions.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
n-C6 and n-C10 response factors are within 30% of Toluene response factor.
n-C10, n-C16 and n-C34 response factors are within 10% of their average.
C50 response factor is within 70% of n-C10 + n-C16 + n-C34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD.

AGAT WORK ORDER: 13T737226

PROJECT NO: 11-1170-0043

ATTENTION TO: Christl Groves

Trace Organics Analysis

RPT Date: Jul 26, 2013

DUPLICATE

REFERENCE MATERIAL

METHOD BLANK SPIKE

MATRIX SPIKE

PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

Benzene	1		< 0.02	< 0.02	0.0%	< 0.02	92%	50%	140%	99%	60%	130%	119%	50%	140%
Toluene	1		< 0.08	< 0.08	0.0%	< 0.08	94%	50%	140%	103%	60%	130%	104%	50%	140%
Ethylbenzene	1		< 0.05	< 0.05	0.0%	< 0.05	89%	50%	140%	93%	60%	130%	104%	50%	140%
Xylene Mixture	1		< 0.05	< 0.05	0.0%	< 0.05	94%	50%	140%	99%	60%	130%	119%	50%	140%
F1 (C6 to C10)	1		< 5	< 5	0.0%	< 5	102%	60%	140%	92%	80%	120%	101%	60%	140%
F2 (C10 to C16)	1		< 10	< 10	0.0%	< 10	110%	60%	140%	85%	80%	120%	103%	60%	140%
F3 (C16 to C34)	1		< 50	< 50	0.0%	< 50	120%	60%	140%	96%	80%	120%	102%	60%	140%
F4 (C34 to C50)	1		< 50	< 50	0.0%	< 50	100%	60%	140%	110%	80%	120%	115%	60%	140%

Certified By:



Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD.
AGAT WORK ORDER: 13T737226
PROJECT NO: 11-1170-0043
ATTENTION TO: Christi Groves

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID



APPENDIX E

Laboratory Certificates of Analysis – Groundwater

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 REPORT # 150216

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L. Erik S.

100



E3 Laboratories Inc.
SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0
Email: info@e3labs.ca
Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
Christi Groves
121 Commerce Park Drive, Unit L
Barrie
L4N 8X1
Tel: 705-722-4492

Fax:
Email: cgroves@golder.com

Work Order No.: 2514382
Received: 2013-12-12
PO Number:
Reported: 2014-01-13
Project Name: C of B-Historic Waste Sites
Chain of Custody No.: 11776

Note: Re-issued to include revised subcontracted report. (Originally reported December 19, 2013)

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
Trip Blank	2013-12-05	352827	VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
Field Blank 1	2013-12-10	352828	Alkalinity (CaCO ₃)	<2.00	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	2.0	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	5.96	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	<0.004	mg/L	0.004	2013-12-13	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
Field Blank 2	2013-12-11	352829	Alkalinity (CaCO ₃)	<2.00	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	1.8	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	5.01	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	<0.004	mg/L	0.004	2013-12-13	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 1 of 11

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
Results relate only to items tested.



E3 Laboratories Inc.

SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0

Email: info@e3labs.ca

Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.

Christi Groves

121 Commerce Park Drive, Unit L

Barrie

L4N 8X1

Tel: 705-722-4492

Fax:

Email: cgroves@golder.com

Work Order No.: 2514382

Received : 2013-12-12

PO Number:

Reported: 2014-01-13

Project Name: C of B-Historic Waste Sites

Chain of Custody No.: 11776

Client Sample ID	Sample		Parameter	Result	Unit	Date		Method
	Date	Lab ID				RDL	Analyzed	

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 2 of 11

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Reported by:

Nilou Ghazi, Ph.D., P Eng.

Laboratory Manager

Page 3 of 11

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Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
W-B1	2013-12-10	352838	Alkalinity (CaCO ₃)	373	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	0.10	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	3740	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.96	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	0.004	mg/L	0.004	2013-12-16	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
MW-B2	2013-12-10	352839	Alkalinity (CaCO ₃)	565	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	12.9	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	1970	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.62	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	0.010	mg/L	0.004	2013-12-16	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
W-B3	2013-12-10	352840	Alkalinity (CaCO ₃)	251	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 4 of 11

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 Received : 2013-12-12
 PO Number:
 Reported: 2014-01-13
 Project Name: C of B-Historic Waste Sites
 Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
MW-B3	2013-12-10	352840	Ammonia (Total)	0.48	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	1300	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.94	SU	N/A	2013-12-12	APHA 4500 A.B MOD
			Phenolics	0.108	mg/L	0.004	2013-12-17	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
MW-B4	2013-12-12	352841	Alkalinity (CaCO3)	1040	mg/LCaCO3	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	149	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	3460	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.48	SU	N/A	2013-12-12	APHA 4500 A.B MOD
			Phenolics	0.028	mg/L	0.004	2013-12-17	HACH 8047
MW-B5	2013-12-10	352842	Alkalinity (CaCO3)	298	mg/LCaCO3	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	2.26	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	1950	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.78	SU	N/A	2013-12-12	APHA 4500 A.B MOD
			Phenolics	0.006	mg/L	0.004	2013-12-17	HACH 8047
MW-B6	2013-12-10	352843	Alkalinity (CaCO3)	592	mg/LCaCO3	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	30.3	mg/L	0.03	2013-12-18	APHA 4500

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 5 of 11

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Received : 2013-12-12
PO Number:
Reported: 2014-01-13
Project Name: C of B-Historic Waste Sites
Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
MW-B6	2013-12-10	352843	Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	3290	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.35	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	0.015	mg/L	0.004	2013-12-17	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
MW-B7	2013-12-10	352844	Alkalinity (CaCO ₃)	432	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	8.96	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	2350	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.60	SU	N/A	2013-12-12	APHA 4500 A,B MOD
IW-B23	2013-12-10	352845	Alkalinity (CaCO ₃)	306	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	1.84	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	3210	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.75	SU	N/A	2013-12-12	APHA 4500 A,B MOD
Dup 1	2013-12-10	352846	Alkalinity (CaCO ₃)	575	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	30.0	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 6 of 11

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
Results relate only to items tested.



E3 Laboratories Inc.
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Email: info@e3labs.ca
Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
Christi Groves
121 Commerce Park Drive, Unit L
Barrie
L4N 8X1
Tel: 705-722-4492

Fax:
Email: cgroves@golder.com

Work Order No.: 2514382
Received : 2013-12-12
PO Number:
Reported: 2014-01-13
Project Name: C of B-Historic Waste Sites
Chain of Custody No.: 11776

Client Sample ID	Sample		Parameter	Result	Unit	RDL	Date	Method
	Date	Lab ID					Analyzed	
Dup 1	2013-12-10	352846	Conductivity	3410	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	6.34	SU	N/A	2013-12-12	APHA 4500 A.B MOD
			Phenolics	0.011	mg/L	0.004	2013-12-17	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 7 of 11

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PO Number:

Reported: 2014-01-13

Project Name: C of B-Historic Waste Sites

Chain of Custody No.: 11776

Client Sample ID	Sample		Parameter	Result	Unit	Date		Method
	Date	Lab ID				RDL	Analyzed	

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 8 of 11

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Project Name: C of B-Historic Waste Sites

Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

Page 9 of 11

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Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 10 of 11

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PO Number:

Reported: 2014-01-13

Project Name:

Chain of Custody No.:

Client Sample ID	Sample		Parameter	Result	Unit	RDL	Date	Method
	Date	Lab ID					Analyzed	

Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

Page 11 of 11

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Certificate of Analysis

E-3 Laboratories Inc.

RR#4, 360 York Rd. Unit 10
Niagara-on-the-Lake, ON L0S 1J0
Attn: Kristy LeBrasseur

Phone: (905) 641-9000
Fax: (905) 641-9001

Client PO: 2514382
Project: City of Barrie

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Custody:

Revised Report **Order #: 1350281**

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

Paracel ID

Client ID

1350281-01	352827 - Trip Blank
1350281-02	352828 - Field Blank 1
1350281-03	352829 - Field Blank 2

1350281-12	352838 - MW B1
1350281-13	352839 - MW B2
1350281-14	352840 - MW B3
1350281-15	352841 - MW B4
1350281-16	352842 - MW B5
1350281-17	352843 - MW B6
1350281-18	352844 - MW B7
1350281-19	352845 - MW B23
1350281-20	352846 - Dup 1

Approved By: 

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

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Client PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	13-Dec-13	13-Dec-13
Chromium, hexavalent	MOE E3056 - colourimetric	13-Dec-13	13-Dec-13
Chromium, trivalent	Calculation	18-Dec-13	18-Dec-13
Cyanide, free	MOE E3015 - Auto Colour	17-Dec-13	18-Dec-13
Hardness	Hardness	19-Dec-13	19-Dec-13
Hardness	Hardness as CaCO ₃	18-Dec-13	19-Dec-13
Mercury	EPA 245.1 - Cold Vapour AA	16-Dec-13	16-Dec-13
Mercury, dissolved	EPA 245.2 - CVAA	16-Dec-13	16-Dec-13
Metals, ICP-MS	EPA 200.8 - ICP-MS	18-Dec-13	18-Dec-13
PAHs by GC-MS	EPA 625 - GC-MS, extraction	16-Dec-13	17-Dec-13
PHC F1	CWS Tier 1 - P&T GC-FID	16-Dec-13	16-Dec-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	13-Dec-13	13-Dec-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	16-Dec-13	16-Dec-13

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: **E-3 Laboratories Inc.**

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Client ID:	352827 - Trip Blank	352828 - Field Blank 1	352829 - Field Blank 2
Sample Date:	05-Dec-13	10-Dec-13	11-Dec-13
Sample ID:	1350281-01	1350281-02	1350281-03
MDL/Units	Water	Water	Water

General Inorganics

Cyanide, free	2 ug/L	-	<2	<2
Hardness	1.0 mg/L	-	<1.0	<1.0

Anions

Bromide	0.1 mg/L	-	<0.1	<0.1
Chloride	1 mg/L	-	<1	<1
Fluoride	0.1 mg/L	-	<0.1	<0.1
Nitrate as N	0.1 mg/L	-	<0.1	<0.1
Nitrite as N	0.05 mg/L	-	<0.05	<0.05
Phosphate as P	1 mg/L	-	<1	<1
Sulphate	1 mg/L	-	<1	<1

Metals

Mercury	0.1 ug/L	-	<0.1	0.1
Antimony	0.5 ug/L	-	<0.5	<0.5
Arsenic	1 ug/L	-	<1	<1
Barium	1 ug/L	-	<1	<1
Beryllium	0.5 ug/L	-	<0.5	<0.5
Boron	10 ug/L	-	<10	<10
Cadmium	0.1 ug/L	-	<0.1	<0.1
Calcium	100 ug/L	-	<100	<100
Chromium	1 ug/L	-	<1	<1
Chromium (III)	10 ug/L	-	<10	<10
Chromium (VI)	10 ug/L	-	<10	<10
Cobalt	0.5 ug/L	-	<0.5	<0.5
Copper	0.5 ug/L	-	<0.5	<0.5
Iron	100 ug/L	-	<100	<100
Lead	0.1 ug/L	-	<0.1	<0.1
Magnesium	200 ug/L	-	<200	<200
Molybdenum	0.5 ug/L	-	<0.5	<0.5
Nickel	1 ug/L	-	<1	<1
Potassium	100 ug/L	-	<100	<100
Selenium	1 ug/L	-	<1	<1
Silver	0.1 ug/L	-	<0.1	<0.1
Sodium	200 ug/L	-	<200	<200

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: 352827 - Trip Blank 352828 - Field Blank 352829 - Field Blank			
	Sample Date: Sample ID:	05-Dec-13 1350281-01	10-Dec-13 1350281-02	11-Dec-13 1350281-03
		Water	Water	Water
MDL/Units				
Thallium	0.1 ug/L	-	<0.1	<0.1
Uranium	0.1 ug/L	-	<0.1	<0.1
Vanadium	0.5 ug/L	-	<0.5	<0.5
Zinc	5 ug/L	-	<5	<5

Volatiles

Acetone	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Benzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2 [2]	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0 [2]	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Chloromethane	3.0 ug/L	<3.0 [2]	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Chlorodifluoromethane	1.0 ug/L	<1.0 [2]	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2 [2]	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Hexane	1.0 ug/L	<1.0 [2]	<1.0	<1.0

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: 352827 - Trip Blank 352828 - Field Blank 352829 - Field Blank			
	Sample Date: 05-Dec-13 10-Dec-13 11-Dec-13			
	Sample ID: 1350281-01 1350281-02 1350281-03			
	MDL/Units	Water	Water	Water
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0 [2]	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0 [2]	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Styrene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Toluene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0 [2]	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Vinyl chloride	0.5 ug/L	<0.5 [2]	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5 [2]	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5 [2]	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	91.7% [2]	92.2%	93.5%
Dibromofluoromethane	Surrogate	104% [2]	103%	105%
Toluene-d8	Surrogate	108% [2]	109%	109%

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L	-	<25.0	<25.0
F2 PHCs (C10-C16)	100 ug/L	-	<100	<100
F3 PHCs (C16-C34)	100 ug/L	-	<100	<100
F4 PHCs (C34-C50)	100 ug/L	-	<100	<100
F1 + F2 PHCs	125 ug/L	-	<125	<125
F3 + F4 PHCs	200 ug/L	-	<200	<200

Semi-Volatiles

Acenaphthene	0.05 ug/L	-	<0.05	<0.05
Acenaphthylene	0.05 ug/L	-	<0.05	<0.05
Anthracene	0.01 ug/L	-	<0.01	<0.01

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: 352827 - Trip Blank		352828 - Field Blank	352829 - Field Blank
	Sample Date: 05-Dec-13		1	2
	Sample ID: 1350281-01		1350281-02	1350281-03
	MDL/Units	Water	Water	Water
Benzo [a] anthracene	0.01 ug/L	-	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	-	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	-	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	-	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	-	<0.05	<0.05
Biphenyl	0.05 ug/L	-	<0.05	<0.05
Chrysene	0.05 ug/L	-	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	-	<0.05	<0.05
Fluoranthene	0.01 ug/L	-	<0.01	<0.01
Fluorene	0.05 ug/L	-	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	-	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	-	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	-	<0.10	<0.10
Naphthalene	0.05 ug/L	-	<0.05	<0.05
Phenanthrene	0.05 ug/L	-	<0.05	<0.05
Pyrene	0.01 ug/L	-	<0.01	<0.01
2-Fluorobiphenyl	Surrogate	-	83.5%	82.4%
Terphenyl-d14	Surrogate	-	99.1%	97.5%

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Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
General Inorganics	
Cyanide, free	2 ug/L
Hardness	1.0 mg/L
Anions	
Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L
Metals	
Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

Thallium	0.1 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Chlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L

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Niagara Falls, ON L2J 0A3**SARNIA**123 Christine St. N
Sarnia ON N7T 5T7

Certificate of Analysis

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:
	MDL/Units
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L

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SARNIA
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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
1,2-Dibromobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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Certificate of Analysis

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

		Client ID	352838 - MW
		Sample Date	10-Dec-13
		Sample ID:	1350281-12
		MDL/Units	Water
General Inorganics			
Cyanide, free	2 ug/L		<2
Hardness	1.0 mg/L		710
Anions			
Bromide	0.1 mg/L		0.2
Chloride	1 mg/L		885
Fluoride	0.1 mg/L		<0.1
Nitrate as N	0.1 mg/L		6.0
Nitrite as N	0.05 mg/L		<0.05
Phosphate as P	1 mg/L		<1
Sulphate	1 mg/L		80
Metals			
Mercury	0.1 ug/L		<0.1
Antimony	0.5 ug/L		<0.5
Arsenic	1 ug/L		<1
Barium	1 ug/L		223
Beryllium	0.5 ug/L		<0.5
Boron	10 ug/L		59
Cadmium	0.1 ug/L		<0.1
Calcium	100 ug/L		246000
Chromium	1 ug/L		13
Chromium (III)	10 ug/L		13
Chromium (VI)	10 ug/L		<10
Cobalt	0.5 ug/L		<0.5
Copper	0.5 ug/L		1.6
Iron	100 ug/L		<100
Lead	0.1 ug/L		<0.1
Magnesium	200 ug/L		23300
Molybdenum	0.5 ug/L		<0.5
Nickel	1 ug/L		6
Potassium	100 ug/L		10200
Selenium	1 ug/L		<1
Silver	0.1 ug/L		<0.1
Sodium	200 ug/L		647000

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

		Client ID:	352838 - MW B1
		Sample Date:	10-Dec-13
		Sample ID:	1350281-12
	MDL/Units		Water
Thallium	0.1 ug/L		<0.1
Uranium	0.1 ug/L		0.4
Vanadium	0.5 ug/L		7.9
Zinc	5 ug/L		<5
Volatiles			
Acetone	5.0 ug/L		<5.0
Benzene	0.5 ug/L		<0.5
Bromodichloromethane	0.5 ug/L		<0.5
Bromoform	0.5 ug/L		<0.5
Bromomethane	0.5 ug/L		<0.5
Carbon Tetrachloride	0.2 ug/L		<0.2
Chlorobenzene	0.5 ug/L		<0.5
Chloroethane	1.0 ug/L		<1.0
Chloroform	0.5 ug/L		<0.5
Chloromethane	3.0 ug/L		<3.0
Dibromochloromethane	0.5 ug/L		<0.5
Chlorodifluoromethane	1.0 ug/L		<1.0
1,2-Dibromoethane	0.2 ug/L		<0.2
1,2-Dichlorobenzene	0.5 ug/L		<0.5
1,3-Dichlorobenzene	0.5 ug/L		<0.5
1,4-Dichlorobenzene	0.5 ug/L		<0.5
1,1-Dichloroethane	0.5 ug/L		<0.5
1,2-Dichloroethane	0.5 ug/L		<0.5
1,1-Dichloroethylene	0.5 ug/L		<0.5
cis-1,2-Dichloroethylene	0.5 ug/L		<0.5
trans-1,2-Dichloroethylene	0.5 ug/L		<0.5
1,2-Dichloroethylene, total	0.5 ug/L		<0.5
1,2-Dichloropropane	0.5 ug/L		<0.5
cis-1,3-Dichloropropylene	0.5 ug/L		<0.5
trans-1,3-Dichloropropylene	0.5 ug/L		<0.5
1,3-Dichloropropene, total	0.5 ug/L		<0.5
Ethylbenzene	0.5 ug/L		<0.5
Hexane	1.0 ug/L		<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L		<5.0

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

		Client ID:	352838 - MW
		Sample Date:	10-Dec-13
		Sample ID:	1350281-12
	MDL/Units		Water
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L		<10.0
Methyl Isobutyl Ketone	5.0 ug/L		<5.0
Methyl tert-butyl ether	2.0 ug/L		<2.0
Methylene Chloride	5.0 ug/L		<5.0
Styrene	0.5 ug/L		<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L		<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L		<0.5
Tetrachloroethylene	0.5 ug/L		<0.5
Toluene	0.5 ug/L		<0.5
1,2,4-Trichlorobenzene	0.5 ug/L		<0.5
1,1,1-Trichloroethane	0.5 ug/L		<0.5
1,1,2-Trichloroethane	0.5 ug/L		<0.5
Trichloroethylene	0.5 ug/L		<0.5
Trichlorofluoromethane	1.0 ug/L		<1.0
1,3,5-Trimethylbenzene	0.5 ug/L		<0.5
Vinyl chloride	0.5 ug/L		<0.5
m,p-Xylenes	0.5 ug/L		<0.5
o-Xylene	0.5 ug/L		<0.5
Xylenes, total	0.5 ug/L		<0.5
4-Bromofluorobenzene	Surrogate		93.7%
Dibromofluoromethane	Surrogate		101%
Toluene-d8	Surrogate		108%
Hydrocarbons			
F1 PHCs (C6-C10)	25.0 ug/L		<25.0
F2 PHCs (C10-C16)	100 ug/L		<100
F3 PHCs (C16-C34)	100 ug/L		<100
F4 PHCs (C34-C50)	100 ug/L		<100
F1 + F2 PHCs	125 ug/L		<125
F3 + F4 PHCs	200 ug/L		<200
Semi-Volatiles			
Acenaphthene	0.05 ug/L		<0.05
Acenaphthylene	0.05 ug/L		<0.05
Anthracene	0.01 ug/L		<0.01
Benzo [a] anthracene	0.01 ug/L		<0.01

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SARNIA
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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

352838 - MW B1
10-Dec-13
1350281-12
Water

<0.01

<0.05

<0.05

<0.05

<0.05

<0.05

<0.05

<0.01

<0.05

<0.05

<0.05

<0.05

<0.10

<0.05

<0.05

<0.01

81.8%

95.1%

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Client ID:	352839 - MW B2	352840 - MW B3	352841 - MW B4	352842 - MW
Sample Date:	10-Dec-13	10-Dec-13	12-Dec-13	10-Dec-13
Sample ID:	1350281-13	1350281-14	1350281-15	1350281-16
MDL/Units	Water	Water	Water	Water

General Inorganics

Cyanide, free	2 ug/L	<2	<2	<2	<2
Hardness	1.0 mg/L	565	466	716	412

Anions

Bromide	0.1 mg/L	0.3	<0.1	0.5	<0.1
Chloride	1 mg/L	370	31	590	510
Fluoride	0.1 mg/L	<0.1	<0.1	<0.1	<0.1
Nitrate as N	0.1 mg/L	<0.1	5.4	<0.1	<0.1
Nitrite as N	0.05 mg/L	<0.05	4.82	<0.05	<0.05
Phosphate as P	1 mg/L	<1	<1	<1	<1
Sulphate	1 mg/L	2	34	2	1

Metals

Mercury	0.1 ug/L	0.2	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	3	<1	1	8
Barium	1 ug/L	321	165	360	200
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	219	12	366	36
Cadmium	0.1 ug/L	<0.1	0.1	<0.1	<0.1
Calcium	100 ug/L	198000	152000	246000	145000
Chromium	1 ug/L	11	6	28	7
Chromium (III)	10 ug/L	11	<10	28	<10
Chromium (VI)	10 ug/L	<10	<10	<10	<10
Cobalt	0.5 ug/L	1.7	1.0	3.5	0.8
Copper	0.5 ug/L	<0.5	4.5	0.6	<0.5
Iron	100 ug/L	30000	<100	70500	23700
Lead	0.1 ug/L	<0.1	<0.1	0.1	<0.1
Magnesium	200 ug/L	17100	21200	24300	12200
Molybdenum	0.5 ug/L	<0.5	<0.5	<0.5	0.7
Nickel	1 ug/L	6	6	7	4
Potassium	100 ug/L	11500	16800	19000	2580
Selenium	1 ug/L	<1	<1	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	233000	148000	339000	332000

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:	352839 - MW B2	352840 - MW B3	352841 - MW B4	352842 - MW B5
	Sample Date:	10-Dec-13	10-Dec-13	12-Dec-13	10-Dec-13
	Sample ID:	1350281-13	1350281-14	1350281-15	1350281-16
	MDL/Units	Water	Water	Water	Water
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	<0.1	0.5	<0.1	<0.1
Vanadium	0.5 ug/L	15.0	4.5	37.3	6.0
Zinc	5 ug/L	<5	26	<5	17
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	5.9	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	4.8	<0.5
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	3.9	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:	352839 - MW B2 10-Dec-13 1350281-13 Water	352840 - MW B3 10-Dec-13 1350281-14 Water	352841 - MW B4 12-Dec-13 1350281-15 Water	352842 - MW B5 10-Dec-13 1350281-16 Water
	MDL/Units				
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	1.9	<0.5
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	0.6	<0.5	27.8	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	27.4	<0.5
Xylenes, total	0.5 ug/L	0.6	<0.5	55.3	<0.5
4-Bromofluorobenzene	Surrogate	88.5%	92.5%	88.1%	91.9%
Dibromofluoromethane	Surrogate	102%	103%	103%	103%
Toluene-d8	Surrogate	107%	109%	107%	109%
Hydrocarbons					
F1 PHCs (C6-C10)	25.0 ug/L	75.0	<25.0	108	<25.0
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
F1 + F2 PHCs	125 ug/L	<125	<125	<125	<125
F3 + F4 PHCs	200 ug/L	<200	<200	<200	<200
Semi-Volatiles					
Acenaphthene	0.05 ug/L	2.02	<0.05	<0.05	0.65
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Anthracene	0.01 ug/L	0.40	<0.01	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	0.40	<0.01	<0.01	<0.01

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 Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Client PO: 2514382

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:	352839 - MW B2	352840 - MW B3	352841 - MW B4	352842 - MW B5
	Sample Date:	10-Dec-13	10-Dec-13	12-Dec-13	10-Dec-13
	Sample ID:	1350281-13	1350281-14	1350281-15	1350281-16
	MDL/Units	Water	Water	Water	Water
Benzo [a] pyrene	0.01 ug/L	0.28	<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	0.44	<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	0.21	<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	0.22	<0.05	<0.05	<0.05
Biphenyl	0.05 ug/L	0.16	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	0.41	<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	1.20	<0.01	0.07	0.09
Fluorene	0.05 ug/L	1.05	<0.05	0.12	0.11
Indeno [1,2,3-cd] pyrene	0.05 ug/L	0.15	<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	2.08	<0.05	1.01	0.26
2-Methylnaphthalene	0.05 ug/L	1.74	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	3.82	<0.10	1.01	0.26
Naphthalene	0.05 ug/L	36.2	<0.05	7.28	0.54
Phenanthrene	0.05 ug/L	2.32	<0.05	0.31	0.12
Pyrene	0.01 ug/L	1.07	<0.01	<0.01	0.08
Fluorobiphenyl	Surrogate	77.8%	68.6%	68.3%	72.1%
Terphenyl-d14	Surrogate	89.8%	90.1%	69.5%	85.3%

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Certificate of Analysis

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Client ID:	352843 - MW B6	352844 - MW B7	352845 - MW B23	352846 - Dup
Sample Date:	10-Dec-13	10-Dec-13	10-Dec-13	10-Dec-13
Sample ID:	1350281-17	1350281-18	1350281-19	1350281-20
MDL/Units	Water	Water	Water	Water

General Inorganics

Cyanide, free	2 ug/L	<2	<2	<2	<2
Hardness	1.0 mg/L	907	588	584	963

Anions

Bromide	0.1 mg/L	0.7	0.3	0.4	0.7
Chloride	1 mg/L	916	535	952	938
Fluoride	0.1 mg/L	<0.1	<0.1	<0.1	<0.1
Nitrate as N	0.1 mg/L	<0.1	<0.1	<0.1	<0.1
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	<0.05
Phosphate as P	1 mg/L	<1	<1	<1	<1
Sulphate	1 mg/L	2	2	2	2

Metals

Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	3	2	<1	<1
Barium	1 ug/L	190	213	166	192
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	110	106	30	153
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Calcium	100 ug/L	310000	206000	203000	324000
Chromium	1 ug/L	12	10	11	16
Chromium (III)	10 ug/L	12	10	11	16
Chromium (VI)	10 ug/L	<10	<10	<10	<10
Cobalt	0.5 ug/L	6.5	0.8	0.6	2.4
Copper	0.5 ug/L	1.5	<0.5	<0.5	1.4
Iron	100 ug/L	9790	33000	4730	31000
Lead	0.1 ug/L	1.3	<0.1	<0.1	0.2
Magnesium	200 ug/L	31700	17400	18600	37000
Molybdenum	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Nickel	1 ug/L	20	5	5	9
Potassium	100 ug/L	9200	9450	7930	13100
Selenium	1 ug/L	<1	<1	<1	1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	381000	304000	469000	367000

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:	352843 - MW B6 10-Dec-13 1350281-17	352844 - MW B7 10-Dec-13 1350281-18	352845 - MW B23 10-Dec-13 1350281-19	352846 - Dup 1 10-Dec-13 1350281-20
	MDL/Units	Water	Water	Water	Water
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Vanadium	0.5 ug/L	9.8	12.3	6.0	18.1
Zinc	5 ug/L	139	<5	<5	<5
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	3.0	<0.5	<0.5	2.6
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	0.7	<0.5	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:	352843 - MW B6 10-Dec-13 1350281-17 Water	352844 - MW B7 10-Dec-13 1350281-18 Water	352845 - MW B23 10-Dec-13 1350281-19 Water	352846 - Dup 10-Dec-13 1350281-20 Water
	MDL/Units				
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	7.2	<0.5	<0.5	4.0
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	7.2	<0.5	<0.5	4.0
4-Bromofluorobenzene	Surrogate	89.7%	91.1%	92.0%	90.5%
Dibromofluoromethane	Surrogate	104%	101%	104%	101%
Toluene-d8	Surrogate	108%	108%	104%	107%
Hydrocarbons					
F1 PHCs (C6-C10)	25.0 ug/L	<25.0	<25.0	<25.0	<25.0
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	321	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	112	<100	<100	<100
F1 + F2 PHCs	125 ug/L	<125	<125	<125	<125
F3 + F4 PHCs	200 ug/L	433	<200	<200	<200
Semi-Volatiles					
Acenaphthene	0.05 ug/L	0.12	0.91	<0.05	0.12
Acenaphthylene	0.05 ug/L	0.09	<0.05	<0.05	0.07
Anthracene	0.01 ug/L	0.23	0.13	0.03	0.19

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Client PO: 2514382

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:	352843 - MW B6	352844 - MW B7	352845 - MW B23	352846 - Dup 1
	Sample Date:	10-Dec-13	10-Dec-13	10-Dec-13	10-Dec-13
	Sample ID:	1350281-17	1350281-18	1350281-19	1350281-20
	MDL/Units	Water	Water	Water	Water
Benzo [a] anthracene	0.01 ug/L	0.41	0.10	0.07	0.33
Benzo [a] pyrene	0.01 ug/L	0.35	0.08	0.06	0.28
Benzo [b] fluoranthene	0.05 ug/L	0.61	0.16	0.10	0.49
Benzo [g,h,i] perylene	0.05 ug/L	0.25	0.07	0.06	0.20
Benzo [k] fluoranthene	0.05 ug/L	0.28	0.07	<0.05	0.23
Biphenyl	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	0.39	0.10	0.06	0.33
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	1.01	0.34	0.12	0.86
Fluorene	0.05 ug/L	0.15	0.31	<0.05	0.16
Indeno [1,2,3-cd] pyrene	0.05 ug/L	0.21	<0.05	<0.05	0.16
1-Methylnaphthalene	0.05 ug/L	0.42	<0.05	0.06	0.43
2-Methylnaphthalene	0.05 ug/L	0.48	<0.05	0.06	0.47
Methylnaphthalene (1&2)	0.10 ug/L	0.90	<0.10	0.11	0.90
Naphthalene	0.05 ug/L	2.10	<0.05	0.11	2.21
Phenanthrene	0.05 ug/L	0.87	0.52	0.07	0.83
ene	0.01 ug/L	0.84	0.33	0.11	0.71
2-Fluorobiphenyl	Surrogate	70.2%	77.1%	73.9%	69.8%
Terphenyl-d14	Surrogate	90.3%	80.4%	86.4%	77.9%

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Certificate of Analysis

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Aluminum, dissolved	1 ug/L
Mercury, dissolved	0.1 ug/L
Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Manganese	5 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:
Sample Date:
Sample ID:

MDL/Units

Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L
Strontium	10 ug/L
Thallium	0.1 ug/L
Titanium	5 ug/L
Tungsten	10 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L
Zirconium	1 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Chloroform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate
Hydrocarbons	
F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L

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NIAGARA FALLS
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Niagara Falls, ON L2J 0A3

SARNIA
123 Christie St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

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

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SARNIA
123 Christine St. N.
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Certificate of Analysis

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Hardness	1.0 mg/L
----------	----------

Metals

Aluminum, dissolved	1 ug/L
Mercury, dissolved	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Manganese	5 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L
Strontium	10 ug/L
Thallium	0.1 ug/L
Titanium	5 ug/L
Tungsten	10 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L
Zirconium	1 ug/L

Volatiles

Acetone	5.0 ug/L
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SARNIA
123 Christine St. N
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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:
Sample Date:
Sample ID:

MDL/Units

Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L

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SARNIA
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Certificate of Analysis

Client: E-3 Laboratories Inc.
Client PO: 2514382

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:	
Sample Date:	
Sample ID:	
	MDL/Units
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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Certificate of Analysis

Client: E-3 Laboratories Inc.
Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Client ID:	
Sample Date:	
Sample ID:	
MDL/Units	

General Inorganics

Hardness	1.0 mg/L
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Metals

Aluminum, dissolved	1 ug/L
Mercury, dissolved	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Manganese	5 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L
Strontium	10 ug/L
Thallium	0.1 ug/L
Titanium	5 ug/L
Tungsten	10 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L
Zirconium	1 ug/L

Volatiles

Acetone	5.0 ug/L
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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

	Client ID: Sample Date: Sample ID:
	MDL/Units
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:
	MDL/Units
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**
Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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Certificate of Analysis

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.
Client PO: 2514382

Project Description: City of Barrie

Client ID:
Sample Date:
Sample ID:
MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L
Thallium	0.1 ug/L

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SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:
Sample Date:
Sample ID:

MDL/Units

Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:
	MDL/Units
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L

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Niagara Falls, ON L2J 0A3

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

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID: Sample Date: Sample ID:	
	MDL/Units
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Bromide	ND	0.1	mg/L						
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Phosphate as P	ND	1	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Cyanide, free	ND	2	ug/L						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25.0	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury, dissolved	ND	0.1	ug/L						
Aluminum, dissolved	ND	1	ug/L						
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Calcium	ND	100	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Iron	ND	100	ug/L						
Lead	ND	0.1	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Potassium	ND	100	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Strontium	ND	10	ug/L						
Thallium	ND	0.1	ug/L						
Titanium	ND	5	ug/L						
Tungsten	ND	10	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Zirconium	ND	1	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						

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SARNIA
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Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [k] fluoranthene	ND	0.05	ug/L						
Biphenyl	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	14.5		ug/L		72.3	50-140			
Surrogate: Terphenyl-d14	19.4		ug/L		97.0	50-140			

Volatiles

Acetone	ND	5.0	ug/L
Benzene	ND	0.5	ug/L
Bromodichloromethane	ND	0.5	ug/L
Bromoform	ND	0.5	ug/L
Bromomethane	ND	0.5	ug/L
Carbon Tetrachloride	ND	0.2	ug/L
Chlorobenzene	ND	0.5	ug/L
Chloroethane	ND	1.0	ug/L
Chloroform	ND	0.5	ug/L
Chloromethane	ND	3.0	ug/L
Dibromochloromethane	ND	0.5	ug/L
Dibromodifluoromethane	ND	1.0	ug/L
Dibromoethane	ND	0.2	ug/L
1,2-Dichlorobenzene	ND	0.5	ug/L
1,3-Dichlorobenzene	ND	0.5	ug/L
1,4-Dichlorobenzene	ND	0.5	ug/L
1,1-Dichloroethane	ND	0.5	ug/L
1,2-Dichloroethane	ND	0.5	ug/L
1,1-Dichloroethylene	ND	0.5	ug/L
cis-1,2-Dichloroethylene	ND	0.5	ug/L
trans-1,2-Dichloroethylene	ND	0.5	ug/L
1,2-Dichloroethylene, total	ND	0.5	ug/L
1,2-Dichloropropane	ND	0.5	ug/L
cis-1,3-Dichloropropylene	ND	0.5	ug/L
trans-1,3-Dichloropropylene	ND	0.5	ug/L
1,3-Dichloropropene, total	ND	0.5	ug/L
Ethylbenzene	ND	0.5	ug/L
Hexane	ND	1.0	ug/L
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L
Methyl Isobutyl Ketone	ND	5.0	ug/L
Methyl tert-butyl ether	ND	2.0	ug/L
Methylene Chloride	ND	5.0	ug/L
Styrene	ND	0.5	ug/L
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L
1,1,1,2,2-Tetrachloroethane	ND	0.5	ug/L
Tetrachloroethylene	ND	0.5	ug/L
Toluene	ND	0.5	ug/L
1,2,4-Trichlorobenzene	ND	0.5	ug/L
1,1,1-Trichloroethane	ND	0.5	ug/L
1,1,2-Trichloroethane	ND	0.5	ug/L
Trichloroethylene	ND	0.5	ug/L

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SARNIA
123 Christine St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	73.3		ug/L		91.6	50-140			
Surrogate: Dibromofluoromethane	85.3		ug/L		107	50-140			
Surrogate: Toluene-d8	87.2		ug/L		109	50-140			

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Bromide	0.19	0.1	mg/L	0.17			12.7	20	
Chloride	753	10	mg/L	781			3.7	10	
Fluoride	ND	0.1	mg/L	ND				10	
Nitrate as N	0.16	0.1	mg/L	0.17			1.9	20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Phosphate as P	ND	1	mg/L	ND				20	
Sulphate	70.4	1	mg/L	70.5			0.1	10	
General Inorganics									
Cyanide, free	ND	2	ug/L	ND				20	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25.0	ug/L	ND				30	
Metals									
Mercury, dissolved	ND	0.1	ug/L	ND				27	
Aluminum, dissolved	3.0	1	ug/L	3.2			5.9	20	
Mercury	ND	0.1	ug/L	ND				20	
Antimony	0.66	0.5	ug/L	1.97			100.0	20	QR-01
Arsenic	ND	1	ug/L	ND			0.0	20	
Barium	ND	1	ug/L	ND			0.0	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	ND	10	ug/L	ND			0.0	20	
Cadmium	ND	0.1	ug/L	ND			0.0	20	
Calcium	ND	100	ug/L	ND			0.0	20	
Chromium (VI)	ND	10	ug/L	ND				20	
Chromium	ND	1	ug/L	ND			0.0	20	
Copper	ND	0.5	ug/L	ND			0.0	20	
Copper	ND	0.5	ug/L	ND			0.0	20	
Iron	ND	100	ug/L	ND			0.0	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Magnesium	ND	200	ug/L	ND			0.0	20	
Manganese	ND	5	ug/L	ND			0.0	20	
Molybdenum	ND	0.5	ug/L	ND			0.0	20	
Nickel	ND	1	ug/L	ND			0.0	20	
Potassium	ND	100	ug/L	ND			0.0	20	
Selenium	ND	1	ug/L	ND			0.0	20	
Silver	ND	0.1	ug/L	ND			0.0	20	
Sodium	ND	200	ug/L	ND			0.0	20	
Strontium	ND	10	ug/L	ND			0.0	20	
Thallium	ND	0.1	ug/L	ND			0.0	20	
Titanium	ND	5	ug/L	ND			0.0	20	
Tungsten	ND	10	ug/L	ND			0.0	20	
Uranium	ND	0.1	ug/L	ND			0.0	20	
Vanadium	ND	0.5	ug/L	ND			0.0	20	
Zinc	ND	5	ug/L	ND			0.0	20	
Zirconium	ND	1	ug/L	ND			0.0	20	
Volatiles									
Acetone	9.21	5.0	ug/L	ND			0.0	30	
Benzene	3.28	0.5	ug/L	2.59			23.5	30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	0.71	0.5	ug/L	ND			0.0	30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	

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SARNIA
123 Christina St N
Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			0.0	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	0.57	0.5	ug/L	ND			0.0	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND			0.0	30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND			0.0	30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND			0.0	30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	7.59	0.5	ug/L	4.01			61.7	30	QR-07
o-Xylene	ND	0.5	ug/L	ND			0.0	30	
Surrogate: 4-Bromofluorobenzene	75.0		ug/L	ND	93.7	50-140			
Surrogate: Dibromofluoromethane	88.3		ug/L	ND	110	50-140			
Surrogate: Toluene-d8	87.0		ug/L	ND	109	50-140			

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Client PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Bromide	1.18		mg/L	0.17	101	72-106			
Chloride	9.08		mg/L	ND	90.8	78-112			
Fluoride	0.90		mg/L	ND	90.4	73-113			
Nitrate as N	1.14		mg/L	0.17	97.5	81-112			
Nitrite as N	1.02		mg/L	ND	102	76-117			
Phosphate as P	4.53		mg/L	ND	90.6	72-131			
Sulphate	80.5		mg/L	70.5	101	75-111			
General Inorganics									
Cyanide, free	30.7	2	ug/L	ND	102	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	2070	25.0	ug/L	ND	104	68-117			
F2 PHCs (C10-C16)	1570	100	ug/L	ND	87.0	60-140			
F3 PHCs (C16-C34)	3150	100	ug/L	ND	84.7	60-140			
F4 PHCs (C34-C50)	1910	100	ug/L	ND	76.9	60-140			
Metals									
Mercury, dissolved	3.2	0.1	ug/L	ND	108	74-130			
Aluminum, dissolved	50.4		ug/L	3.2	94.4	70-130			
Mercury	3.16	0.1	ug/L	ND	105	78-137			
Antimony	46.3		ug/L	1.97	88.7	80-120			
Arsenic	50.8		ug/L	0.1	101	80-120			
Barium	48.8		ug/L	ND	97.7	80-120			
Beryllium	46.5		ug/L	0.005	93.0	80-120			
Bismuth	46		ug/L	ND	92.6	80-120			
Cadmium	53.4		ug/L	0.03	107	80-120			
Calcium	1180		ug/L	3	118	80-120			
Chromium (VI)	188	10	ug/L	ND	94.0	70-130			
Chromium	48.8		ug/L	0.09	97.3	80-120			
Cobalt	47.4		ug/L	0.002	94.8	80-120			
Copper	47.4		ug/L	ND	94.9	80-120			
Iron	1130		ug/L	ND	114	80-120			
Lead	47.3		ug/L	ND	94.6	80-120			
Magnesium	1050		ug/L	0.4	105	80-120			
Manganese	48.0		ug/L	0.004	96.0	80-120			
Molybdenum	48.9		ug/L	0.29	97.3	80-120			
Nickel	47.1		ug/L	ND	94.1	80-120			
Potassium	1080		ug/L	0.09	108	80-120			
Selenium	51.2		ug/L	0.2	102	80-120			
Silver	52.3		ug/L	0.03	104	80-120			
Sodium	1050		ug/L	ND	105	80-120			
Strontium	49		ug/L	0.003	97.4	80-120			
Thallium	47.4		ug/L	ND	94.9	80-120			
Titanium	50.3		ug/L	ND	101	80-120			
Tungsten	45.0		ug/L	0.4	89.2	80-120			
Uranium	45.8		ug/L	0.02	91.5	80-120			
Vanadium	49.9		ug/L	0.07	99.7	80-120			
Zinc	45		ug/L	ND	92.6	80-120			
Zirconium	44.9		ug/L	ND	89.7	80-120			

Semi-Volatiles

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SARNIA
123 Christina St. N
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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthene	3.74	0.05	ug/L	ND	74.8	50-140			
Acenaphthylene	3.67	0.05	ug/L	ND	73.3	50-140			
Anthracene	3.83	0.01	ug/L	ND	76.6	50-140			
Benzo [a] anthracene	3.80	0.01	ug/L	ND	76.0	50-140			
Benzo [a] pyrene	3.51	0.01	ug/L	ND	70.2	50-140			
Benzo [b] fluoranthene	4.41	0.05	ug/L	ND	88.3	50-140			
Benzo [g,h,i] perylene	4.08	0.05	ug/L	ND	81.6	50-140			
Benzo [k] fluoranthene	4.97	0.05	ug/L	ND	99.4	50-140			
Biphenyl	4.11	0.05	ug/L	ND	82.3	50-140			
Chrysene	3.94	0.05	ug/L	ND	78.7	50-140			
Dibenzo [a,h] anthracene	4.15	0.05	ug/L	ND	82.9	50-140			
Fluoranthene	4.09	0.01	ug/L	ND	81.8	50-140			
Fluorene	3.41	0.05	ug/L	ND	68.2	50-140			
Indeno [1,2,3-cd] pyrene	4.28	0.05	ug/L	ND	85.6	50-140			
1-Methylnaphthalene	3.72	0.05	ug/L	ND	74.4	50-140			
2-Methylnaphthalene	3.80	0.05	ug/L	ND	76.0	50-140			
Naphthalene	3.55	0.05	ug/L	ND	71.0	50-140			
Phenanthrene	4.04	0.05	ug/L	ND	80.8	50-140			
Pyrene	4.16	0.01	ug/L	ND	83.2	50-140			
Surrogate: 2-Fluorobiphenyl	15.6		ug/L		78.2	50-140			
Volatiles									
Acetone	85.6	5.0	ug/L	ND	85.6	50-140			
Benzene	44.6	0.5	ug/L	ND	112	60-130			
Bromodichloromethane	40.8	0.5	ug/L	ND	102	60-130			
Bromoform	31.4	0.5	ug/L	ND	78.5	60-130			
Bromomethane	41.3	0.5	ug/L	ND	103	50-140			
Carbon Tetrachloride	27.4	0.2	ug/L	ND	68.5	60-130			
Chlorobenzene	37.9	0.5	ug/L	ND	94.8	60-130			
Chloroethane	39.4	1.0	ug/L	ND	98.6	50-140			
Chloroform	46.4	0.5	ug/L	ND	116	60-130			
Chloromethane	32.7	3.0	ug/L	ND	81.7	50-140			
Dibromochloromethane	34.7	0.5	ug/L	ND	86.8	60-130			
Dichlorodifluoromethane	39.0	1.0	ug/L	ND	97.4	50-140			
1,2-Dibromoethane	35.5	0.2	ug/L	ND	88.8	60-130			
1,2-Dichlorobenzene	43.2	0.5	ug/L	ND	108	60-130			
1,3-Dichlorobenzene	39.4	0.5	ug/L	ND	98.4	60-130			
1,4-Dichlorobenzene	40.9	0.5	ug/L	ND	102	60-130			
1,1-Dichloroethane	40.7	0.5	ug/L	ND	102	60-130			
1,2-Dichloroethane	41.6	0.5	ug/L	ND	104	60-130			
1,1-Dichloroethylene	38.2	0.5	ug/L	ND	95.5	60-130			
cis-1,2-Dichloroethylene	40.8	0.5	ug/L	ND	102	60-130			
trans-1,2-Dichloroethylene	43.3	0.5	ug/L	ND	108	60-130			
1,2-Dichloropropane	48.9	0.5	ug/L	ND	122	60-130			
cis-1,3-Dichloropropylene	46.1	0.5	ug/L	ND	115	60-130			
trans-1,3-Dichloropropylene	42.4	0.5	ug/L	ND	106	60-130			
Ethylbenzene	38.0	0.5	ug/L	ND	95.0	60-130			
Hexane	33.3	1.0	ug/L	ND	83.4	60-130			
Methyl Ethyl Ketone (2-Butanone)	103	5.0	ug/L	ND	103	50-140			
Methyl Butyl Ketone (2-Hexanone)	108	10.0	ug/L	ND	108	50-140			
Methyl Isobutyl Ketone	113	5.0	ug/L	ND	113	50-140			

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SARNIA
123 Christine St. N
Sarnia ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Client PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	107	2.0	ug/L	ND	107	50-140			
Methylene Chloride	35.8	5.0	ug/L	ND	89.5	60-130			
Styrene	36.3	0.5	ug/L	ND	90.8	60-130			
1,1,1,2-Tetrachloroethane	29.2	0.5	ug/L	ND	73.0	60-130			
1,1,2,2-Tetrachloroethane	38.5	0.5	ug/L	ND	96.2	60-130			
Tetrachloroethylene	36.0	0.5	ug/L	ND	89.9	60-130			
Toluene	40.2	0.5	ug/L	ND	100	60-130			
1,2,4-Trichlorobenzene	41.3	0.5	ug/L	ND	103	60-130			
1,1,1-Trichloroethane	38.3	0.5	ug/L	ND	95.7	60-130			
1,1,2-Trichloroethane	47.4	0.5	ug/L	ND	119	60-130			
Trichloroethylene	41.8	0.5	ug/L	ND	105	60-130			
Trichlorofluoromethane	35.6	1.0	ug/L	ND	88.9	60-130			
1,3,5-Trimethylbenzene	36.7	0.5	ug/L	ND	91.7	60-130			
Vinyl chloride	29.3	0.5	ug/L	ND	73.2	50-140			
m,p-Xylenes	74.0	0.5	ug/L	ND	92.5	60-130			
o-Xylene	39.8	0.5	ug/L	ND	99.6	60-130			

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SARNIA
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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.
Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Qualifier Notes:

Sample Qualifiers :

- 1 : Elevated detection limit due to dilution required because of high target analyte concentration.
- 2 : Please note that this sample is a standard, therefore Paracels normal Holding Time does not apply.

QC Qualifiers :

- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.
- QR-07 : Duplicate result exceeds RPD limits due to non-homogeneity between multiple sample vials.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 - this report includes an updated Hardness result.

Other Report Notes:

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

CCME PHC additional information:

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

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Fax:
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Work Order No.: 2509907
 Received : 2013-08-22
 PO Number:
 Reported: 2013-09-03
 Project Name: BHWS Sampling
 Chain of Custody No.: 21802

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
MW-B2	2013-08-21	340137	F2-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
W-B4	2013-08-21	340138	F2-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
MW-B5	2013-08-21	340139	F2-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
W-B6	2013-08-21	340140	F2-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
MW-B23	2013-08-21	340141	Alkalinity (CaCO ₃)	294	mg/L CaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	1.70	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	290	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	2640	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO ₃)	832	mg/L CaCO ₃	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	26.2	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	6.88	SU	N/A	2013-08-22	APHA 4500 A.B MOD
			Phenolics	0.006	mg/L	0.004	2013-08-28	HACH 8047
			Potassium	13.6	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	457	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted
MW-B7	2013-08-21	340142	Alkalinity (CaCO ₃)	436	mg/L CaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	6.12	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	223	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	1960	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO ₃)	632	mg/L CaCO ₃	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	18.2	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 1 of 9

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Work Order No.: 2509907
 Received : 2013-08-22
 PO Number:
 Reported: 2013-09-03
 Project Name: BHWS Sampling
 Chain of Custody No.: 21802

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
MW-B7	2013-08-21	340142	pH	6.65	SU	N/A	2013-08-22	APHA 4500 AB MOD
			Phenolics	0.006	mg/L	0.004	2013-08-28	HACH 8047
			Potassium	13.0	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	295	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted
MW-B3	2013-08-21	340143	Alkalinity (CaCO ₃)	255	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	0.07	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	183	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	1180	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO ₃)	546	mg/LCaCO ₃	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	21.6	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	7.18	SU	N/A	2013-08-22	APHA 4500 AB MOD
			Phenolics	0.025	mg/L	0.004	2013-08-28	HACH 8047
			Potassium	4.7	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	128	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted
MW-B1	2013-08-21	340144	Alkalinity (CaCO ₃)	363	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	192	mg/L	11	2013-08-26	EPA 6010C
			Conductivity	2920	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO ₃)	551	mg/LCaCO ₃	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	17.3	mg/L	0.2	2013-08-26	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted

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Nilou Ghazi, Ph.D., P.Eng.
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Work Order No.: 2509907
 Received : 2013-08-22
 PO Number:
 Reported: 2013-09-03
 Project Name: BHWS Sampling
 Chain of Custody No.: 21802

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
W-B1	2013-08-21	340144	pH	7.14	SU	N/A	2013-08-22	APHA 4500 A,B MOD
			Phenolics	<0.004	mg/L	0.004	2013-08-28	HACH 8047
			Potassium	10.1	mg/L	3.0	2013-08-26	EPA 6010C
			Sodium	516	mg/L	50.0	2013-08-26	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted
FIELD BLANK #1	2013-08-21	340145	Alkalinity (CaCO3)	<2.00	mg/LCaCO3	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	<0.11	mg/L	0.11	2013-08-26	EPA 6010C
			Conductivity	6	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO3)	<0.36	mg/LCaCO3	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	<0.02	mg/L	0.02	2013-08-26	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	5.26	SU	N/A	2013-08-22	APHA 4500 A,B MOD
			Phenolics	<0.004	mg/L	0.004	2013-08-28	HACH 8047
			Potassium	<0.30	mg/L	0.30	2013-08-26	EPA 6010C
			Sodium	<0.500	mg/L	0.500	2013-08-26	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted
DUP A	2013-08-21	340146	Alkalinity (CaCO3)	442	mg/LCaCO3	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	8.17	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	225	mg/L	11	2013-08-26	EPA 6010C
			Conductivity	2020	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO3)	638	mg/LCaCO3	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	18.6	mg/L	0.2	2013-08-26	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 3 of 9

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Work Order No.: 2509907
Received : 2013-08-22
PO Number:
Reported: 2013-09-03
Project Name: BHWS Sampling
Chain of Custody No.: 21802

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
DUP A	2013-08-21	340146	pH	6.76	SU	N/A	2013-08-22	APHA 4500 A.B MOD
			Phenolics	0.007	mg/L	0.004	2013-08-28	HACH 8047
			Potassium	11.9	mg/L	3.0	2013-08-26	EPA 6010C
			Sodium	299	mg/L	50.0	2013-08-26	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 4 of 9

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Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

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Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
Christi Groves
121 Commerce Park Drive, Unit L
Barrie
L4N 8X1
Tel: 705-722-4492

Fax:
Email: cgroves@golder.com

Work Order No.: 2509907
Received : 2013-08-22
PO Number:
Reported: 2013-09-03
Project Name: BHWS Sampling
Chain of Custody No.: 21802

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
TRIP BLANK	2013-08-21	340156	Alkalinity (CaCO ₃)	<2.00	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-28	Subcontracted
			Calcium	<0.11	mg/L	0.11	2013-08-26	EPA 6010C
			Conductivity	7	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-08-29	Subcontracted
			Hardness (CaCO ₃)	<0.36	mg/LCaCO ₃	0.06	2013-09-03	APHA 2340B (Calc)
			Magnesium	<0.02	mg/L	0.02	2013-08-26	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 8 of 9

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
Results relate only to items tested.



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Project Name: BHWS Sampling
Chain of Custody No.: 21802

Client Sample ID	Sample		Parameter	Result	Unit	RDL	Date	Method
	Date	Lab ID					Analyzed	
TRIP BLANK	2013-08-21	340156	pH	5.42	SU	N/A	2013-08-22	APHA 4500 A.B MOD
			Phenolics	<0.004	mg/L	0.004	2013-08-26	HACH 8047
			Potassium	<0.30	mg/L	0.30	2013-08-26	EPA 6010C
			Sodium	<0.500	mg/L	0.500	2013-08-26	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-26	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

Page 9 of 9

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Results relate only to items tested.

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REPORT No. B13-22043 (I)

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

					Client I.D.	340141-MW B23	340142-MW B7	340143-MW B3	340144-MW B1
					Sample I.D.	B13-22043-5	B13-22043-6	B13-22043-7	B13-22043-8
					Date Collected	21-Aug-13	21-Aug-13	21-Aug-13	21-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed					
Cyanide (Free)	mg/L	0.005	SM 4500CN	23-Aug-13/K	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
o-Phosphate (P)	mg/L	0.01	PE4500-S	28-Aug-13/K	0.05	0.07	0.05	0.05	0.02
Fluoride	mg/L	0.1	SM4110C	26-Aug-13/O	0.2	0.2	0.2	0.2	0.2
Nitrite (N)	mg/L	0.1	SM4110C	26-Aug-13/O	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nitrate (N)	mg/L	0.1	SM4110C	26-Aug-13/O	< 0.1	< 0.1	3.9	7.3	7.3
Bromide	mg/L	0.4	SM4110C	26-Aug-13/O	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chloride	mg/L	0.5	SM4110C	26-Aug-13/O	921	541	242	959	959
Sulphate	mg/L	1	SM4110C	26-Aug-13/O	< 1	1	24	79	79
Antimony	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Arsenic	µg/L	0.1	EPA 200.8	27-Aug-13/O	0.4	1.3	0.2	0.2	0.2
Barium	µg/L	1	SM 3120	26-Aug-13/O	202	241	141	210	210
Beryllium	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Boron	µg/L	5	SM 3120	26-Aug-13/O	32	128	< 5	50	50
Cadmium	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 0.02	< 0.02	0.05	0.02	0.02
Chromium	µg/L	2	SM 3120	26-Aug-13/O	< 2	< 2	< 2	< 2	< 2
Chromium (VI)	µg/L	10	MOEE 3056	27-Aug-13/O	< 10	< 10	< 10	< 10	< 10
Cobalt	µg/L	0.1	EPA 200.8	27-Aug-13/O	0.7	0.3	0.1	0.1	0.1
Copper	µg/L	2	SM 3120	26-Aug-13/O	< 2	< 2	< 2	< 2	< 2
Iron	mg/L	0.005	SM 3120	26-Aug-13/O	3.34	27.8	0.025	0.011	0.011
Lead	µg/L	0.02	EPA 200.8	27-Aug-13/O	0.10	0.19	0.28	0.10	0.10
Mercury	µg/L	0.02	SM 3112B	27-Aug-13/R	< 0.02	0.15	< 0.02	< 0.02	< 0.02
Molybdenum	µg/L	0.1	EPA 200.8	27-Aug-13/O	0.1	< 0.1	0.1	0.4	0.4
Nickel	µg/L	10	SM 3120	26-Aug-13/O	< 10	< 10	< 10	< 10	< 10
Selenium	µg/L	1	EPA 200.8	27-Aug-13/O	< 1	< 1	< 1	< 1	< 1
Silver	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Thallium	µg/L	0.05	EPA 200.8	27-Aug-13/O	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Uranium	µg/L	0.05	EPA 200.8	27-Aug-13/O	0.08	< 0.05	0.51	0.39	0.39
Vanadium	µg/L	0.1	EPA 200.8	27-Aug-13/O	1.5	2.2	1.7	1.9	1.9

SB

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Scott Burrows

Acting Lab Manager

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REPORT No. B13-22043 (i)

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360 York Rd #10,

NOTL ON LOS 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	340141-MW B23	340142-MW B7	340143-MW B3	340144-MW B1
Sample I.D.	B13-22043-5	B13-22043-6	B13-22043-7	B13-22043-8
Date Collected	21-Aug-13	21-Aug-13	21-Aug-13	21-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Zinc	µg/L	5	SM 3120	26-Aug-13/O	< 5	< 5	8	< 5

1. Chromium (VI) result is based on total chromium

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M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	340145-Field Blank #1	340146-Dup A
			Sample I.D.	B13-22043-9	B13-22043-10
			Date Collected	21-Aug-13	21-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	
Cyanide (Free)	mg/L	0.005	SM 4500CN	23-Aug-13/K	< 0.005
o-Phosphate (P)	mg/L	0.01	PE4500-S	28-Aug-13/K	< 0.01
Fluoride	mg/L	0.1	SM4110C	26-Aug-13/O	0.06
Nitrite (N)	mg/L	0.1	SM4110C	26-Aug-13/O	0.2
Nitrate (N)	mg/L	0.1	SM4110C	26-Aug-13/O	< 0.1
Bromide	mg/L	0.4	SM4110C	26-Aug-13/O	< 0.1
Chloride	mg/L	0.5	SM4110C	26-Aug-13/O	< 0.4
Sulphate	mg/L	1	SM4110C	26-Aug-13/O	< 0.5
Antimony	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 1
Arsenic	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Barium	µg/L	1	SM 3120	26-Aug-13/O	< 0.1
Beryllium	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Boron	µg/L	5	SM 3120	26-Aug-13/O	< 0.1
Cadmium	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 5
Chromium	µg/L	2	SM 3120	26-Aug-13/O	< 0.02
Chromium (VI)	µg/L	10	MOEE 3056	27-Aug-13/O	< 2
Cobalt	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 10
Copper	µg/L	2	SM 3120	26-Aug-13/O	< 0.1
Iron	mg/L	0.005	SM 3120	26-Aug-13/O	< 2
Lead	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 0.005
Mercury	µg/L	0.02	SM 3112B	27-Aug-13/R	< 0.02
Molybdenum	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.02
Nickel	µg/L	10	SM 3120	26-Aug-13/O	< 0.1
Selenium	µg/L	1	EPA 200.8	27-Aug-13/O	< 10
Silver	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 1
Thallium	µg/L	0.05	EPA 200.8	27-Aug-13/O	< 0.02
Uranium	µg/L	0.05	EPA 200.8	27-Aug-13/O	< 0.05
Vanadium	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.05

SB

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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Fax: 613-544-2770

DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	340145-Field Blank #1	340146-Dup A
Sample I.D.	B13-22043-9	B13-22043-10
Date Collected	21-Aug-13	21-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed		
Zinc	µg/L	5	SM 3120	26-Aug-13/O	< 5	7

1 Chromium (VI) result is based on total chromium

SB —————

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	M.D.L.	Client I.D.	
			Sample I.D.	
			Date Collected	
			Reference Method	Date/Site Analyzed
Cyanide (Free)	mg/L	0.005	SM 4500CN	23-Aug-13/K
o-Phosphate (P)	mg/L	0.01	PE4500-S	28-Aug-13/K
Fluoride	mg/L	0.1	SM4110C	26-Aug-13/O
Nitrite (N)	mg/L	0.1	SM4110C	26-Aug-13/O
Nitrate (N)	mg/L	0.1	SM4110C	26-Aug-13/O
Bromide	mg/L	0.4	SM4110C	26-Aug-13/O
Chloride	mg/L	0.5	SM4110C	26-Aug-13/O
Sulphate	mg/L	1	SM4110C	26-Aug-13/O
Antimony	µg/L	0.1	EPA 200.8	27-Aug-13/O
Arsenic	µg/L	0.1	EPA 200.8	27-Aug-13/O
Barium	µg/L	1	SM 3120	26-Aug-13/O
Beryllium	µg/L	0.1	EPA 200.8	27-Aug-13/O
Boron	µg/L	5	SM 3120	26-Aug-13/O
Cadmium	µg/L	0.02	EPA 200.8	27-Aug-13/O
Chromium	µg/L	2	SM 3120	26-Aug-13/O
Chromium (VI)	µg/L	10	MOEE 3056	27-Aug-13/O
Cobalt	µg/L	0.1	EPA 200.8	27-Aug-13/O
Copper	µg/L	2	SM 3120	26-Aug-13/O
Iron	mg/L	0.005	SM 3120	26-Aug-13/O
Lead	µg/L	0.02	EPA 200.8	27-Aug-13/O
Mercury	µg/L	0.02	SM 3112B	27-Aug-13/R
Molybdenum	µg/L	0.1	EPA 200.8	27-Aug-13/O
Nickel	µg/L	10	SM 3120	26-Aug-13/O
Selenium	µg/L	1	EPA 200.8	27-Aug-13/O
Silver	µg/L	0.02	EPA 200.8	27-Aug-13/O
Thallium	µg/L	0.05	EPA 200.8	27-Aug-13/O
Uranium	µg/L	0.05	EPA 200.8	27-Aug-13/O
Vanadium	µg/L	0.1	EPA 200.8	27-Aug-13/O

SB

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Scott Burrows

Acting Lab Manager

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Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.

Sample I.D.

Date Collected

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
Zinc	µg/L	5	SM 3120	26-Aug-13/O

1 Chromium (VI) result is based on total chromium

SB —————

M.D.L. = Method Detection Limit

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DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.		340156-Trip
			Sample I.D.		Blank
			Date Collected		B13-22043-20
					21-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	
Cyanide (Free)	mg/L	0.005	SM 4500CN	23-Aug-13/K	< 0.005
o-Phosphate (P)	mg/L	0.01	PE4500-S	28-Aug-13/K	< 0.01
Fluoride	mg/L	0.1	SM4110C	26-Aug-13/O	0.2
Nitrite (N)	mg/L	0.1	SM4110C	26-Aug-13/O	< 0.1
Nitrate (N)	mg/L	0.1	SM4110C	26-Aug-13/O	0.1
Bromide	mg/L	0.4	SM4110C	26-Aug-13/O	< 0.4
Chloride	mg/L	0.5	SM4110C	26-Aug-13/O	< 0.5
Sulphate	mg/L	1	SM4110C	26-Aug-13/O	< 1
Antimony	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Arsenic	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Barium	µg/L	1	SM 3120	26-Aug-13/O	< 1
Beryllium	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Boron	µg/L	5	SM 3120	26-Aug-13/O	< 5
Cadmium	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 0.02
Chromium	µg/L	2	SM 3120	26-Aug-13/O	< 2
Chromium (VI)	µg/L	10	MOEE 3056	27-Aug-13/O	< 10
Cobalt	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Copper	µg/L	2	SM 3120	26-Aug-13/O	< 2
Iron	mg/L	0.005	SM 3120	26-Aug-13/O	< 0.005
Lead	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 0.02
Mercury	µg/L	0.02	SM 3112B	27-Aug-13/R	< 0.02
Molybdenum	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1
Nickel	µg/L	10	SM 3120	26-Aug-13/O	< 10
Selenium	µg/L	1	EPA 200.8	27-Aug-13/O	< 1
Silver	µg/L	0.02	EPA 200.8	27-Aug-13/O	< 0.02
Thallium	µg/L	0.05	EPA 200.8	27-Aug-13/O	< 0.05
Uranium	µg/L	0.05	EPA 200.8	27-Aug-13/O	< 0.05
Vanadium	µg/L	0.1	EPA 200.8	27-Aug-13/O	0.2

340156-Trip
Blank
B13-22043-20
21-Aug-13

SB

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Scott Burrows

Acting Lab Manager

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Tel: 613-544-2001

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DATE REPORTED: 30-Aug-13

SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:

P.O. NUMBER: 2509907

WATERWORKS NO.

Client I.D.

Sample I.D.

Date Collected

340156-Trip

Blank

B13-22043-20

21-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
Zinc	µg/L	5	SM 3120	26-Aug-13/O

< 5

1. Chromium (VI) result is based on total chromium

SB —————

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	3
			Sample I.D.	E
			Date Collected	
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
Cyanide (Free)	mg/L	0.005	SM 4500CN	23-Aug-13/K
o-Phosphate (P)	mg/L	0.01	PE4500-S	28-Aug-13/K
Fluoride	mg/L	0.1	SM4110C	26-Aug-13/O
Nitrite (N)	mg/L	0.1	SM4110C	26-Aug-13/O
Nitrate (N)	mg/L	0.1	SM4110C	26-Aug-13/O
Bromide	mg/L	0.4	SM4110C	26-Aug-13/O
Chloride	mg/L	0.5	SM4110C	26-Aug-13/O
Sulphate	mg/L	1	SM4110C	26-Aug-13/O
Antimony	µg/L	0.1	EPA 200.8	27-Aug-13/O
Arsenic	µg/L	0.1	EPA 200.8	27-Aug-13/O
Barium	µg/L	1	SM 3120	26-Aug-13/O
Beryllium	µg/L	0.1	EPA 200.8	27-Aug-13/O
Boron	µg/L	5	SM 3120	26-Aug-13/O
Cadmium	µg/L	0.02	EPA 200.8	27-Aug-13/O
Chromium	µg/L	2	SM 3120	26-Aug-13/O
Chromium (VI)	µg/L	10	MOEE 3056	27-Aug-13/O
Cobalt	µg/L	0.1	EPA 200.8	27-Aug-13/O
Copper	µg/L	2	SM 3120	26-Aug-13/O
Iron	mg/L	0.005	SM 3120	26-Aug-13/O
Lead	µg/L	0.02	EPA 200.8	27-Aug-13/O
Mercury	µg/L	0.02	SM 3112B	27-Aug-13/R
Molybdenum	µg/L	0.1	EPA 200.8	27-Aug-13/O
Nickel	µg/L	10	SM 3120	26-Aug-13/O
Selenium	µg/L	1	EPA 200.8	27-Aug-13/O
Silver	µg/L	0.02	EPA 200.8	27-Aug-13/O
Thallium	µg/L	0.05	EPA 200.8	27-Aug-13/O
Uranium	µg/L	0.05	EPA 200.8	27-Aug-13/O
Vanadium	µg/L	0.1	EPA 200.8	27-Aug-13/O
Zinc	µg/L	5	SM 3120	26-Aug-13/O

SB —————

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Scott Burrows
Acting Lab Manager

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: ---

REPORT No. B13-22043 (I)

Report To:

E3 Labs Inc.

360 York Rd #10,

NOTL ON LOS 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 23-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 30-Aug-13

P.O. NUMBER: 2509907

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.

Sample I.D.

Date Collected

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
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1 Chromium (VI) result is based on total chromium

SB —————

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Scott Burrows

Acting Lab Manager

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E3 Laboratories Inc.
 SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0
 Email: info@e3labs.ca
 Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
 Christi Groves
 121 Commerce Park Drive, Unit L
 Barrie
 L4N 8X1
 Tel: 705-722-4492

Fax:
 Email: cgroves@golder.com

Work Order No.: 2509825
 Received : 2013-08-21
 PO Number:
 Reported: 2013-08-29
 Project Name: BHWS Sampling
 Chain of Custody No.: 21801

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
MW-B2	2013-08-20	339912	Alkalinity (CaCO ₃)	559	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	13.5	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-27	Subcontracted
			Calcium	203	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	1840	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1(C06-C10)	See	Attached	N/A	2013-08-23	Subcontracted
			Hardness (CaCO ₃)	577	mg/LCaCO ₃	0.06	2013-08-29	APHA 2340B (Calc)
			Magnesium	17.0	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	6.83	SU	N/A	2013-08-21	APHA 4500 A.B
			Phenolics	0.007	mg/L	0.004	2013-08-26	HACH 8047
			Potassium	13.2	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	267	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-23	Subcontracted
MW-B4	2013-08-20	339913	Alkalinity (CaCO ₃)	951	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	116	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-27	Subcontracted
			Calcium	215	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	2460	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1(C06-C10)	See	Attached	N/A	2013-08-23	Subcontracted
			Hardness (CaCO ₃)	642	mg/LCaCO ₃	0.06	2013-08-29	APHA 2340B (Calc)
			Magnesium	25.6	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	6.63	SU	N/A	2013-08-21	APHA 4500 A.B MOD
			Phenolics	0.056	mg/L	0.004	2013-08-26	HACH 8047
			Potassium	23.1	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	269	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-23	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 1 of 3

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
 Results relate only to items tested.



E3 Laboratories Inc.

SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0

Email: info@e3labs.ca

Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
Christi Groves
121 Commerce Park Drive, Unit L
Barrie
L4N 8X1
Tel: 705-722-4492

Fax:
Email: cgroves@golder.com

Work Order No.: 2509825
Received : 2013-08-21
PO Number:
Reported: 2013-08-29
Project Name: BHWS Sampling
Chain of Custody No.: 21801

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
*IW-B5	2013-08-20	339914	Alkalinity (CaCO ₃)	308	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	2.29	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-27	Subcontracted
			Calcium	123	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	1900	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1(C06-C10)	See	Attached	N/A	2013-08-23	Subcontracted
			Hardness (CaCO ₃)	349	mg/LCaCO ₃	0.06	2013-08-29	APHA 2340B (Calc)
			Magnesium	10.2	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	6.99	SU	N/A	2013-08-21	APHA 4500 A.B MOD
			Phenolics	0.006	mg/L	0.004	2013-08-26	HACH 8047
			Potassium	3.3	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	333	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-23	Subcontracted
IW-B6	2013-08-20	339915	Alkalinity (CaCO ₃)	615	mg/LCaCO ₃	2.00	2013-08-26	APHA 2320B mod
			Ammonia (Total)	36.4	mg/L	0.03	2013-08-22	APHA 4500
			Anions	See	Attached	N/A	2013-08-27	Subcontracted
			Calcium	270	mg/L	11	2013-08-23	EPA 6010C
			Conductivity	1590	uS/cm	N/A	2013-08-27	APHA 2510
			Cyanide (Free)	<0.005	mg/L	0.005	2013-08-23	Subcontracted
			Dissolved Metals	See	Attached	N/A	2013-08-27	Subcontracted
			F1(C06-C10)	See	Attached	N/A	2013-08-23	Subcontracted
			Hardness (CaCO ₃)	798	mg/LCaCO ₃	0.06	2013-08-29	APHA 2340B (Calc)
			Magnesium	30.0	mg/L	0.2	2013-08-23	EPA 6010C
			Metals	See	Attached	N/A	2013-08-27	Subcontracted
			PAHs	See	Attached	N/A	2013-08-28	Subcontracted
			pH	6.62	SU	N/A	2013-08-21	APHA 4500 A.B MOD
			Phenolics	0.018	mg/L	0.004	2013-08-26	HACH 8047
			Potassium	13.9	mg/L	3.0	2013-08-23	EPA 6010C
			Sodium	178	mg/L	50.0	2013-08-23	EPA 6010C
			VOC Scan	See	Attached	N/A	2013-08-23	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 2 of 3

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Work Order No.: 2509825

Received : 2013-08-21

PO Number:

Reported: 2013-08-29

Project Name: BHWS Sampling

Chain of Custody No.: 21801

Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.

Results relate only to items tested.

C.O.C.: ---

REPORT No. B13-21931

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Aug-13
DATE REPORTED: 29-Aug-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
P.O. NUMBER: 2509825
WATERWORKS NO.

Client I.D.	339912-MW B2	339913-MW B4	339914-MW B5	339915-MW B6
Sample I.D.	B13-21931-1	B13-21931-2	B13-21931-3	B13-21931-4
Date Collected	20-Aug-13	20-Aug-13	20-Aug-13	20-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Cyanide (Free)	mg/L	0.005	SM 4500CN	23-Aug-13/K	< 0.005	< 0.005	< 0.005	< 0.005
o-Phosphate (P)	mg/L	0.01	PE4500-S	27-Aug-13/K	0.05	0.04	0.04	0.06
Fluoride	mg/L	0.1	SM4110C	23-Aug-13/O	0.2	0.2	0.2	0.2
Nitrite (N)	mg/L	0.1	SM4110C	23-Aug-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Nitrate (N)	mg/L	0.1	SM4110C	23-Aug-13/O	< 0.1	0.1	< 0.1	< 0.1
Bromide	mg/L	0.4	SM4110C	23-Aug-13/O	0.4	0.9	< 0.4	0.6
Chloride	mg/L	0.5	SM4110C	26-Aug-13/O	396	552	547	395
lphate	mg/L	1	SM4110C	23-Aug-13/O	< 1	2	< 1	< 1
Antimony	µg/L	0.1	EPA 200.8	27-Aug-13/O	0.2	0.9	< 0.1	0.1
Arsenic	µg/L	0.1	EPA 200.8	27-Aug-13/O	3.5	4.3	3.1	1.2
Barium	µg/L	1	SM 3120	26-Aug-13/O	190	489	265	259
Beryllium	µg/L	0.1	EPA 200.8	27-Aug-13/O	< 0.1	< 0.1	< 0.1	< 0.1
Boron	µg/L	5	SM 3120	26-Aug-13/O	191	377	44	157
Cadmium	µg/L	0.02	EPA 200.8	27-Aug-13/O	0.61	0.95	0.26	0.78
Chromium	µg/L	2	SM 3120	26-Aug-13/O	< 2	7	3	4
Chromium (VI)	µg/L	10	MOEE 3056	27-Aug-13/O	< 10	< 10	< 10	< 10
Cobalt	µg/L	0.1	EPA 200.8	27-Aug-13/O	1.5	3.3	0.6	1.7
Copper	µg/L	2	SM 3120	26-Aug-13/O	2	26	17	30
Iron	mg/L	0.005	SM 3120	26-Aug-13/O	0.133	44.9	33.1	25.8
Lead	µg/L	0.02	EPA 200.8	27-Aug-13/O	55.6	66.9	1.85	6.71
Mercury	µg/L	0.02	SM 3112 B	26-Aug-13/O	0.18	0.30	< 0.02	< 0.02
Molybdenum	µg/L	0.1	EPA 200.8	27-Aug-13/O	0.9	0.7	0.2	1.9
Nickel	µg/L	10	SM 3120	26-Aug-13/O	< 10	< 10	10	10
Selenium	µg/L	1	EPA 200.8	27-Aug-13/O	< 1	2	< 1	1
Silver	µg/L	0.02	EPA 200.8	27-Aug-13/O	0.11	< 0.02	0.18	0.69
Vanadium	µg/L	0.1	EPA 200.8	27-Aug-13/O	4.9	9.8	1.6	1.3
Thallium	µg/L	0.05	EPA 200.8	27-Aug-13/O	< 0.05	< 0.05	< 0.05	< 0.05
Uranium	µg/L	0.05	EPA 200.8	27-Aug-13/O	0.36	0.48	0.14	0.39

SB

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Scott Burrows
Acting Lab Manager

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C.O.C.: ---

REPORT No. B13-21931

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Aug-13

DATE REPORTED: 29-Aug-13

SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:

P.O. NUMBER: 2509825

WATERWORKS NO.

			Client I.D.		339912-MW B2	339913-MW B4	339914-MW B5	339915-MW B6
			Sample I.D.		B13-21931-1	B13-21931-2	B13-21931-3	B13-21931-4
			Date Collected		20-Aug-13	20-Aug-13	20-Aug-13	20-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Zinc	µg/L	5	SM 3120	26-Aug-13/O	6	458	319	143
Acetone	µg/L	30	EPA 8260	23-Aug-13/R	< 30	< 30	< 30	< 30
Benzene	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	µg/L	2	EPA 8260	23-Aug-13/R	< 2	< 2	< 2	< 2
Bromoform	µg/L	5	EPA 8260	23-Aug-13/R	< 5	< 5	< 5	< 5
Bromomethane	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride	µg/L	0.2	EPA 8260	23-Aug-13/R	< 0.2	< 0.2	< 0.2	< 0.2
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform	µg/L	1	EPA 8260	23-Aug-13/R	< 1	< 1	< 1	< 1
Dibromochloromethane	µg/L	2	EPA 8260	23-Aug-13/R	< 2	< 2	< 2	< 2
Dichlorobenzene, 1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene, 1,3-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene, 1,4-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	3.1	< 0.5	< 0.5
Dichlorodifluoromethane	µg/L	2	EPA 8260	23-Aug-13/R	< 2	< 2	< 2	< 2
Dichloroethane, 1,1-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethane, 1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethylene, 1,1-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropane, 1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene 1,3- cis+trans	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	23-Aug-13/R	< 0.2	< 0.2	< 0.2	< 0.2
Hexane	µg/L	5	EPA 8260	23-Aug-13/R	< 5	< 5	< 5	< 5

SB

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Scott Burrows

Acting Lab Manager

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C.O.C.: --

REPORT No. B13-21931

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Aug-13
DATE REPORTED: 29-Aug-13
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
P.O. NUMBER: 2509825
WATERWORKS NO.

Client I.D.	339912-MW B2	339913-MW B4	339914-MW B5	339915-MW B6
Sample I.D.	B13-21931-1	B13-21931-2	B13-21931-3	B13-21931-4
Date Collected	20-Aug-13	20-Aug-13	20-Aug-13	20-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Methyl Ethyl Ketone	µg/L	20	EPA 8260	23-Aug-13/R	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	23-Aug-13/R	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether	µg/L	2	EPA 8260	23-Aug-13/R	< 2	< 2	< 2	< 2
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	23-Aug-13/R	< 5	< 5	< 5	< 5
Styrene	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane, 1,1,1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
trachloroethane, 1,1,2,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorobenzene, 1,2,4-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane, 1,1,1-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane, 1,1,2-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane	µg/L	5	EPA 8260	23-Aug-13/R	< 5	< 5	< 5	< 5
Vinyl Chloride	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p-	µg/L	1.0	EPA 8260	23-Aug-13/R	< 1.0	10.9	< 1.0	3.8
Xylene, o-	µg/L	0.5	EPA 8260	23-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p,o-	µg/L	1.1	EPA 8260	23-Aug-13/R	< 1.1	11.3	< 1.1	3.8
Dibromofluoromethane (SS)	% rec.		EPA 8260	23-Aug-13/R	96.8	91.9	99.1	95.7
Toluene-d8 (SS)	% rec.		EPA 8260	23-Aug-13/R	98	100	110	91
Bromofluorobenzene, 4(SS)	% rec.		EPA 8260	23-Aug-13/R	100	100	100	100
PHC F1 (C6-C10)	µg/L	50	MOE TPH- E3397A	23-Aug-13/R	< 50	< 50	< 50	< 50
Comment-purgeable	-		-	23-Aug-13	-	-	-	-
Acenaphthene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.78	< 0.2	0.50	< 0.3
Acenaphthylene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.41	< 0.2	0.06	< 0.3
Anthracene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.88	< 0.2	0.12	< 0.3

SB

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Scott Burrows
Acting Lab Manager

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C.O.C.: ---

REPORT No. B13-21931

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON L0S 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 22-Aug-13

DATE REPORTED: 29-Aug-13

SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:

P.O. NUMBER: 2509825

WATERWORKS NO.

			Client I.D.		339912-MW B2	339913-MW B4	339914-MW B5	339915-MW B6
			Sample I.D.		B13-21931-1	B13-21931-2	B13-21931-3	B13-21931-4
			Date Collected		20-Aug-13	20-Aug-13	20-Aug-13	20-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Benzo(a)anthracene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.98	< 0.2	0.48	0.67
Benzo(a)pyrene	µg/L	0.01	EPA 8270	28-Aug-13/K	1.55	< 0.05	0.271	0.462
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	28-Aug-13/K	1.71	< 0.2	0.42	0.62
Benzo(b+k)fluoranthene	µg/L	0.1	EPA 8270	28-Aug-13/K	2.53	< 0.5	0.53	0.82
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	28-Aug-13/K	1.09	< 0.2	0.15	0.26
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.83	< 0.2	0.12	< 0.3
Chrysene	µg/L	0.05	EPA 8270	28-Aug-13/K	1.60	0.24	0.29	0.56
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	28-Aug-13/K	< 0.3	< 0.2	< 0.05	< 0.3
Fluoranthene	µg/L	0.05	EPA 8270	28-Aug-13/K	3.83	0.34	0.72	1.39
Fluorene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.93	0.24	0.11	< 0.3
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.78	< 0.2	0.18	< 0.3
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	28-Aug-13/K	0.31	0.63	0.17	< 0.3
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	28-Aug-13/K	< 0.3	< 0.2	0.08	< 0.3
Naphthalene	µg/L	0.05	EPA 8270	28-Aug-13/K	0.31	1.71	0.39	< 0.3
Phenanthrene	µg/L	0.05	EPA 8270	28-Aug-13/K	2.69	0.58	0.50	0.56
Pyrene	µg/L	0.05	EPA 8270	28-Aug-13/K	3.46	0.34	0.64	1.08

1 Chromium (VI) result is based on total chromium

SB —————→

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Scott Burrows

Acting Lab Manager

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1
Attention: Ms. Christi Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Page 1 of 41

Dear Christi Groves:

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

Report Comments:

APPROVAL:

Lorna Wilson
Inorganic Laboratory Supervisor

APPROVAL:

Tanya Baillargeon
Organic Laboratory Team Leader

Exova (Ottawa) is certified and accredited for specific parameters by:

CALA, Canadian Association for Laboratory Accreditation (to ISO 17025), OMAF, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils), Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is accredited for specific parameters by:

SCC, Standards Council of Canada (to ISO 17025)

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

Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Christl Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

Group	Analyte	MRL	Units	Guideline	Lab ID, Sample Matrix, Sample Type, Sampling Date, Sample ID.	1022308 Groundwater 2013-04-22 MW-B1	1022309 Groundwater 2013-04-22 MW-B2	1022310 Groundwater 2013-04-22 MW-B22	1022311 Groundwater 2013-04-22 MW-B3
Calculations	Hardness as CaCO ₃	1	mg/L	OG-100		550*	572	574*	403*
Cyanide	Cyanide (free)	0.005	mg/L	MAC-0.2		<0.005	<0.005	<0.005	<0.005
General Chemistry	Alkalinity as CaCO ₃	5	mg/L	OG-500		341*	385*	591*	312
	Br	0.25	mg/L			<0.25	<0.25	<0.25	<0.25
	Cl	1	mg/L	AO-250		240	363*	310*	239
	Conductivity	5	uS/cm			1730	2160	2170	1380
	F	0.10	mg/L	MAC-1.5		<0.10	<0.10	<0.10	<0.10
	N-NO ₂	0.10	mg/L	MAC-1.0		<0.10	<0.10	<0.10	<0.10
	N-NO ₃	0.10	mg/L	MAC-10.0		2.34	<0.10	<0.10	1.59
	pH	1.00		6.5-8.5		7.39	7.21	7.24	7.75
Hydrocarbons	SO ₄	3	mg/L	AO-500		16	<3	<3	24
	F1 (C6-C10)	0.1	mg/L			<0.1	<0.1	<0.1	<0.1
	F1-BTEX (C6-C10)	0.1	mg/L			<0.1	<0.1	<0.1	<0.1
	F2 (C10-C16)	0.1	mg/L			<0.1	<0.1	<0.1	<0.1
	F3 (C16-C34)	0.2	mg/L			<0.2	0.5	0.9	<0.2
	F4 (C34-C50)	0.2	mg/L			<0.2	0.3	0.5	<0.2
Mercury	Hg	0.0001	mg/L	MAC-0.001		<0.0001	<0.0001	<0.0001	<0.0001
Metals	Ag	0.0001	mg/L			<0.0001	<0.0001	<0.0001	<0.0001
	As	0.001	mg/L	IMAC-0.025		<0.001	0.003	<0.01	<0.001
	B	0.01	mg/L	IMAC-5.0		0.04	0.24	0.24	<0.01
	Ba	0.01	mg/L	MAC-1.0		0.16	0.32	0.34	0.13
	Be	0.0005	mg/L			<0.0005	<0.0005	<0.0005	<0.0005
	Ca	1	mg/L			194	201	202	135
	Cd	0.0001	mg/L	MAC-0.005		<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L			0.0049	0.0020	0.0019	0.0004

Guideline = ODWSOG

Y

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022308 Groundwater 2013-04-22 MW-B1	1022309 Groundwater 2013-04-22 MW-B2	1022310 Groundwater 2013-04-22 MW-B22	1022311 Groundwater 2013-04-22 MW-B3
Metals	Cr	0.001	mg/L	MAC-0.05	0.005	0.008	0.008	0.003
	Cu	0.001	mg/L	AO-1.0	0.002	<0.001	<0.001	0.002
	Fe	0.03	mg/L	AO-0.3	1.62*	34.6*		<0.03
		0.3	mg/L	AO-0.3			33.3*	
	K	1	mg/L		6	12	12	2
	Mg	1	mg/L		16	17	17	16
	Mo	0.005	mg/L		<0.005	<0.005	<0.005	<0.005
	Na	2	mg/L	AO-200	154	232*	232*	144
	Ni	0.005	mg/L		<0.005	<0.005	<0.005	<0.005
	Pb	0.001	mg/L	MAC-0.010	<0.001	<0.001	<0.001	<0.001
Nutrients	Sb	0.0005	mg/L	IMAC-0.006	<0.0005	<0.0005	<0.0005	<0.0005
	Se	0.001	mg/L	MAC-0.01	<0.001	0.001	<0.001	<0.001
	Ti	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
	U	0.001	mg/L	MAC-0.02	<0.001	<0.001	<0.001	<0.001
	V	0.001	mg/L		0.002	0.005	0.004	0.001
	Zn	0.01	mg/L	AO-5.0	<0.01	<0.01	<0.01	<0.01
	N-NH3	0.02	mg/L		1.86	13.6	13.4	0.04
Semi-Volatiles	Phenols	0.001	mg/L		<0.005	<0.001	<0.001	<0.001
	PO4 as P	0.005	mg/L					
	1-methylnaphthalene	0.01	mg/L		<0.01	<0.01	<0.01	<0.01
		0.1	ug/L		<0.1		0.8	<0.1
	2-methylnaphthalene	0.5	ug/L			1.4		
		0.1	ug/L		<0.1		0.7	<0.1
	Acenaphthene	0.5	ug/L			1.3		
		0.1	ug/L		<0.1		0.8	<0.1
		0.5	ug/L			1.7		

Guideline = odwsog

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Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022308 Groundwater 2013-04-22 MW-B1	1022309 Groundwater 2013-04-22 MW-B2	1022310 Groundwater 2013-04-22 MW-B22	1022311 Groundwater 2013-04-22 MW-B3
Semi-Volatiles	Acenaphthylene	0.1	ug/L			<0.1		<0.1	<0.1
		0.5	ug/L				<0.5		
	Anthracene	0.1	ug/L			<0.1		0.1	<0.1
		0.5	ug/L				1.2		
	Benzo(a)anthracene	0.1	ug/L			<0.1		<0.1	<0.1
		0.5	ug/L				2.6		
	Benzo(a)pyrene	0.01	ug/L	MAC-0.01		<0.01		0.02*	<0.01
		0.05	ug/L	MAC-0.01			2.69*		
	Benzo(b)fluoranthene	0.05	ug/L			<0.05		<0.05	<0.05
		0.2	ug/L				2.4		
	Benzo(g,h,i)perylene	0.1	ug/L			<0.1		<0.1	<0.1
		0.5	ug/L				1.7		
	Benzo(k)fluoranthene	0.05	ug/L			<0.05		<0.05	<0.05
		0.2	ug/L				2.2		
	Chrysene	0.05	ug/L			<0.05		<0.05	<0.05
		0.2	ug/L				2.6		
	Dibenzo(a,h)anthracene	0.1	ug/L			<0.1		<0.1	<0.1
		0.5	ug/L				<0.5		
	Fluoranthene	0.1	ug/L			<0.1		0.3	<0.1
		0.5	ug/L				6.6		
	Fluorene	0.1	ug/L			<0.1		0.5	<0.1
		0.5	ug/L				1.2		
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L			<0.1		<0.1	<0.1
		0.5	ug/L				1.7		
	Naphthalene	0.1	ug/L			<0.1		14.2	<0.1
		0.5	ug/L				24.4		

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Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab ID, Sample Matrix Sample Type Sampling Date Sample ID, Guideline	1022308 Groundwater 2013-04-22 MW-B1	1022309 Groundwater 2013-04-22 MW-B2	1022310 Groundwater 2013-04-22 MW-B22	1022311 Groundwater 2013-04-22 MW-B3
Semi-Volatiles	Phenanthrene	0.1	ug/L		<0.1		1.0	<0.1
	Pyrene	0.5	ug/L		<0.1	5.6	0.3	<0.1
Subcontract		0.1	ug/L			6.2		
		0.5	ug/L					
	Cr(III)	0.005	mg/L		<0.005	<0.005	<0.005	<0.005
	Cr(VI)	0.0005	mg/L		<0.0005	<0.0005	<0.0005	<0.0005
	1,1,1,2-tetrachloroethane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	1,1,1-trichloroethane	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	1,1,2-trichloroethane	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethylene	0.5	ug/L	MAC-14	<0.5	<0.5	<0.5	<0.5
	1,2,4-trichlorobenzene	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	1,2-dibromoethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	1,2-dichlorobenzene	0.4	ug/L	MAC-200	<0.4	<0.4	<0.4	<0.4
	1,2-dichloroethane	0.2	ug/L	IMAC-5	<0.2	<0.2	<0.2	<0.2
	1,2-dichloroethane-d4	1	%		106	106	107	105
	1,2-dichloropropane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
VOCs	1,3,5-trimethylbenzene	0.3	ug/L		<0.3	1.5	0.6	<0.3
	1,3-dichlorobenzene	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	1,4-dichlorobenzene	0.4	ug/L	MAC-5	<0.4	<0.4	<0.4	<0.4
	2-Hexanone (MBK)	10	ug/L		<10	<10	<10	<10
	4-bromofluorobenzene	1	%		104	103	103	104
	Acetone	50	ug/L		<50	<50	<50	<50
	Benzene	0.5	ug/L	MAC-5	<0.5	<0.5	<0.5	<0.5
	Bromodichloromethane	0.3	ug/L		<0.3	<0.3	<0.3	<0.3

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Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022308 Groundwater 2013-04-22 MW-B1	1022309 Groundwater 2013-04-22 MW-B2	1022310 Groundwater 2013-04-22 MW-B22	1022311 Groundwater 2013-04-22 MW-B3
VOCs	Bromoform	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	Bromomethane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	c-1,3-Dichloropropylene	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Carbon Tetrachloride	0.2	ug/L	MAC-5	<0.2	<0.2	<0.2	<0.2
	Chloroethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Chloroform	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Chloromethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Dibromochloromethane	0.3	ug/L		<0.3	<0.3	<0.3	<0.3
	Dichlorodifluoromethane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Dichloromethane	4.0	ug/L	MAC-50	<4.0	<4.0	<4.0	<4.0
	Ethylbenzene	0.5	ug/L	AO-2.4	<0.5	<0.5	<0.5	<0.5
	Hexane	5	ug/L		<5	<5	<5	<5
	m/p-xylene	0.5	ug/L		<0.5	2.0	2.0	<0.5
	Methyl Ethyl Ketone (MEK)	10	ug/L		<10	<10	<10	<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L		<10	<10	<10	<10
	Methyl Tert Butyl Ether (MTBE)	10	ug/L		<10	<10	<10	<10
	Monochlorobenzene	0.2	ug/L	MAC-80	<0.2	0.2	<0.2	<0.2
	o-xylene	0.5	ug/L		<0.5	0.6	0.5	<0.5
	Styrene	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	t-1,2-Dichloroethylene	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	t-1,3-Dichloropropylene	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Tetrachloroethylene	0.3	ug/L	MAC-30	<0.3	<0.3	<0.3	<0.3
	Toluene	0.5	ug/L	AO-24	<0.5	<0.5	<0.5	<0.5
	Toluene-d8	1	%		93	93	96	93
	Trichloroethylene	0.3	ug/L	MAC-5	<0.3	<0.3	<0.3	<0.3

Guideline = ODWSOG

Y

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

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

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christli Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022308 Groundwater 2013-04-22 MW-B1	1022309 Groundwater 2013-04-22 MW-B2	1022310 Groundwater 2013-04-22 MW-B22	1022311 Groundwater 2013-04-22 MW-B3
VOCs	Trichlorofluoromethane	0.5	ug/L	MAC-2 AO-300	<0.5	<0.5	<0.5	<0.5
	Vinyl Chloride	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Xylene: total	1.0	ug/L		<1.0	2.6	2.5	<1.0
Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022312 Groundwater 2013-04-22 MW-B4	1022313 Groundwater 2013-04-22 MW-B5	1022314 Groundwater 2013-04-22 MW-B6	1022315 Groundwater 2013-04-22 MW-B7
Calculations	Hardness as CaCO3	1	mg/L	OG-100 MAC-0.2 OG-500 AO-250 MAC-1.5 MAC-1.0 MAC-10.0 6.5-8.5 AO-500	692*	415*	806*	540*
	Cyanide (free)	0.005	mg/L		<0.005	<0.005	<0.005	<0.005
	Alkalinity as CaCO3	5	mg/L		948*	299	551*	442
	Br	0.25	mg/L		<0.25	<0.25	<0.25	<0.25
	Cl	1	mg/L		558*	567*	423*	483*
	Conductivity	5	uS/cm		3500	2370	2290	2410
	F	0.10	mg/L		<0.10	<0.10	<0.10	<0.10
	N-NO2	0.10	mg/L		<0.10	<0.10	<0.10	<0.10
	N-NO3	0.10	mg/L		<0.10	<0.10	<0.10	<0.10
	pH	1.00			7.11	7.54	7.16	7.23
Hydrocarbons	SO4	3	mg/L		11	<3	<3	<3
	F1 (C6-C10)	0.1	mg/L		<0.1	<0.1	<0.1	<0.1
	F1-BTEX (C6-C10)	0.1	mg/L		<0.1	<0.1	<0.1	<0.1
	F2 (C10-C16)	0.1	mg/L		<0.1	<0.1	<0.1	<0.1
	F3 (C16-C34)	0.2	mg/L		0.7	<0.2	0.7	0.4
	F4 (C34-C50)	0.2	mg/L		0.2	<0.2	0.5	<0.2

Guideline = odwSOG

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Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Christl Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022312 Groundwater 2013-04-22 MW-B4	1022313 Groundwater 2013-04-22 MW-B5	1022314 Groundwater 2013-04-22 MW-B6	1022315 Groundwater 2013-04-22 MW-B7
Mercury Metals	Hg	0.0001	mg/L	MAC-0.001		<0.0001	<0.0001	<0.0001	<0.0001
	Ag	0.0001	mg/L			<0.0001	<0.0001	<0.0001	<0.0001
	As	0.001	mg/L	IMAC-0.025				<0.001	
		0.01	mg/L	IMAC-0.025		<0.01			<0.01
	B	0.01	mg/L	IMAC-5.0		0.34	0.02	0.10	0.13
	Ba	0.01	mg/L	MAC-1.0		0.35	0.14	0.11	0.21
	Be	0.0005	mg/L			<0.0005	<0.0005	<0.0005	<0.0005
	Ca	1	mg/L			241	143	275	190
	Cd	0.0001	mg/L	MAC-0.005		<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L			0.0035	0.0015	0.0026	0.0008
	Cr	0.001	mg/L	MAC-0.05		0.007	0.003	0.010	0.005
	Cu	0.001	mg/L	MAC-0.05					
	Fe	0.3	mg/L	AO-1.0		<0.001	<0.001	<0.001	<0.001
				AO-0.3		58.8*	19.5*	23.5*	34.9*
	K	1	mg/L			17	2	7	10
	Mg	1	mg/L			22	14	29	16
	Mo	0.005	mg/L			<0.005	<0.005	<0.005	<0.005
	Na	2	mg/L	AO-200		293*	318*	78	301*
	Ni	0.005	mg/L			<0.005	<0.005	<0.005	<0.005
	Pb	0.001	mg/L	MAC-0.010		<0.001	<0.001	<0.001	<0.001
	Sb	0.0005	mg/L	IMAC-0.006		<0.0005	<0.0005	<0.0005	<0.0005
	Se	0.001	mg/L	MAC-0.01		<0.001	<0.001	<0.01	<0.001
		0.01	mg/L	MAC-0.01					
	Tl	0.0001	mg/L			<0.0001	<0.0001	<0.0001	<0.0001
	U	0.001	mg/L	MAC-0.02		<0.001	<0.001	<0.001	<0.001
	V	0.001	mg/L				0.001	0.005	0.002

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab ID, Sample Matrix Sample Type Sampling Date Sample ID, Guideline	1022312 Groundwater 2013-04-22 MW-B4	1022313 Groundwater 2013-04-22 MW-B5	1022314 Groundwater 2013-04-22 MW-B6	1022315 Groundwater 2013-04-22 MW-B7
Metals	V	0.005	mg/L		<0.005			
	Zn	0.01	mg/L	AO-5.0	<0.01	0.06	<0.01	<0.01
Nutrients	N-NH3	0.02	mg/L			2.20	18.8	7.87
		2.0	mg/L		123			
	Phenols	0.001	mg/L		<0.001			
		0.01	mg/L			<0.01	<0.01	<0.01
	PO4 as P	0.01	mg/L		<0.01	<0.01	0.02	<0.01
Semi-Volatiles	1-methylnaphthalene	0.1	ug/L		0.4	<0.1	0.1	<0.1
	2-methylnaphthalene	0.1	ug/L		<0.1	<0.1	0.2	<0.1
	Acenaphthene	0.1	ug/L		<0.1	0.1	<0.1	0.5
	Acenaphthylene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Anthracene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Benzo(a)anthracene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Benzo(a)pyrene	0.01	ug/L	MAC-0.01	<0.01	<0.01	<0.01	<0.01
	Benzo(b)fluoranthene	0.05	ug/L		<0.05	<0.05	<0.05	<0.05
	Benzo(g,h,i)perylene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Benzo(k)fluoranthene	0.05	ug/L		<0.05	<0.05	<0.05	<0.05
	Chrysene	0.05	ug/L		<0.05	<0.05	<0.05	<0.05
	Dibenzo(a,h)anthracene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Fluoranthene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Fluorene	0.1	ug/L		<0.1	<0.1	<0.1	0.2
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Naphthalene	0.1	ug/L		2.4	0.2	0.5	<0.1
	Phenanthrene	0.1	ug/L		0.1	<0.1	0.3	0.3
	Pyrene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
Subcontract	Cr(III)	0.005	mg/L		0.006	<0.005	<0.005	<0.005

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
LAN 8X1
Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022312 Groundwater 2013-04-22 MW-B4	1022313 Groundwater 2013-04-22 MW-B5	1022314 Groundwater 2013-04-22 MW-B6	1022315 Groundwater 2013-04-22 MW-B7
VOCs	1,1,1,2-tetrachloroethane	0.0005	mg/L			<0.0005	<0.0005	<0.0005	<0.0005
	1,1,1-trichloroethane	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	1,1,1-trichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	1,1,2-trichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethylene	0.5	ug/L	MAC-14		<0.5	<0.5	<0.5	<0.5
	1,2,4-trichlorobenzene	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	1,2-dibromoethane	0.2	ug/L			<0.2	<0.2	<0.2	<0.2
	1,2-dichlorobenzene	0.4	ug/L	MAC-200		<0.4	<0.4	<0.4	<0.4
	1,2-dichloroethane	0.2	ug/L	IMAC-5		<0.2	<0.2	<0.2	<0.2
	1,2-dichloroethane-d4	1	%			105	105	106	101
	1,2-dichloropropane	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	1,3,5-trimethylbenzene	0.3	ug/L			1.2	<0.3	0.3	<0.3
	1,3-dichlorobenzene	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	1,4-dichlorobenzene	0.4	ug/L	MAC-5		2.1	<0.4	0.4	<0.4
	2-Hexanone (MBK)	10	ug/L			<10	<10	<10	<10
	4-bromofluorobenzene	1	%			101	102	101	102
	Acetone	50	ug/L			<50	<50	<50	<50
	Benzene	0.5	ug/L	MAC-5		4.3	<0.5	1.6	<0.5
	Bromodichloromethane	0.3	ug/L			<0.3	<0.3	<0.3	<0.3
	Bromoform	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	Bromomethane	0.5	ug/L			<0.5	<0.5	<0.5	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L			<0.4	<0.4	<0.4	<0.4
	c-1,3-Dichloropropylene	0.2	ug/L			<0.2	<0.2	<0.2	<0.2
	Carbon Tetrachloride	0.2	ug/L	MAC-5		<0.2	<0.2	<0.2	<0.2

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022312 Groundwater 2013-04-22 MW-B4	1022313 Groundwater 2013-04-22 MW-B5	1022314 Groundwater 2013-04-22 MW-B6	1022315 Groundwater 2013-04-22 MW-B7
VOCs	Chloroethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Chloroform	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Chloromethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Dibromochloromethane	0.3	ug/L		<0.3	<0.3	<0.3	<0.3
	Dichlorodifluoromethane	0.5	ug/L		0.9	<0.5	<0.5	<0.5
	Dichloromethane	4.0	ug/L	MAC-50	<4.0	<4.0	<4.0	<4.0
	Ethylbenzene	0.5	ug/L	AO-2.4	<0.5	<0.5	<0.5	<0.5
	Hexane	5	ug/L		<5	<5	<5	<5
	m/p-xylene	0.5	ug/L		9.9	<0.5	7.5	<0.5
	Methyl Ethyl Ketone (MEK)	10	ug/L		<10	<10	<10	<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L		<10	<10	<10	<10
	Methyl Tert Butyl Ether (MTBE)	10	ug/L		<10	<10	<10	<10
	Monochlorobenzene	0.2	ug/L	MAC-80	1.7	<0.2	0.3	<0.2
	o-xylene	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Styrene	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	t-1,2-Dichloroethylene	0.4	ug/L		<0.4	<0.4	<0.4	<0.4
	t-1,3-Dichloropropylene	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Tetrachloroethylene	0.3	ug/L	MAC-30	<0.3	<0.3	<0.3	<0.3
	Toluene	0.5	ug/L	AO-24	<0.5	<0.5	<0.5	<0.5
	Toluene-d8	1	%		95	97	96	97
	Trichloroethylene	0.3	ug/L	MAC-5	<0.3	<0.3	<0.3	<0.3
	Trichlorofluoromethane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Vinyl Chloride	0.2	ug/L	MAC-2	<0.2	<0.2	<0.2	<0.2
	Xylene; total	1.0	ug/L	AO-300	9.9	<1.0	7.5	<1.0

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1
Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Calculations	Hardness as CaCO ₃	1	mg/L	OG-100	1022316 Groundwater
Cyanide	Cyanide (free)	0.005	mg/L	MAC-0.2	<0.005
General Chemistry	Alkalinity as CaCO ₃	5	mg/L	OG-500	<5
	Br	0.25	mg/L		<0.25
	Cl	1	mg/L	AO-250	<1
	Conductivity	5	uS/cm		<5
	F	0.10	mg/L	MAC-1.5	<0.10
	N-NO ₂	0.10	mg/L	MAC-1.0	<0.10
	N-NO ₃	0.10	mg/L	MAC-10.0	<0.10
	pH	1.00		6.5-8.5	6.05
	SO ₄	3	mg/L	AO-500	<3
	F1 (C6-C10)	0.1	mg/L		<0.1
Hydrocarbons	F1-BTEX (C6-C10)	0.1	mg/L		<0.1
	F2 (C10-C16)	0.1	mg/L		<0.1
	F3 (C16-C34)	0.2	mg/L		<0.2
	F4 (C34-C50)	0.2	mg/L		<0.2
Mercury	Hg	0.0001	mg/L	MAC-0.001	<0.0001
Metals	Ag	0.0001	mg/L		<0.0001
	As	0.001	mg/L	IMAC-0.025	<0.001
	B	0.01	mg/L	IMAC-0.025	<0.01
	Ba	0.01	mg/L	MAC-1.0	<0.01
	Be	0.0005	mg/L		<0.0005
	Ca	1	mg/L		<1
	Cd	0.0001	mg/L	MAC-0.005	<0.0001
	Co	0.0002	mg/L		<0.0002

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Client: Golder Assosciates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab ID, Sample Matrix Sample Type Sampling Date Sample ID, Guideline	1022316 Groundwater 2013-04-22 Field Blank
Metals	Cr	0.001	mg/L	MAC-0.05	<0.001
		0.005	mg/L	MAC-0.05	
	Cu	0.001	mg/L	AO-1.0	<0.001
	Fe	0.03	mg/L	AO-0.3	<0.03
		0.3	mg/L	AO-0.3	
	K	1	mg/L		<1
	Mg	1	mg/L		<1
	Mo	0.005	mg/L		<0.005
	Na	2	mg/L	AO-200	<2
	Ni	0.005	mg/L		<0.005
	Pb	0.001	mg/L	MAC-0.010	<0.001
	Sb	0.0005	mg/L	IMAC-0.006	<0.0005
Nutrients	Se	0.001	mg/L	MAC-0.01	<0.001
		0.01	mg/L	MAC-0.01	
	Ti	0.0001	mg/L		<0.0001
	U	0.001	mg/L	MAC-0.02	<0.001
	V	0.001	mg/L		<0.001
	Zn	0.005	mg/L		
Semi-Volatiles	N-NH3	0.01	mg/L	AO-5.0	<0.01
		0.02	mg/L		0.07
	Phenols	2.0	mg/L		
		0.001	mg/L		<0.001
		0.005	mg/L		
	PO4 as P	0.01	mg/L		<0.01
	1-methylnaphthalene	0.01	mg/L		<0.1

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

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
LAN 8X1
Attention: Ms. Christl Groves
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Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022316 Groundwater 2013-04-22 Field Blank
Semi-Volatiles	2-methylnaphthalene	0.1	ug/L			<0.1
	Acenaphthene	0.1	ug/L			<0.1
	Acenaphthylene	0.1	ug/L			<0.1
	Anthracene	0.1	ug/L			<0.1
	Benzo(a)anthracene	0.1	ug/L			<0.1
	Benzo(a)pyrene	0.01	ug/L	MAC-0.01		<0.01
	Benzo(b)fluoranthene	0.05	ug/L			<0.05
	Benzo(g,h,i)perylene	0.1	ug/L			<0.1
	Benzo(k)fluoranthene	0.05	ug/L			<0.05
	Chrysene	0.05	ug/L			<0.05
	Dibenzo(a,h)anthracene	0.1	ug/L			<0.1
	Fluoranthene	0.1	ug/L			<0.1
	Fluorene	0.1	ug/L			<0.1
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L			<0.1
Subcontract	Naphthalene	0.1	ug/L			<0.1
	Phenanthrene	0.1	ug/L			<0.1
	Pyrene	0.1	ug/L			<0.1
	Cr(III)	0.005	mg/L			<0.005
	Cr(VI)	0.0005	mg/L			<0.0005
VOCs	1,1,1,2-tetrachloroethane	0.5	ug/L			<0.5
	1,1,1-trichloroethane	0.4	ug/L			<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L			<0.5
	1,1,2-trichloroethane	0.4	ug/L			<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4
	1,1-dichloroethylene	0.5	ug/L			<0.5
	1,2,4-trichlorobenzene	0.5	ug/L	MAC-14		<0.5

Guideline = ODWSOG

Y

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Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum

Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality

Guideline, IPWQO = Interim Provincial Water Quality Objective.



Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab ID.	
				Sample Matrix Sample Type	Sample I.D.
VOCs	1,2-dibromoethane	0.2	ug/L		1022316 Groundwater
	1,2-dichlorobenzene	0.4	ug/L	MAC-200	2013-04-22 Field Blank
	1,2-dichloroethane	0.2	ug/L	IMAC-5	
	1,2-dichloroethane-d4	1	%		102
	1,2-dichloropropane	0.5	ug/L		<0.5
	1,3,5-trimethylbenzene	0.3	ug/L		<0.3
	1,3-dichlorobenzene	0.4	ug/L		<0.4
	1,4-dichlorobenzene	0.4	ug/L	MAC-5	<0.4
	2-Hexanone (MBK)	10	ug/L		<10
	4-bromofluorobenzene	1	%		102
	Acetone	50	ug/L		<50
	Benzene	0.5	ug/L	MAC-5	<0.5
	Bromodichloromethane	0.3	ug/L		<0.3
	Bromoform	0.4	ug/L		<0.4
	Bromomethane	0.5	ug/L		<0.5
	c-1,2-Dichloroethylene	0.4	ug/L		<0.4
	c-1,3-Dichloropropylene	0.2	ug/L		<0.2
	Carbon Tetrachloride	0.2	ug/L	MAC-5	<0.2
	Chloroethane	0.2	ug/L		<0.2
	Chloroform	0.5	ug/L		0.8
	Chloromethane	0.2	ug/L		<0.2
	Dibromochloromethane	0.3	ug/L		<0.3
	Dichlorodifluoromethane	0.5	ug/L		<0.5
	Dichloromethane	4.0	ug/L	MAC-50	<4.0
	Ethylbenzene	0.5	ug/L	AO-2.4	<0.5
	Hexane	5	ug/L		<5

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Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum
Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality
Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
LAN 8X1
Attention: Ms. Chnstl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022316 Groundwater 2013-04-22 Field Blank
VOCS	m/p-xylene	0.5	ug/L			<0.5
	Methyl Ethyl Ketone (MEK)	10	ug/L			<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L			<10
	Methyl Tert Butyl Ether (MTBE)	10	ug/L			<10
	Monochlorobenzene	0.2	ug/L	MAC-80		<0.2
	o-xylene	0.5	ug/L			<0.5
	Styrene	0.5	ug/L			<0.5
	t-1,2-Dichloroethylene	0.4	ug/L			<0.4
	t-1,3-Dichloropropylene	0.2	ug/L			<0.2
	Tetrachloroethylene	0.3	ug/L	MAC-30		<0.3
	Toluene	0.5	ug/L	AO-24		<0.5
	Toluene-d8	1	%			95
	Trichloroethylene	0.3	ug/L	MAC-5		<0.3
	Trichlorofluoromethane	0.5	ug/L			<0.5
	Vinyl Chloride	0.2	ug/L	MAC-2		<0.2
	Xylene, total	1.0	ug/L	AO-300		<1.0

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab ID. Sample Matrix Sample Type Sampling Date Sample ID.
Calculations	Hardness as CaCO ₃	1	mg/L	OG-100
Cyanide	Cyanide (free)	0.005	mg/L	MAC-0.2
General Chemistry	Alkalinity as CaCO ₃	5	mg/L	OG-500
	Br	0.25	mg/L	
	Cl	1	mg/L	AO-250
	Conductivity	5	uS/cm	
	F	0.10	mg/L	MAC-1.5
	N-NO ₂	0.10	mg/L	MAC-1.0
	N-NO ₃	0.10	mg/L	MAC-10.0
	pH	1.00		6.5-8.5
	SO ₄	3	mg/L	AO-500
	F1 (C6-C10)	0.1	mg/L	
Hydrocarbons	F1-BTEX (C6-C10)	0.1	mg/L	
	F2 (C10-C16)	0.1	mg/L	
	F3 (C16-C34)	0.2	mg/L	
	F4 (C34-C50)	0.2	mg/L	
Mercury Metals	Hg	0.0001	mg/L	MAC-0.001
	Ag	0.0001	mg/L	
	As	0.001	mg/L	IMAC-0.025
		0.01	mg/L	IMAC-0.025
	B	0.01	mg/L	IMAC-5.0
	Ba	0.01	mg/L	MAC-1.0
	Be	0.0005	mg/L	
	Ca	1	mg/L	
	Cd	0.0001	mg/L	MAC-0.005
	Co	0.0002	mg/L	

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Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Christi Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

Lab I.D.
 Sample Matrix
 Sample Type
 Sampling Date
 Sample I.D.

Group	Analyte	MRL	Units	Guideline
Metals	Cr	0.001	mg/L	MAC-0.05
		0.005	mg/L	MAC-0.05
	Cu	0.001	mg/L	AO-1.0
	Fe	0.3	mg/L	AO-0.3
	K	1	mg/L	
	Mg	1	mg/L	
	Mo	0.005	mg/L	
	Na	2	mg/L	AO-200
	Ni	0.005	mg/L	
	Pb	0.001	mg/L	MAC-0.010
	Sb	0.0005	mg/L	IMAC-0.006
	Se	0.001	mg/L	MAC-0.01
		0.01	mg/L	MAC-0.01
	Tl	0.0001	mg/L	
Nutrients	U	0.001	mg/L	MAC-0.02
	V	0.001	mg/L	
	Zn	0.01	mg/L	AO-5.0
	N-NH3	0.02	mg/L	
		2.0	mg/L	
	Phenols	0.001	mg/L	
		0.02	mg/L	
	PO4 as P	0.01	mg/L	
	1-methylnaphthalene	0.1	ug/L	
	2-methylnaphthalene	0.1	ug/L	
Semi-Volatiles	Acenaphthene	0.1	ug/L	
	Acenaphthylene	0.1	ug/L	

Guideline = ODWSOG

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Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality

Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Semi-Volatiles	Anthracene	0.1	ug/L	
	Benzo(a)anthracene	0.1	ug/L	
	Benzo(a)pyrene	0.01	ug/L	MAC-0.01
	Benzo(b)fluoranthene	0.05	ug/L	
	Benzo(g,h,i)perylene	0.1	ug/L	
	Benzo(k)fluoranthene	0.05	ug/L	
	Chrysene	0.05	ug/L	
	Dibenzo(a,h)anthracene	0.1	ug/L	
	Fluoranthene	0.1	ug/L	
	Fluorene	0.1	ug/L	
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L	
	Naphthalene	0.1	ug/L	
	Phenanthrene	0.1	ug/L	
	Pyrene	0.1	ug/L	
Subcontract	Cr(III)	0.005	mg/L	
	Cr(VI)	0.0005	mg/L	
	1,1,1,2-tetrachloroethane	0.5	ug/L	
	1,1,1-trichloroethane	0.4	ug/L	
	1,1,2,2-tetrachloroethane	0.5	ug/L	
	1,1,2-trichloroethane	0.4	ug/L	
	1,1-dichloroethane	0.4	ug/L	
	1,1-dichloroethylene	0.5	ug/L	MAC-14
	1,2,4-trichlorobenzene	0.5	ug/L	
	1,2-dibromoethane	0.2	ug/L	
	1,2-dichlorobenzene	0.4	ug/L	MAC-200
	1,2-dichloroethane	0.2	ug/L	IMAC-5
VOCs				

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
LAN 8X1
Attention: Ms. Chrisl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
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Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
VOCs	1,2-dichloroethane-d4	1	%		
	1,2-dichloropropane	0.5	ug/L		
	1,3,5-trimethylbenzene	0.3	ug/L		
	1,3-dichlorobenzene	0.4	ug/L		
	1,4-dichlorobenzene	0.4	ug/L	MAC-5	
	2-Hexanone (MBK)	10	ug/L		
	4-bromofluorobenzene	1	%		
	Acetone	50	ug/L		
	Benzene	0.5	ug/L	MAC-5	
	Bromodichloromethane	0.3	ug/L		
	Bromoform	0.4	ug/L		
	Bromomethane	0.5	ug/L		
	c-1,2-Dichloroethylene	0.4	ug/L		
	c-1,3-Dichloropropylene	0.2	ug/L		
	Carbon Tetrachloride	0.2	ug/L	MAC-5	
	Chloroethane	0.2	ug/L		
	Chloroform	0.5	ug/L		
	Chloromethane	0.2	ug/L		
	Dibromochloromethane	0.3	ug/L		
	Dichlorodifluoromethane	0.5	ug/L		
	Dichloromethane	4.0	ug/L	MAC-50	
	Ethylbenzene	0.5	ug/L	AO-2.4	
	Hexane	5	ug/L		
	m/p-xylene	0.5	ug/L		
	Methyl Ethyl Ketone (MEK)	10	ug/L		
	Methyl Isobutyl Ketone (MIBK)	10	ug/L		

Guideline = ODWSOG

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Client:

Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention:

Ms. Christi Groves
PO25698

Invoice to:

The City of Barrie - Finance Dept.

Report Number:

1307216

Date Submitted:

2013-04-24

Date Reported:

2013-05-09

Project:

11-1170-0043

COC #:

762319

Lab I.D.
Sample Matrix
Sample Type
Sampling Date
Sample I.D.

Group	Analyte	MRL	Units	Guideline
VOCs	Methyl Tert Butyl Ether (MTBE)	10	ug/L	
	Monochlorobenzene	0.2	ug/L	MAC-80
	o-xylene	0.5	ug/L	
	Styrene	0.5	ug/L	
	t-1,2-Dichloroethylene	0.4	ug/L	
	t-1,3-Dichloropropylene	0.2	ug/L	
	Tetrachloroethylene	0.3	ug/L	MAC-30
	Toluene	0.5	ug/L	AO-24
	Toluene-d8	1	%	
	Trichloroethylene	0.3	ug/L	MAC-5
	Trichlorofluoromethane	0.5	ug/L	
	Vinyl Chloride	0.2	ug/L	MAC-2
	Xylene: total	1.0	ug/L	AO-300

Lab I.D.
Sample Matrix
Sample Type
Sampling Date
Sample I.D.

Group	Analyte	MRL	Units	Guideline
Calculations	Hardness as CaCO3	1	mg/L	OG-100
Cyanide	Cyanide (free)	0.005	mg/L	MAC-0.2
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG-500
	Br	0.25	mg/L	
	Cl	1	mg/L	AO-250
	Conductivity	5	uS/cm	

1022324
Groundwater

2013-04-22
Trip Blank

Guideline = ODWSOG

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Client: Golder Associates
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
Attention: Ms. Chrsiti Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group		Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022324 Groundwater 2013-04-22 Trip Blank
General Chemistry		F	0.10	mg/L	MAC-1.5	<0.10	
		N-NO2	0.10	mg/L	MAC-1.0	<0.10	
		N-NO3	0.10	mg/L	MAC-10.0	<0.10	
		pH	1.00		6.5-8.5	6.15	
		SO4	3	mg/L	AO-500	<3	
		F1 (C6-C10)	0.1	mg/L		<0.1	
Hydrocarbons		F1-BTEX (C6-C10)	0.1	mg/L		<0.1	
		F2 (C10-C16)	0.1	mg/L		<0.1	
		F3 (C16-C34)	0.2	mg/L		<0.2	
		F4 (C34-C50)	0.2	mg/L		<0.2	
		Hg	0.0001	mg/L	MAC-0.001	<0.0001	
Mercury		Ag	0.0001	mg/L		<0.0001	
		As	0.001	mg/L	IMAC-0.025	<0.001	
		B	0.01	mg/L	IMAC-5.0	<0.01	
		Ba	0.01	mg/L	MAC-1.0	<0.01	
		Be	0.0005	mg/L		<0.0005	
		Ca	1	mg/L		<1	
		Cd	0.0001	mg/L	MAC-0.005	<0.0001	
		Co	0.0002	mg/L		<0.0002	
		Cr	0.001	mg/L	MAC-0.05	<0.001	
		Cu	0.001	mg/L	AO-1.0	<0.001	
		Fe	0.03	mg/L	AO-0.3	<0.03	
		K	1	mg/L		<1	
Metals		Mg	1	mg/L		<1	
		Mn	0.005	mg/L		<0.005	
		Na	2	mg/L	AO-200	<2	

Client:

Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention:

Ms. Christl Groves

PO#:

PO25698

Invoice to:

The City of Barrie - Finance Dept.

Report Number:

1307216

Date Submitted:

2013-04-24

Date Reported:

2013-05-09

Project:

11-1170-0043

COC #:

762319

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022324 Groundwater 2013-04-22 Trip Blank
Metals	Ni	0.005	mg/L		<0.005
	Pb	0.001	mg/L	MAC-0.010	<0.001
	Sb	0.0005	mg/L	IMAC-0.006	<0.0005
	Se	0.001	mg/L	MAC-0.01	<0.001
	Tl	0.0001	mg/L		<0.0001
	U	0.001	mg/L	MAC-0.02	<0.001
	V	0.001	mg/L		<0.001
	Zn	0.01	mg/L	AO-5.0	<0.01
	N-NH3	0.02	mg/L		0.06
	Phenols	0.001	mg/L		<0.001
Nutrients	PO4 as P	0.01	mg/L		<0.01
	1-methylnaphthalene	0.1	ug/L		<0.1
	2-methylnaphthalene	0.1	ug/L		<0.1
	Acenaphthene	0.1	ug/L		<0.1
	Acenaphthylene	0.1	ug/L		<0.1
	Anthracene	0.1	ug/L		<0.1
	Benzo(a)anthracene	0.1	ug/L		<0.1
	Benzo(a)pyrene	0.01	ug/L	MAC-0.01	<0.01
	Benzo(b)fluoranthene	0.05	ug/L		<0.05
	Benzo(g,h,i)perylene	0.1	ug/L		<0.1
Semi-Volatiles	Benzo(k)fluoranthene	0.05	ug/L		<0.05
	Chrysene	0.05	ug/L		<0.05
	Dibenzo(a,h)anthracene	0.1	ug/L		<0.1
	Fluoranthene	0.1	ug/L		<0.1
	Fluorene	0.1	ug/L		<0.1
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L		<0.1

Guideline = ODWSOG

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Client: Golder Associates
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
Attention: Ms. Christi Groves
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Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022324 Groundwater 2013-04-22 Trip Blank
Semi-Volatiles	Naphthalene	0.1	ug/L			<0.1
	Phenanthrene	0.1	ug/L			<0.1
	Pyrene	0.1	ug/L			<0.1
Subcontract	Cr(III)	0.005	mg/L			<0.005
	Cr(VI)	0.0005	mg/L			<0.0005
	1,1,1,2-tetrachloroethane	0.5	ug/L			<0.5
	1,1,1-trichloroethane	0.4	ug/L			<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L			<0.5
	1,1,2-trichloroethane	0.4	ug/L			<0.4
	1,1-dichloroethane	0.4	ug/L			<0.4
	1,1-dichloroethylene	0.5	ug/L			<0.5
	1,2,4-trichlorobenzene	0.5	ug/L		MAC-14	<0.5
	1,2-dibromoethane	0.2	ug/L			<0.2
	1,2-dichlorobenzene	0.4	ug/L		MAC-200	<0.4
	1,2-dichloroethane	0.2	ug/L		IMAC-5	<0.2
	1,2-dichloroethane-d4	1	%			107
	1,2-dichloropropane	0.5	ug/L			<0.5
	1,3,5-trimethylbenzene	0.3	ug/L			<0.3
VOCs	1,3-dichlorobenzene	0.4	ug/L			<0.4
	1,4-dichlorobenzene	0.4	ug/L		MAC-5	<0.4
	2-Hexanone (MBK)	10	ug/L			<10
	4-bromofluorobenzene	1	%			102
	Acetone	50	ug/L			<50
	Benzene	0.5	ug/L		MAC-5	<0.5
	Bromodichloromethane	0.3	ug/L			<0.3
	Bromoform	0.4	ug/L			<0.4

Guideline = ODWSOG **Y** *** = Guideline Exceedence**
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 146 Colomade Rd. Unit 8, Ottawa, ON K2E 7Y1 Page 24 of 41

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational
 Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum
 Acceptable Concentration, STD = Standard, PMQO = Provincial Water Quality
 Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group	Analyte	MRL	Units	Lab ID, Sample Matrix Sample Type Sampling Date Sample ID, Guideline	1022324 Groundwater 2013-04-22 Trip Blank
VOCs	Bromomethane	0.5	ug/L		<0.5
	c-1,2-Dichloroethylene	0.4	ug/L		<0.4
	c-1,3-Dichloropropylene	0.2	ug/L		<0.2
	Carbon Tetrachloride	0.2	ug/L	MAC-5	<0.2
	Chloroethane	0.2	ug/L		<0.2
	Chloroform	0.5	ug/L		<0.5
	Chloromethane	0.2	ug/L		<0.2
	Dibromochloromethane	0.3	ug/L		<0.3
	Dichlorodifluoromethane	0.5	ug/L		<0.5
	Dichloromethane	4.0	ug/L	MAC-50	<4.0
	Ethylbenzene	0.5	ug/L	AO-2.4	<0.5
	Hexane	5	ug/L		<5
	m/p-xylene	0.5	ug/L		<0.5
	Methyl Ethyl Ketone (MEK)	10	ug/L		<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L		<10
	Methyl Tert Butyl Ether (MTBE)	10	ug/L		<10
	Monochlorobenzene	0.2	ug/L	MAC-80	<0.2
	o-xylene	0.5	ug/L		<0.5
	Styrene	0.5	ug/L		<0.5
	t-1,2-Dichloroethylene	0.4	ug/L		<0.4
	t-1,3-Dichloropropylene	0.2	ug/L		<0.2
	Tetrachloroethylene	0.3	ug/L	MAC-30	<0.3
	Toluene	0.5	ug/L	AO-24	<0.5
	Toluene-d8	1	%		96
	Trichloroethylene	0.3	ug/L		<0.3
	Trichlorofluoromethane	0.5	ug/L	MAC-5	<0.5

Guideline = ODWSOG

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Group		Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022324 Groundwater 2013-04-22 Trip Blank
VOCs		Vinyl Chloride	0.2	ug/L	MAC-2		<0.2
		Xylene, total	1.0	ug/L	AO-300		<1.0

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146 Colomnade Rd. Unit 8, Ottawa, ON K2E 7Y1

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

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 0	Analysis Date 2013-05-01	Method C SM2340B	
Hardness as CaCO ₃			
Xylene; total			
Run No 249387	Analysis Date 2013-04-25	Method O OCME	
F1 (C6-C10)	<0.1 mg/L	94	80-120
Run No 249389	Analysis Date 2013-04-25	Method O OCME	
F1-BTEX (C6-C10)			
Run No 249415	Analysis Date 2013-04-25	Method C SM4500-NO3-F	
N-NO ₂	<0.10 mg/L	97	80-120
N-NO ₃	<0.10 mg/L	100	80-120
Run No 249421	Analysis Date 2013-04-24	Method V 8260B	
1,1,1,2-tetrachloroethane	<0.5 ug/L	92	80-120
1,1,1-trichloroethane	<0.4 ug/L	94	80-120
1,1,2,2-tetrachloroethane	<0.5 ug/L	93	80-120
1,1,2-trichloroethane	<0.4 ug/L	88	80-120

Guideline = ODWSOG

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Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Chrsil Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

QC Summary

Analyte	Blank	QC % Rec	QC Limits
1,1-dichloroethane	<0.4 ug/L	98	80-120
1,1-dichloroethylene	<0.5 ug/L	92	80-120
1,2,4-trichlorobenzene	<0.5 ug/L	98	
1,2-dibromoethane	<0.2 ug/L	88	80-120
1,2-dichlorobenzene	<0.4 ug/L	107	80-120
1,2-dichloroethane	<0.2 ug/L	100	80-120
1,2-dichloroethane-d4	104 %	98	80-120
1,2-dichloropropane	<0.5 ug/L	94	80-120
1,3,5-trimethylbenzene	<0.3 ug/L	90	80-120
1,3-dichlorobenzene	<0.4 ug/L	93	80-120
1,4-dichlorobenzene	<0.4 ug/L	91	80-120
Benzene	<0.5 ug/L	95	80-120
Bromodichloromethane	<0.3 ug/L	88	80-120
Bromofarr	<0.4 ug/L	95	80-120
Bromomethane	<0.5 ug/L	84	70-130
c-1,2-Dichloroethylene	<0.4 ug/L	83	80-120
c-1,3-Dichloropropylene	<0.2 ug/L	86	80-120

Guideline = ODWSOG

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Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum

Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality

Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Carbon Tetrachloride	<0.2 ug/L	92	80-120
Chloroethane	<0.2 ug/L	86	70-130
Chloroform	<0.5 ug/L	92	80-120
Chloromethane	<0.2 ug/L	85	70-130
Dibromochloromethane	<0.3 ug/L	83	80-120
Dichlorodifluoromethane	<0.5 ug/L	109	70-130
Dichloromethane	<4.0 ug/L	114	60-200
Ethylbenzene	<0.5 ug/L	90	80-120
Hexane	<5 ug/L	100	70-130
m/p-xylene	<0.5 ug/L	95	80-120
Monochlorobenzene	<0.2 ug/L	88	80-120
o-xylene	<0.5 ug/L	92	80-120
Styrene	<0.5 ug/L	87	80-120
t-1,2-Dichloroethylene	<0.4 ug/L	91	80-120
t-1,3-Dichloropropylene	<0.2 ug/L	90	80-120
Tetrachloroethylene	<0.3 ug/L	90	80-120
Toluene	<0.5 ug/L	98	80-120

Guideline = ODWSOG

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Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum
Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality
Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates

121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Toluene-d8	95 %	95	80-120
Trichloroethylene	<0.3 µg/L	95	80-120
Trichlorofluoromethane	<0.5 µg/L	99	80-120
Vinyl Chloride	<0.2 µg/L	117	70-130
Run No 249426	Analysis Date 2013-04-25	Method M SM3112B-3500B	
Hg	<0.0001 mg/L	100	70-130
Run No 249432	Analysis Date 2013-04-25	Method C SM4500-NO3-F	
N-NO2	<0.10 mg/L	100	80-120
N-NO3	<0.10 mg/L	100	80-120
Run No 249436	Analysis Date 2013-04-26	Method O OCME	
F2 (C10-C16)	<0.1 mg/L	88	50-120
F3 (C16-C34)	<0.2 mg/L	88	50-120
F4 (C34-C50)	<0.2 mg/L	88	50-120
Run No 249444	Analysis Date 2013-04-26	Method C SM4500-NH3D	
NH43	<0.02 mg/L	100	85-115
Run No 249452	Analysis Date 2013-04-26	Method O OCME	
F1 (C6-C10)	<0.1 mg/L	94	80-120

Guideline = ODWSOG

Y

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MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational

Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum

Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality

Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1
Attention: Ms. Christi Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 249453	Analysis Date 2013-04-26	Method O COWE	
F1-BTEX (C6-C10)			
Run No 249457	Analysis Date 2013-04-26	Method EPA 200.8	
Ag	<0.0001 mg/L	93	89-111
As	<0.001 mg/L	104	81-119
B	<0.01 mg/L	91	81-119
Ba	<0.01 mg/L	95	91-109
Be	<0.0005 mg/L	90	82-118
Cd	<0.0001 mg/L	92	86-114
Co	<0.0002 mg/L	96	88-112
Cr	<0.001 mg/L	95	89-111
Cu	<0.001 mg/L	92	86-114
Fe	<0.03 mg/L	97	88-112
Mo	<0.005 mg/L	98	84-116
Ni	<0.005 mg/L	102	92-108
Pb	<0.001 mg/L	93	89-111
Sb	<0.0005 mg/L	95	77-123

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Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Christl Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Se	<0.001 mg/L	105	77-123
Tl	<0.0001 mg/L	96	88-112
U	<0.001 mg/L	96	87-113
V	<0.001 mg/L	93	88-112
Zn	<0.01 mg/L	96	89-111
Run No 249459	Analysis Date 2013-04-26	Method	P 8270
1-methylnaphthalene	<0.1 ug/L	44	20-140
2-methylnaphthalene	<0.1 ug/L	44	20-140
Acenaphthene	<0.1 ug/L	46	20-140
Acenaphthylene	<0.1 ug/L	44	20-140
Anthracene	<0.1 ug/L	48	20-140
Benzo(a)anthracene	<0.1 ug/L	54	20-140
Benzo(a)pyrene	<0.01 ug/L	49	20-140
Benzo(b)fluoranthene	<0.05 ug/L	57	20-140
Benzo(g,h,i)perylene	<0.1 ug/L	54	20-140
Benzo(k)fluoranthene	<0.05 ug/L	97	20-140
Chrysene	<0.05 ug/L	51	20-140

Guideline = ODWSOG

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Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum

Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality

Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Dibenzo(a,h)anthracene	<0.1 ug/L	50	20-140
Fluoranthene	<0.1 ug/L	56	20-140
Fluorene	<0.1 ug/L	46	20-140
Indeno(1,2,3-c,d)pyrene	<0.1 ug/L	66	20-140
Naphthalene	<0.1 ug/L	44	20-140
Phenanthrene	<0.1 ug/L	52	20-140
Pyrene	<0.1 ug/L	56	20-140
Run No 249460	Analysis Date 2013-04-26	Method O CME	
F2 (C10-C16)	<0.1 mg/L	93	50-120
F3 (C16-C34)	<0.2 mg/L	93	50-120
F4 (C34-C50)	<0.2 mg/L	93	50-120
Run No 249466	Analysis Date 2013-04-26	Method C SM4500-PF	
PO4 as P	<0.01 mg/L	99	89-111
Run No 249467	Analysis Date 2013-04-25	Method SM 2320B	
Alkalinity as CaCO3	<5 mg/L	100	95-105
Conductivity	<5 uS/cm	99	95-105
F	<0.10 mg/L	101	90-110

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barré, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barré - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
pH	5.84	100	90-110
Run No 249481	Analysis Date 2013-04-24	Method V 8260B	
2-Hexanone (MBK)	<10 ug/L	115	80-120
Acetone	<50 ug/L	87	80-120
Bromomethane		84	70-130
m/p-xylene		95	80-120
Methyl Ethyl Ketone (MEK)	<10 ug/L	97	80-120
Methyl Isobutyl Ketone (MIBK)	<10 ug/L	103	80-120
Methyl Tert Butyl Ether (MTBE)	<10 ug/L	110	80-120
Run No 249486	Analysis Date 2013-04-25	Method SM 4110C	
Br	<0.25 mg/L	98	90-110
Cl	<1 mg/L	101	90-112
SO4	<3 mg/L	101	90-110
Run No 249491	Analysis Date 2013-04-26	Method C SM5530D	
Phenols	<0.001 mg/L	93	73-127
Run No 249508	Analysis Date 2013-04-26	Method M SM3120B-3500C	
Cr	<0.005 mg/L	95	92-108

Guideline = ODWSOG Y *** = Guideline Exceedence**

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146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

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

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christli Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
V	<0.005 mg/L	93	92-108
Run No 249535	Analysis Date 2013-04-26	Method M SM3120B-3500C	
Ca	<1 mg/L	98	80-120
K	<1 mg/L	102	80-120
Mg	<1 mg/L	97	80-120
Na	<2 mg/L	102	80-120
Run No 249543	Analysis Date 2013-04-29	Method C SM4500-NH3D	
NH3	<0.02 mg/L	96	85-115
Run No 249545	Analysis Date 2013-04-26	Method SM 4110C	
Br	<0.25 mg/L	99	90-110
Cl	<1 mg/L	101	90-112
SO4	<3 mg/L	99	90-110
Run No 249549	Analysis Date 2013-04-27	Method P 8270	
1-methylnaphthalene	<0.1 ug/L	44	20-140
2-methylnaphthalene	<0.1 ug/L	44	20-140
Acenaphthene	<0.1 ug/L	46	20-140
Acenaphthylene	<0.1 ug/L	44	20-140

Guideline = ODWSOG

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Y

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Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Christi Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Anthracene	<0.1 ug/L	48	20-140
Benzo(a)anthracene	<0.1 ug/L	54	20-140
Benzo(a)pyrene	<0.01 ug/L	49	20-140
Benzo(b)fluoranthene	<0.05 ug/L	57	20-140
Benzo(g,h,i)perylene	<0.1 ug/L	54	20-140
Benzo(k)fluoranthene	<0.05 ug/L	97	20-140
Chrysene	<0.05 ug/L	51	20-140
Dibenzo(a,h)anthracene	<0.1 ug/L	50	20-140
Fluoranthene	<0.1 ug/L	56	20-140
Fluorene	<0.1 ug/L	46	20-140
Indeno(1,2,3-c,d)pyrene	<0.1 ug/L	66	20-140
Naphthalene	<0.1 ug/L	44	20-140
Phenanthrene	<0.1 ug/L	52	20-140
Pyrene	<0.1 ug/L	56	20-140
Run No 249550	Analysis Date 2013-04-27	Method SM 2320B	
Alkalinity as CaCO3	<5 mg/L	100	95-105
Run No 249565	Analysis Date 2013-04-29	Method M SM3120B-3500C	

Guideline = ODWSOC

Y

* = Guideline Exceedence

** = Analysis completed at Mississauga, Ontario.

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

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

MRP = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational

Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum

Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality

Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Ca	<1 mg/L	93	80-120
Na	<2 mg/L	96	80-120
Run No 249597	Analysis Date 2013-04-30	Method C SM5530D	
Phenols	<0.001 mg/L	95	73-127
Run No 249601	Analysis Date 2013-04-29	Method EPA 200.8	
Ag	<0.0001 mg/L	94	89-111
As	<0.001 mg/L	99	81-119
B	<0.01 mg/L	96	81-119
Ba	<0.01 mg/L	97	91-109
Be	<0.0005 mg/L	98	82-118
Cd	<0.0001 mg/L	96	86-114
Co	<0.0002 mg/L	99	88-112
Cr	<0.001 mg/L	103	89-111
Cu	<0.001 mg/L	98	86-114
Fe	<0.03 mg/L	103	88-112
Mn	<0.005 mg/L	100	84-116
Ni	<0.005 mg/L	101	92-108

Guideline = ODWSOG

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

Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Christl Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Pb	<0.001 mg/L	96	89-111
Se	<0.001 mg/L	100	77-123
Ti	<0.0001 mg/L	95	88-112
U	<0.001 mg/L	97	87-113
V	<0.001 mg/L	100	88-112
Zn	<0.01 mg/L	96	89-111
Run No 249645	Analysis Date 2013-04-30	Method C SM5530D	
Phenols	<0.001 mg/L	99	73-127
Run No 249650	Analysis Date 2013-04-30	Method EPA 200.8	
Ag	<0.0001 mg/L	93	89-111
As	<0.01 mg/L	96	81-119
B	<0.01 mg/L	86	81-119
Ba	<0.01 mg/L	99	91-109
Be	<0.0005 mg/L	97	82-118
Cd	<0.0001 mg/L	92	86-114
Co	<0.0002 mg/L	95	88-112
Cr	<0.001 mg/L	100	89-111

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Cu	<0.001 mg/L	95	86-114
Fe	<0.3 mg/L	106	88-112
Mn	<0.005 mg/L	101	84-116
Ni	<0.005 mg/L	94	92-108
Pb	<0.001 mg/L	97	89-111
Sb	<0.0005 mg/L	98	77-123
Se	<0.01 mg/L	99	77-123
Ti	<0.0001 mg/L	96	88-112
U	<0.001 mg/L	95	87-113
V	<0.001 mg/L	95	88-112
Zn	<0.01 mg/L	94	89-111
Run No 249653	Analysis Date 2013-04-30	Method C SM4500-NH3E	
NNH3		<2.0 mg/L	96
Run No 249665	Analysis Date 2013-04-30	Method O COWE	
F1 (C6-C10)		<0.1 mg/L	94
Run No 249671	Analysis Date 2013-04-30	Method SM 4110C	
Cl		<1 mg/L	99

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Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality
Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1
Attention: Ms. Chrsiti Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 249677	Analysis Date 2013-04-30	Method C SM4500-CNC	
Cyanide (free)	<0.005 mg/L	79	75-125
Run No 249699	Analysis Date 2013-05-01	Method C SM5530D	
Phenols	<0.001 mg/L	106	73-127
Run No 249746	Analysis Date 2013-05-01	Method M SM3120B-3500C	
Cr	<0.005 mg/L	102	92-108
Run No 249750	Analysis Date 2013-05-01	Method M SM3120B-3500C	
Ca	<1 mg/L	98	80-120
Na	<2 mg/L	106	80-120
Run No 249799	Analysis Date 2013-05-02	Method SUBCONTRACT-M-INORG	
Cr(III)			
Cr(VI)			

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Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality
Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307216
Date Submitted: 2013-04-24
Date Reported: 2013-05-09
Project: 11-1170-0043
COC #: 762319

Sample Comment Summary

Sample ID: 1022308	MW-B1	Phenols MRL elevated due to matrix interference (dilution was done). Samples were subcontracted for Cr(VI) and Cr III analysis for entire report.
Sample ID: 1022309	MW-B2	Due to matrix interference 5x dilution factor required for PAHs.
Sample ID: 1022310	MW-B22	Arsenic MRL elevated due to matrix interference (dilution was done).
Sample ID: 1022312	MW-B4	Arsenic MRL elevated due to matrix interference (dilution was done).
Sample ID: 1022313	MW-B5	Arsenic MRL elevated due to matrix interference (dilution was done). Phenols MRL elevated due to matrix interference (dilution was done).
Sample ID: 1022314	MW-B6	Selenium MRL elevated due to matrix interference (dilution was done). Phenols MRL elevated due to matrix interference (dilution was done).
Sample ID: 1022315	MW-B7	Arsenic MRL elevated due to matrix interference (dilution was done). Phenols MRL elevated due to matrix interference (dilution was done).

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* = Guideline Exceedence

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

Client: **Golder Associates**
 121 Commerce Park Drive Unit L
 Barrie, ON
 L4N 8X1
 Attention: **Ms. Chrsiti Groves**
 PO#: **PO25698**
 Invoice to: **The City of Barrie - Finance Dept.**

Report Number: **1307216**
 Date Submitted: **2013-04-24**
 Date Reported: **2013-05-09**
 Project: **11-1170-0043**
 COC #: **762319**

Petroleum Hydrocarbons - CCME Checklist

Samples were analysed by Exova Ottawa Method AMCCME2. "Petroleum Hydrocarbons in Water and Soil, CCME/TPH" This method complies with the reference method for the CCME CWS PHC and is validated for use in the laboratory. Exova Ottawa is accredited by CALA (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Data for QC samples (blank, duplicate, spike) are available on request.

Holding/Analysis Times	Yes/No	If NO, then reasons
All fractions analyzed within recommended hold times/analysis times?	Yes	
F1		
nC6 and nC10 response factors within 30% of toluene	Yes	
BTEX was subtracted from F1 fraction	Yes	
If YES, was F1-BTEX (C6-C10) reported	Yes	
F2		
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	Yes	
Linearly within 15% (F2-F4)	Yes	
Naphthalene was subtracted from F2 fraction	No	Naphthalene (PAH) not requested/analysed
If YES was F2-Naphthalene reported		
F3		
PAH (selected compounds) subtracted from F3 fraction	No	PAH not requested/analysed
If YES was F3-PAH reported		
F4		
C50 response factor within 70% of nC10+nC16+nC34 average	Yes	
Chromatogram descended to baseline by retention time of C50	Yes	
If NO was F4 (C34-C50) gravimetric reported		

Guideline = ODWSOS

Y

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



APPENDIX F

Analytical Results - Surface Water

CHAIN OF CUSTODY

7099999

146 Colonnade Rd Unit 8
Ottawa, ON K2E 7Y1
Ph (613) 27-5692 Fax (613) 27-5272

608 Norris Court
Kingston, ON K7P 2R9
Ph (613) 634-5307 Fax (613) 634-9308

380 Vansickle Rd Unit 630
St Catharines, ON L2R 6P7
Ph (905) 680 9997 Fax (905) 680 4255

Company Name: Associated City/Prov: 121 Commerce Park Drive Unit L Fax Results to:
 Report Address: Christie, Ontario Postal Code: L4N 8X1 E-mail Results to: cgay@exova.com
 Phone: 1-877-444-2220 Project #: 11-1770-0043 Copy of Results to:
 Waterworks Name: 2220 Waterworks Number:

Invoice to:
if different from above:

Leanda Hyatt
P.O. Box 400, Barrie, ON
L4N 4T5

SAMPLE ANALYSIS REQUIRED

Sample ID	Date/Time Collected	Sample Matrix (e.g. Water, Soil, Paint)	Sample Type (See Codes below)	MOE Reportable? (Y=Yes, N=No)	# of Containers	Service Required (R=Rush, S=Standard)	Criteria Required (See Codes below)	Identification
SW B1	23 Apr 13 / AM	SW	SW	Y	1	S	SW	SW B1
SW B2		SW	SW	Y	1	S	SW	SW B2
SW B3		SW	SW	Y	1	S	SW	SW B3
SW B4		SW	SW	Y	1	S	SW	SW B4
SW B5		SW	SW	Y	1	S	SW	SW B5
Field Blank 1								
SW D1								
SW D2								
SW D3								

Sample Type Codes for Drinking Water Systems: RW = Raw Water, RWFC = Raw Water For Consumption, TW = Treated Water at point of entry to distribution, DW = Distribution/Plumbing Water
 MOE Reportable refers to the requirements under the SDWA for immediate reporting of results, which are indicators of adverse water quality, to the Owner/Operator, MOE, and MOH Medical Officer

Sampled By: Scott Watson Date/Time: 23 Apr 13 Date/Time: 23 Apr 13
 Work Authorized By (signature): Scott Watson Received By Lab: Scott Watson Date/Time: 23 Apr 13
 Print: Scott Watson Signature: Scott Watson Date/Time: 23 Apr 13

Comments: SW not filtered Cooler Temp (°C) on Receipt: 3



E3 Laboratories Inc.
 SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0
 Email: info@e3labs.ca
 Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
 Christi Groves
 121 Commerce Park Drive, Unit L
 Barrie
 L4N 8X1
 Tel: 705-722-4492

Fax:
 Email: cgroves@golder.com

Work Order No.: 2514382
 Received : 2013-12-12
 PO Number:
 Reported: 2014-01-13
 Project Name: C of B-Historic Waste Sites
 Chain of Custody No.: 11776

Note: Re-issued to include revised subcontracted report. (Originally reported December 19, 2013)

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
rip Blank	2013-12-05	352827	VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
Field Blank 1	2013-12-10	352828	Alkalinity (CaCO ₃)	<2.00	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	2.0	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	5.96	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	<0.004	mg/L	0.004	2013-12-13	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
Field Blank 2	2013-12-11	352829	Alkalinity (CaCO ₃)	<2.00	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-12-18	APHA 4500
			Anions	See	Attached	N/A	2013-12-13	Subcontracted
			Conductivity	1.8	uS/cm	N/A	2013-12-13	APHA 2510
			Cyanide (Free)	See	Attached	N/A	2013-12-18	Subcontracted
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	5.01	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Phenolics	<0.004	mg/L	0.004	2013-12-13	HACH 8047
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 1 of 11

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
 Results relate only to items tested.



E3 Laboratories Inc.

SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0

Email: info@e3labs.ca

Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

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Christi Groves

121 Commerce Park Drive, Unit L

Barrie

L4N 8X1

Tel: 705-722-4492

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Work Order No.: 2514382

Received : 2013-12-12

PO Number:

Reported: 2014-01-13

Project Name: C of B-Historic Waste Sites

Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

Page 2 of 11

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	Date	Lab ID					Analyzed		

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Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

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Client Sample ID	Sample		Parameter	Result	Unit	Date		Method
	Date	Lab ID				RDL	Analyzed	

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 4 of 11

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	Date	Lab ID				RDL	Analyzed	

Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

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Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

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Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
SW B1	2013-12-10	352848	Alkalinity (CaCO ₃)	279	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	0.96	mg/L	0.03	2013-12-18	APHA 4500
			Chloride	467	mg/L	0.25	2013-12-18	HACH 8113
			Conductivity	2110	uS/cm	N/A	2013-12-13	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	7.68	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Sulfate (SO ₄)	30	mg/L	10	2013-12-13	HACH 8051
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
W B2	2013-12-10	352849	Alkalinity (CaCO ₃)	302	mg/LCaCO ₃	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	0.66	mg/L	0.03	2013-12-18	APHA 4500
			Chloride	478	mg/L	0.25	2013-12-18	HACH 8113
			Conductivity	2130	uS/cm	N/A	2013-12-13	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 7 of 11

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 PO Number:
 Reported: 2014-01-13
 Project Name: C of B-Historic Waste Sites
 Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
SW B2	2013-12-10	352849	Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	7.70	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Sulfate (SO4)	40	mg/L	10	2013-12-13	HACH 8051
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
SW B3	2013-12-10	352850	Alkalinity (CaCO3)	292	mg/LCaCO3	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	0.56	mg/L	0.03	2013-12-18	APHA 4500
			Chloride	522	mg/L	0.25	2013-12-18	HACH 8113
			Conductivity	2300	uS/cm	N/A	2013-12-13	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	7.66	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Sulfate (SO4)	40	mg/L	10	2013-12-13	HACH 8051
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
SW B4	2013-12-10	352851	Alkalinity (CaCO3)	295	mg/LCaCO3	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	0.51	mg/L	0.03	2013-12-18	APHA 4500
			Chloride	505	mg/L	0.25	2013-12-18	HACH 8113
			Conductivity	2310	uS/cm	N/A	2013-12-13	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	7.73	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Sulfate (SO4)	40	mg/L	10	2013-12-13	HACH 8051
			VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted
SW B5	2013-12-10	352852	Alkalinity (CaCO3)	298	mg/LCaCO3	2.00	2013-12-12	APHA 2320B mod
			Ammonia (Total)	0.25	mg/L	0.03	2013-12-18	APHA 4500
			Chloride	469	mg/L	0.25	2013-12-18	HACH 8113
			Conductivity	2260	uS/cm	N/A	2013-12-13	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-12-16	Subcontracted
			Metals	See	Attached	N/A	2013-12-18	Subcontracted
			PAHs	See	Attached	N/A	2013-12-16	Subcontracted
			pH	7.78	SU	N/A	2013-12-12	APHA 4500 A,B MOD
			Sulfate (SO4)	40	mg/L	10	2013-12-13	HACH 8051

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 8 of 11

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.
 Results relate only to items tested.



E3 Laboratories Inc.

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Email: info@e3labs.ca

Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.

Christi Groves

121 Commerce Park Drive, Unit L

Barrie

L4N 8X1

Tel: 705-722-4492

Fax:

Email: cgroves@golder.com

Work Order No.: 2514382

Received : 2013-12-12

PO Number:

Reported: 2014-01-13

Project Name: C of B-Historic Waste Sites

Chain of Custody No.: 11776

Client Sample ID	Sample		Parameter	Result	Unit	RDL	Date	Method
	Date	Lab ID					Analyzed	
WB5	2013-12-10	352852	VOC Scan	See	Attached	N/A	2013-12-16	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

Page 9 of 11

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Email: cgroves@golder.com

Work Order No.: 2514382

Received : 2013-12-12

PO Number:

Reported: 2014-01-13

Project Name: C of B-Historic Waste Sites

Chain of Custody No.: 11776

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.

Laboratory Manager

Page 10 of 11

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Work Order No.: 2514382

Received : 2013-12-12

PO Number:

Reported: 2014-01-13

Project Name:

Chain of Custody No.:

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 11 of 11

All work has been performed using accepted testing methodologies, except where otherwise agreed to by the client in writing. Our total liability in connection with this work shall be limited to the amount paid by the client.

Results relate only to items tested

Certificate of Analysis

E-3 Laboratories Inc.

RR#4, 360 York Rd. Unit 10
Niagara-on-the-Lake, ON L0S 1J0
Attn: Kristy LeBrasseur

Phone: (905) 641-9000
Fax: (905) 641-9001

Client PO: 2514382
Project: City of Barrie
Custody:

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

Revised Report **Order #: 1350281**

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

Paracel ID	Client ID
1350281-01	352827 - Trip Blank
1350281-02	352828 - Field Blank 1
1350281-03	352829 - Field Blank 2

1350281-22	352848 - SW B1
1350281-23	352849 - SW B2
1350281-24	352850 - SW B3
1350281-25	352851 - SW B4
1350281-26	352852 - SW B5

Approved By:

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

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

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SARNIA
123 Christine St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	13-Dec-13	13-Dec-13
Chromium, hexavalent	MOE E3056 - colourimetric	13-Dec-13	13-Dec-13
Chromium, trivalent	Calculation	18-Dec-13	18-Dec-13
Cyanide, free	MOE E3015 - Auto Colour	17-Dec-13	18-Dec-13
Hardness	Hardness	19-Dec-13	19-Dec-13
Hardness	Hardness as CaCO ₃	18-Dec-13	19-Dec-13
Mercury	EPA 245.1 - Cold Vapour AA	16-Dec-13	16-Dec-13
Mercury, dissolved	EPA 245.2 - CVAA	16-Dec-13	16-Dec-13
Metals, ICP-MS	EPA 200.8 - ICP-MS	18-Dec-13	18-Dec-13
PAHs by GC-MS	EPA 625 - GC-MS, extraction	16-Dec-13	17-Dec-13
PHC F1	CWS Tier 1 - P&T GC-FID	16-Dec-13	16-Dec-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	13-Dec-13	13-Dec-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	16-Dec-13	16-Dec-13

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:	352827 - Trip Blank	352828 - Field Blank 1	352829 - Field Blank 2
Sample Date:	05-Dec-13	10-Dec-13	11-Dec-13
Sample ID:	1350281-01	1350281-02	1350281-03
MDL/Units	Water	Water	Water

General Inorganics

Cyanide, free	2 ug/L	-	<2	<2
Hardness	1.0 mg/L	-	<1.0	<1.0

Anions

Bromide	0.1 mg/L	-	<0.1	<0.1
Chloride	1 mg/L	-	<1	<1
Fluoride	0.1 mg/L	-	<0.1	<0.1
Nitrate as N	0.1 mg/L	-	<0.1	<0.1
Nitrite as N	0.05 mg/L	-	<0.05	<0.05
Phosphate as P	1 mg/L	-	<1	<1
Sulphate	1 mg/L	-	<1	<1

Metals

Mercury	0.1 ug/L	-	<0.1	0.1
Antimony	0.5 ug/L	-	<0.5	<0.5
Arsenic	1 ug/L	-	<1	<1
Barium	1 ug/L	-	<1	<1
Beryllium	0.5 ug/L	-	<0.5	<0.5
Boron	10 ug/L	-	<10	<10
Cadmium	0.1 ug/L	-	<0.1	<0.1
Calcium	100 ug/L	-	<100	<100
Chromium	1 ug/L	-	<1	<1
Chromium (III)	10 ug/L	-	<10	<10
Chromium (VI)	10 ug/L	-	<10	<10
Cobalt	0.5 ug/L	-	<0.5	<0.5
Copper	0.5 ug/L	-	<0.5	<0.5
Iron	100 ug/L	-	<100	<100
Lead	0.1 ug/L	-	<0.1	<0.1
Magnesium	200 ug/L	-	<200	<200
Molybdenum	0.5 ug/L	-	<0.5	<0.5
Nickel	1 ug/L	-	<1	<1
Potassium	100 ug/L	-	<100	<100
Selenium	1 ug/L	-	<1	<1
Silver	0.1 ug/L	-	<0.1	<0.1
Sodium	200 ug/L	-	<200	<200

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:	352827 - Trip Blank	352828 - Field Blank 1	352829 - Field Blank 2
	Sample Date:	05-Dec-13	10-Dec-13	11-Dec-13
	Sample ID:	1350281-01	1350281-02	1350281-03
	MDL/Units	Water	Water	Water
Thallium	0.1 ug/L	-	<0.1	<0.1
Uranium	0.1 ug/L	-	<0.1	<0.1
Vanadium	0.5 ug/L	-	<0.5	<0.5
Zinc	5 ug/L	-	<5	<5

Volatiles

Acetone	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Benzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2 [2]	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0 [2]	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Chloromethane	3.0 ug/L	<3.0 [2]	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0 [2]	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2 [2]	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Hexane	1.0 ug/L	<1.0 [2]	<1.0	<1.0

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Client PO: 2514382

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:	352827 - Trip Blank	352828 - Field Blank 1	352829 - Field Blank 2
	Sample Date:	05-Dec-13	10-Dec-13	11-Dec-13
	Sample ID:	1350281-01	1350281-02	1350281-03
	MDL/Units	Water	Water	Water
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0 [2]	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0 [2]	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0 [2]	<5.0	<5.0
Styrene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Toluene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0 [2]	<1.0	<1.0
5-Trimethylbenzene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Vinyl chloride	0.5 ug/L	<0.5 [2]	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5 [2]	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5 [2]	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5 [2]	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	91.7% [2]	92.2%	93.5%
Dibromofluoromethane	Surrogate	104% [2]	103%	105%
Toluene-d8	Surrogate	108% [2]	109%	109%

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L	-	<25.0	<25.0
F2 PHCs (C10-C16)	100 ug/L	-	<100	<100
F3 PHCs (C16-C34)	100 ug/L	-	<100	<100
F4 PHCs (C34-C50)	100 ug/L	-	<100	<100
F1 + F2 PHCs	125 ug/L	-	<125	<125
F3 + F4 PHCs	200 ug/L	-	<200	<200

Semi-Volatiles

Acenaphthene	0.05 ug/L	-	<0.05	<0.05
Acenaphthylene	0.05 ug/L	-	<0.05	<0.05
Anthracene	0.01 ug/L	-	<0.01	<0.01

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

		Client ID:	352827 - Trip Blank	352828 - Field Blank 1	352829 - Field Blank 2
		Sample Date:	05-Dec-13	10-Dec-13	11-Dec-13
		Sample ID:	1350281-01	1350281-02	1350281-03
	MDL/Units		Water	Water	Water
Benzo [a] anthracene	0.01 ug/L		-	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L		-	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L		-	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L		-	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L		-	<0.05	<0.05
Biphenyl	0.05 ug/L		-	<0.05	<0.05
Chrysene	0.05 ug/L		-	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L		-	<0.05	<0.05
Fluoranthene	0.01 ug/L		-	<0.01	<0.01
Fluorene	0.05 ug/L		-	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L		-	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L		-	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L		-	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L		-	<0.10	<0.10
Naphthalene	0.05 ug/L		-	<0.05	<0.05
Phenanthrene	0.05 ug/L		-	<0.05	<0.05
Pyrene	0.01 ug/L		-	<0.01	<0.01
2-Fluorobiphenyl	Surrogate		-	83.5%	82.4%
Terphenyl-d14	Surrogate		-	99.1%	97.5%

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Thallium	0.1 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L

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

SARNIA
123 Christine St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L

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123 Christina St. N.
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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID: Sample Date: Sample ID:
	MDL/Units
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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SARNIA
123 Christie St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L

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

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

Client ID: Sample Date: Sample ID:	
	MDL/Units
Thallium	0.1 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L
Volatiles	
Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L

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SARNIA
123 Christine St. N.
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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L

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SARNIA
123 Christie St. N
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Certificate of Analysis

Client: E-3 Laboratories Inc.
Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014
Order Date: 12-Dec-2013

	Client ID: Sample Date: Sample ID:
	MDL/Units
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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SARNIA
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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L

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Niagara Falls, ON L2J 0A3

SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Thallium	0.1 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L

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SARNIA
129 Christine St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Methyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L

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Niagara Falls, ON L2J 0A3

SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

	Client ID: Sample Date: Sample ID:
	MDL/Units
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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SARNIA
123 Christine St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Bismuth	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L

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5415 Morning Glory Cr.
Niagara Falls, ON L2J 0A3SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Thallium	0.1 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L

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Niagara Falls, ON L2J 0A3

SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:

Sample Date:

Sample ID:

MDL/Units

Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L
Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L

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Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Benzo [a] anthracene	0.01 ug/L
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

		Client ID:	352848 - SW B1	352849 - SW B2	352850 - SW B3
		Sample Date:	10-Dec-13	10-Dec-13	10-Dec-13
		Sample ID:	1350281-22	1350281-23	1350281-24
		MDL/Units	Water	Water	Water
General Inorganics					
Cyanide, free	2 ug/L		-	-	-
Hardness	1.0 mg/L		428	384	461
Hardness	1.0 mg/L		-	-	-
Anions					
Bromide	0.1 mg/L		-	-	-
Chloride	1 mg/L		-	-	-
Fluoride	0.1 mg/L		-	-	-
Nitrate as N	0.1 mg/L		-	-	-
Nitrite as N	0.05 mg/L		-	-	-
Phosphate as P	1 mg/L		-	-	-
Sulphate	1 mg/L		-	-	-
Metals					
Aluminum, dissolved	1 ug/L		8	4	4
Mercury, dissolved	0.1 ug/L		<0.1	<0.1	<0.1
Mercury	0.1 ug/L		-	-	-
Monomethylmercury	0.5 ug/L		<0.5	<0.5	<0.5
Arsenic	1 ug/L		<1	<1	<1
Barium	1 ug/L		138	139	156
Beryllium	0.5 ug/L		<0.5	<0.5	<0.5
Boron	10 ug/L		21	18	18
Cadmium	0.1 ug/L		<0.1	<0.1	<0.1
Calcium	100 ug/L		145000	127000	156000
Chromium	1 ug/L		8	8	9
Chromium (III)	10 ug/L		-	-	-
Chromium (VI)	10 ug/L		-	-	-
Cobalt	0.5 ug/L		<0.5	<0.5	<0.5
Copper	0.5 ug/L		4.8	2.8	3.2
Iron	100 ug/L		1480	1030	1420
Lead	0.1 ug/L		1.7	0.8	1.3
Magnesium	200 ug/L		15800	16100	17000
Manganese	5 ug/L		100	80	106
Molybdenum	0.5 ug/L		<0.5	<0.5	<0.5
Nickel	1 ug/L		4	4	4

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

		Client ID:	352848 - SW B1	352849 - SW B2	352850 - SW B3
		Sample Date:	10-Dec-13	10-Dec-13	10-Dec-13
		Sample ID:	1350281-22	1350281-23	1350281-24
		MDL/Units	Water	Water	Water
Potassium	100 ug/L		2730	2670	3040
Selenium	1 ug/L		<1	<1	<1
Silver	0.1 ug/L		<0.1	<0.1	<0.1
Sodium	200 ug/L		318000	301000	414000
Strontium	10 ug/L		454	431	559
Thallium	0.1 ug/L		<0.1	<0.1	<0.1
Titanium	5 ug/L		<5	<5	6
Tungsten	10 ug/L		<10	<10	<10
Uranium	0.1 ug/L		0.9	0.9	1.1
Vanadium	0.5 ug/L		2.7	2.3	3.4
Zinc	5 ug/L		15	11	18
Zirconium	1 ug/L		<1	<1	<1
Volatiles					
Acetone	5.0 ug/L		<5.0	<5.0	<5.0
Benzene	0.5 ug/L		<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L		<0.5	<0.5	<0.5
Bromoform	0.5 ug/L		<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L		<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L		<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5
Chloroethane	1.0 ug/L		<1.0	<1.0	<1.0
Chloroform	0.5 ug/L		<0.5	<0.5	<0.5
Chloromethane	3.0 ug/L		<3.0	<3.0	<3.0
Dibromochloromethane	0.5 ug/L		<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L		<1.0	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L		<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L		<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L		<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

		Client ID:	352848 - SW B1	352849 - SW B2	352850 - SW B3
		Sample Date:	10-Dec-13	10-Dec-13	10-Dec-13
		Sample ID:	1350281-22	1350281-23	1350281-24
		MDL/Units	Water	Water	Water
1,2-Dichloroethylene, total	0.5 ug/L		<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L		<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L		<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L		<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L		<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L		<0.5	<0.5	<0.5
Hexane	1.0 ug/L		<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L		<5.0	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L		<10.0	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L		<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L		<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L		<5.0	<5.0	<5.0
Styrene	0.5 ug/L		<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L		<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L		<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L		<0.5	<0.5	<0.5
o-Duene	0.5 ug/L		<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L		<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L		<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L		<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L		<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L		<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L		<0.5	<0.5	<0.5
Vinyl chloride	0.5 ug/L		<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L		<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L		<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L		<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate		92.6%	93.2%	93.4%
Dibromofluoromethane	Surrogate		105%	104%	102%
Toluene-d8	Surrogate		109%	109%	108%
Hydrocarbons					
F1 PHCs (C6-C10)	25.0 ug/L		<25.0	<25.0	<25.0
F2 PHCs (C10-C16)	100 ug/L		<100	<100	<100

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

		Client ID:	352848 - SW B1	352849 - SW B2	352850 - SW
		Sample Date:	10-Dec-13	10-Dec-13	10-Dec-13
		Sample ID:	1350281-22	1350281-23	1350281-24
		MDL/Units	Water	Water	Water
F3 PHCs (C16-C34)	100 ug/L		<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L		<100	<100	<100
F1 + F2 PHCs	125 ug/L		<125	<125	<125
F3 + F4 PHCs	200 ug/L		<200	<200	<200
Semi-Volatiles					
Acenaphthene	0.05 ug/L		<0.05	<0.05	<0.05
Acenaphthylene	0.05 ug/L		<0.05	<0.05	<0.05
Anthracene	0.01 ug/L		<0.01	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L		<0.01	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L		<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L		<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L		<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L		<0.05	<0.05	<0.05
Biphenyl	0.05 ug/L		<0.05	<0.05	<0.05
Chrysene	0.05 ug/L		<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L		<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L		<0.01	<0.01	<0.01
Fluorene	0.05 ug/L		<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L		<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L		<0.05	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L		<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L		<0.10	<0.10	<0.10
Naphthalene	0.05 ug/L		<0.05	<0.05	<0.05
Phenanthrene	0.05 ug/L		<0.05	<0.05	<0.05
Pyrene	0.01 ug/L		<0.01	<0.01	<0.01
2-Fluorobiphenyl	Surrogate		69.9%	74.3%	73.2%
Terphenyl-d14	Surrogate		86.4%	81.9%	86.7%

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

PO: 2514382

Project Description: City of Barrie

Client ID:	352851 - SW B4	352852 - SW B5
Sample Date:	10-Dec-13	10-Dec-13
Sample ID:	1350281-25	1350281-26
MDL/Units	Water	Water

General Inorganics

Hardness	1.0 mg/L	459	449
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Metals

Aluminum, dissolved	1 ug/L	6	4
Mercury, dissolved	0.1 ug/L	0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5
Arsenic	1 ug/L	<1	<1
Barium	1 ug/L	137	127
Beryllium	0.5 ug/L	<0.5	<0.5
Boron	10 ug/L	18	15
Cadmium	0.1 ug/L	<0.1	<0.1
Calcium	100 ug/L	156000	151000
Chromium	1 ug/L	9	8
Cobalt	0.5 ug/L	<0.5	<0.5
Copper	0.5 ug/L	1.8	1.1
Iron	100 ug/L	1330	511
Lead	0.1 ug/L	0.3	0.1
Magnesium	200 ug/L	16900	17200
Manganese	5 ug/L	118	95
Molybdenum	0.5 ug/L	<0.5	<0.5
Nickel	1 ug/L	4	4
Potassium	100 ug/L	3190	3100
Selenium	1 ug/L	<1	<1
Silver	0.1 ug/L	<0.1	<0.1
Sodium	200 ug/L	369000	355000
Strontium	10 ug/L	614	568
Thallium	0.1 ug/L	<0.1	<0.1
Titanium	5 ug/L	<5	<5
Tungsten	10 ug/L	<10	<10
Uranium	0.1 ug/L	1.3	1.4
Vanadium	0.5 ug/L	4.4	4.2
Zinc	5 ug/L	6	<5
Zirconium	1 ug/L	<1	<1

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0
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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:	352851 - SW B4	352852 - SW B5
	Sample Date:	10-Dec-13	10-Dec-13
	Sample ID:	1350281-25	1350281-26
	MDL/Units	Water	Water
Benzene	0.5 ug/L	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5	<0.5
Chloromethane	3.0 ug/L	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5
Hexane	1.0 ug/L	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Lab PO: 2514382

Project Description: City of Barrie

	Client ID:	352851 - SW B4	352852 - SW B5
	Sample Date:	10-Dec-13	10-Dec-13
	Sample ID:	1350281-25	1350281-26
	MDL/Units	Water	Water
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5
Vinyl chloride	0.5 ug/L	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	93.7%	93.3%
Dibromofluoromethane	Surrogate	103%	104%
Toluene-d8	Surrogate	108%	109%

Polycyclic Aromatic Hydrocarbons

F1 PHCs (C6-C10)	25.0 ug/L	<25.0	<25.0
F2 PHCs (C10-C16)	100 ug/L	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100
F1 + F2 PHCs	125 ug/L	<125	<125
F3 + F4 PHCs	200 ug/L	<200	<200

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05
Biphenyl	0.05 ug/L	<0.05	<0.05
Chrysene	0.05 ug/L	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05

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SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

	Client ID:	352851 - SW B4	352852 - SW B5
	Sample Date:	10-Dec-13	10-Dec-13
	Sample ID:	1350281-25	1350281-26
	MDL/Units	Water	Water
Fluoranthene	0.01 ug/L	<0.01	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10
Naphthalene	0.05 ug/L	<0.05	<0.05
Phenanthrene	0.05 ug/L	<0.05	<0.05
Pyrene	0.01 ug/L	<0.01	<0.01
2-Fluorobiphenyl	Surrogate	71.4%	67.4%
Terphenyl-d14	Surrogate	81.7%	76.9%

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Lab PO: 2514382

Order Date: 12-Dec-2013

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

General Inorganics

Hardness	1.0 mg/L
----------	----------

Metals

Aluminum, dissolved	1 ug/L
Mercury, dissolved	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Manganese	5 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L
Strontium	10 ug/L
Thallium	0.1 ug/L
Titanium	5 ug/L
Tungsten	10 ug/L
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L
Zirconium	1 ug/L

Volatiles

Acetone	5.0 ug/L
---------	----------

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Client ID: Sample Date: Sample ID:	
	MDL/Units
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L
Methyl tert-butyl ether	2.0 ug/L
Methylene Chloride	5.0 ug/L
Styrene	0.5 ug/L
1,1,1,2-Tetrachloroethane	0.5 ug/L
1,1,2,2-Tetrachloroethane	0.5 ug/L

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

Tetrachloroethylene	0.5 ug/L
Toluene	0.5 ug/L
1,2,4-Trichlorobenzene	0.5 ug/L
1,1,1-Trichloroethane	0.5 ug/L
1,1,2-Trichloroethane	0.5 ug/L
Trichloroethylene	0.5 ug/L
Trichlorofluoromethane	1.0 ug/L
1,3,5-Trimethylbenzene	0.5 ug/L
Vinyl chloride	0.5 ug/L
m,p-Xylenes	0.5 ug/L
o-Xylene	0.5 ug/L
Xylenes, total	0.5 ug/L
4-Bromofluorobenzene	Surrogate
Dibromofluoromethane	Surrogate
Toluene-d8	Surrogate

Hydrocarbons

PHCs (C6-C10)	25.0 ug/L
F2 PHCs (C10-C16)	100 ug/L
F3 PHCs (C16-C34)	100 ug/L
F4 PHCs (C34-C50)	100 ug/L
F1 + F2 PHCs	125 ug/L
F3 + F4 PHCs	200 ug/L

Semi-Volatiles

Acenaphthene	0.05 ug/L
Acenaphthylene	0.05 ug/L
Anthracene	0.01 ug/L
Benzo [a] anthracene	0.01 ug/L
Benzo [a] pyrene	0.01 ug/L
Benzo [b] fluoranthene	0.05 ug/L
Benzo [g,h,i] perylene	0.05 ug/L
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**
 Client PO: 2514382

Report Date: 13-Jan-2014
 Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Client ID:
Sample Date:
Sample ID:

MDL/Units

General Inorganics

Cyanide, free	2 ug/L
Hardness	1.0 mg/L

Anions

Bromide	0.1 mg/L
Chloride	1 mg/L
Fluoride	0.1 mg/L
Nitrate as N	0.1 mg/L
Nitrite as N	0.05 mg/L
Phosphate as P	1 mg/L
Sulphate	1 mg/L

Metals

Mercury	0.1 ug/L
Antimony	0.5 ug/L
Arsenic	1 ug/L
Barium	1 ug/L
Beryllium	0.5 ug/L
Boron	10 ug/L
Cadmium	0.1 ug/L
Calcium	100 ug/L
Chromium	1 ug/L
Chromium (III)	10 ug/L
Chromium (VI)	10 ug/L
Cobalt	0.5 ug/L
Copper	0.5 ug/L
Iron	100 ug/L
Lead	0.1 ug/L
Magnesium	200 ug/L
Molybdenum	0.5 ug/L
Nickel	1 ug/L
Potassium	100 ug/L
Selenium	1 ug/L
Silver	0.1 ug/L
Sodium	200 ug/L
Thallium	0.1 ug/L

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

	Client ID:
	Sample Date:
	Sample ID:
	MDL/Units
Uranium	0.1 ug/L
Vanadium	0.5 ug/L
Zinc	5 ug/L

Volatiles

Acetone	5.0 ug/L
Benzene	0.5 ug/L
Bromodichloromethane	0.5 ug/L
Bromoform	0.5 ug/L
Bromomethane	0.5 ug/L
Carbon Tetrachloride	0.2 ug/L
Chlorobenzene	0.5 ug/L
Chloroethane	1.0 ug/L
Chloroform	0.5 ug/L
Chloromethane	3.0 ug/L
Dibromochloromethane	0.5 ug/L
Dichlorodifluoromethane	1.0 ug/L
1,2-Dibromoethane	0.2 ug/L
1,2-Dichlorobenzene	0.5 ug/L
1,3-Dichlorobenzene	0.5 ug/L
1,4-Dichlorobenzene	0.5 ug/L
1,1-Dichloroethane	0.5 ug/L
1,2-Dichloroethane	0.5 ug/L
1,1-Dichloroethylene	0.5 ug/L
cis-1,2-Dichloroethylene	0.5 ug/L
trans-1,2-Dichloroethylene	0.5 ug/L
1,2-Dichloroethylene, total	0.5 ug/L
1,2-Dichloropropane	0.5 ug/L
cis-1,3-Dichloropropylene	0.5 ug/L
trans-1,3-Dichloropropylene	0.5 ug/L
1,3-Dichloropropene, total	0.5 ug/L
Ethylbenzene	0.5 ug/L
Hexane	1.0 ug/L
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L
Methyl Isobutyl Ketone	5.0 ug/L

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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

t PO: 2514382

Order Date: 12-Dec-2013

Project Description: City of Barrie

Client ID:

Sample Date:

Sample ID:

MDL/Units

Methyl tert-butyl ether 2.0 ug/L

Methylene Chloride 5.0 ug/L

Styrene 0.5 ug/L

1,1,1,2-Tetrachloroethane 0.5 ug/L

1,1,2,2-Tetrachloroethane 0.5 ug/L

Tetrachloroethylene 0.5 ug/L

Toluene 0.5 ug/L

1,2,4-Trichlorobenzene 0.5 ug/L

1,1,1-Trichloroethane 0.5 ug/L

1,1,2-Trichloroethane 0.5 ug/L

Trichloroethylene 0.5 ug/L

Trichlorofluoromethane 1.0 ug/L

1,3,5-Trimethylbenzene 0.5 ug/L

Vinyl chloride 0.5 ug/L

m,p-Xylenes 0.5 ug/L

o-Xylene 0.5 ug/L

nes, total 0.5 ug/L

4-Bromofluorobenzene Surrogate

Dibromofluoromethane Surrogate

Toluene-d8 Surrogate

Hydrocarbons

F1 PHCs (C6-C10) 25.0 ug/L

F2 PHCs (C10-C16) 100 ug/L

F3 PHCs (C16-C34) 100 ug/L

F4 PHCs (C34-C50) 100 ug/L

F1 + F2 PHCs 125 ug/L

F3 + F4 PHCs 200 ug/L

Semi-Volatiles

Acenaphthene 0.05 ug/L

Acenaphthylene 0.05 ug/L

Anthracene 0.01 ug/L

Benzo [a] anthracene 0.01 ug/L

Benzo [a] pyrene 0.01 ug/L

Benzo [b] fluoranthene 0.05 ug/L

Benzo [g,h,i] perylene 0.05 ug/L

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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Project Description: City of Barrie

Client ID: Sample Date: Sample ID:	
	MDL/Units
Benzo [k] fluoranthene	0.05 ug/L
Biphenyl	0.05 ug/L
Chrysene	0.05 ug/L
Dibenzo [a,h] anthracene	0.05 ug/L
Fluoranthene	0.01 ug/L
Fluorene	0.05 ug/L
Indeno [1,2,3-cd] pyrene	0.05 ug/L
1-Methylnaphthalene	0.05 ug/L
2-Methylnaphthalene	0.05 ug/L
Methylnaphthalene (1&2)	0.10 ug/L
Naphthalene	0.05 ug/L
Phenanthrene	0.05 ug/L
Pyrene	0.01 ug/L
2-Fluorobiphenyl	Surrogate
Terphenyl-d14	Surrogate

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123 Christine St. N.
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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Lab PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Bromide	ND	0.1	mg/L						
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Phosphate as P	ND	1	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Cyanide, free	ND	2	ug/L						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25.0	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury, dissolved	ND	0.1	ug/L						
Aluminum, dissolved	ND	1	ug/L						
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Cobalt	ND	100	ug/L						
Cromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Iron	ND	100	ug/L						
Lead	ND	0.1	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Potassium	ND	100	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Strontium	ND	10	ug/L						
Thallium	ND	0.1	ug/L						
Titanium	ND	5	ug/L						
Tungsten	ND	10	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Zirconium	ND	1	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [k] fluoranthene	ND	0.05	ug/L						
Biphenyl	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	14.5		ug/L		72.3	50-140			
Surrogate: Terphenyl-d14	19.4		ug/L		97.0	50-140			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						

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SARNIA
123 Christine St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Contract PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	73.3		ug/L		91.6	50-140			
Surrogate: Dibromofluoromethane	85.3		ug/L		107	50-140			
Surrogate: Toluene-d8	87.2		ug/L		109	50-140			

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Certificate of Analysis

Client: **E-3 Laboratories Inc.**

Client PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Bromide	0.19	0.1	mg/L	0.17			12.7	20	
Chloride	753	10	mg/L	781			3.7	10	
Fluoride	ND	0.1	mg/L	ND				10	
Nitrate as N	0.16	0.1	mg/L	0.17			1.9	20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Phosphate as P	ND	1	mg/L	ND				20	
Sulphate	70.4	1	mg/L	70.5			0.1	10	
General Inorganics									
Cyanide, free	ND	2	ug/L	ND				20	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25.0	ug/L	ND				30	
Metals									
Mercury, dissolved	ND	0.1	ug/L	ND				27	
Aluminum, dissolved	3.0	1	ug/L	3.2			5.9	20	
Mercury	ND	0.1	ug/L	ND				20	
Antimony	0.66	0.5	ug/L	1.97			100.0	20	QR-01
Arsenic	ND	1	ug/L	ND			0.0	20	
Barium	ND	1	ug/L	ND			0.0	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	ND	10	ug/L	ND			0.0	20	
Cadmium	ND	0.1	ug/L	ND			0.0	20	
Calcium	ND	100	ug/L	ND			0.0	20	
Chromium (VI)	ND	10	ug/L	ND				20	
Chromium	ND	1	ug/L	ND			0.0	20	
Cobalt	ND	0.5	ug/L	ND			0.0	20	
Copper	ND	0.5	ug/L	ND			0.0	20	
Iron	ND	100	ug/L	ND			0.0	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Magnesium	ND	200	ug/L	ND			0.0	20	
Manganese	ND	5	ug/L	ND			0.0	20	
Molybdenum	ND	0.5	ug/L	ND			0.0	20	
Nickel	ND	1	ug/L	ND			0.0	20	
Potassium	ND	100	ug/L	ND			0.0	20	
Selenium	ND	1	ug/L	ND			0.0	20	
Silver	ND	0.1	ug/L	ND			0.0	20	
Sodium	ND	200	ug/L	ND			0.0	20	
Strontium	ND	10	ug/L	ND			0.0	20	
Thallium	ND	0.1	ug/L	ND			0.0	20	
Titanium	ND	5	ug/L	ND			0.0	20	
Tungsten	ND	10	ug/L	ND			0.0	20	
Uranium	ND	0.1	ug/L	ND			0.0	20	
Vanadium	ND	0.5	ug/L	ND			0.0	20	
Zinc	ND	5	ug/L	ND			0.0	20	
Zirconium	ND	1	ug/L	ND			0.0	20	
Volatiles									
Acetone	9.21	5.0	ug/L	ND			0.0	30	
Benzene	3.28	0.5	ug/L	2.59			23.5	30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	0.71	0.5	ug/L	ND			0.0	30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	

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SARNIA
123 Christie St. N.
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Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			0.0	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	0.57	0.5	ug/L	ND			0.0	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND			0.0	30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Trichloroethane	ND	0.5	ug/L	ND			0.0	30	
Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND			0.0	30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	7.59	0.5	ug/L	4.01			61.7	30	QR-07
o-Xylene	ND	0.5	ug/L	ND			0.0	30	
Surrogate: 4-Bromofluorobenzene	75.0		ug/L	ND	93.7	50-140			
Surrogate: Dibromofluoromethane	88.3		ug/L	ND	110	50-140			
Surrogate: Toluene-d8	87.0		ug/L	ND	109	50-140			

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SARNIA
123 Christine St. N
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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Bromide	1.18		mg/L	0.17	101	72-106			
Chloride	9.08		mg/L	ND	90.8	78-112			
Fluoride	0.90		mg/L	ND	90.4	73-113			
Nitrate as N	1.14		mg/L	0.17	97.5	81-112			
Nitrite as N	1.02		mg/L	ND	102	76-117			
Phosphate as P	4.53		mg/L	ND	90.6	72-131			
Sulphate	80.5		mg/L	70.5	101	75-111			
General Inorganics									
Cyanide, free	30.7	2	ug/L	ND	102	70-130			
Hydrocarbons									
F1 PHCs (C6-C10)	2070	25.0	ug/L	ND	104	68-117			
F2 PHCs (C10-C16)	1570	100	ug/L	ND	87.0	60-140			
F3 PHCs (C16-C34)	3150	100	ug/L	ND	84.7	60-140			
F4 PHCs (C34-C50)	1910	100	ug/L	ND	76.9	60-140			
Metals									
Mercury, dissolved	3.2	0.1	ug/L	ND	108	74-130			
Aluminum, dissolved	50.4		ug/L	3.2	94.4	70-130			
Mercury	3.16	0.1	ug/L	ND	105	78-137			
Antimony	46.3		ug/L	1.97	88.7	80-120			
Arsenic	50.8		ug/L	0.1	101	80-120			
Barium	48.8		ug/L	ND	97.7	80-120			
Beryllium	46.5		ug/L	0.005	93.0	80-120			
Boron	46		ug/L	ND	92.6	80-120			
Cadmium	53.4		ug/L	0.03	107	80-120			
Calcium	1180		ug/L	3	118	80-120			
Chromium (VI)	188	10	ug/L	ND	94.0	70-130			
Chromium	48.8		ug/L	0.09	97.3	80-120			
Cobalt	47.4		ug/L	0.002	94.8	80-120			
Copper	47.4		ug/L	ND	94.9	80-120			
Iron	1130		ug/L	ND	114	80-120			
Lead	47.3		ug/L	ND	94.6	80-120			
Magnesium	1050		ug/L	0.4	105	80-120			
Manganese	48.0		ug/L	0.004	96.0	80-120			
Molybdenum	48.9		ug/L	0.29	97.3	80-120			
Nickel	47.1		ug/L	ND	94.1	80-120			
Potassium	1080		ug/L	0.09	108	80-120			
Selenium	51.2		ug/L	0.2	102	80-120			
Silver	52.3		ug/L	0.03	104	80-120			
Sodium	1050		ug/L	ND	105	80-120			
Strontium	49		ug/L	0.003	97.4	80-120			
Thallium	47.4		ug/L	ND	94.9	80-120			
Titanium	50.3		ug/L	ND	101	80-120			
Tungsten	45.0		ug/L	0.4	89.2	80-120			
Uranium	45.8		ug/L	0.02	91.5	80-120			
Vanadium	49.9		ug/L	0.07	99.7	80-120			
Zinc	45		ug/L	ND	92.6	80-120			
Zirconium	44.9		ug/L	ND	89.7	80-120			

Semi-Volatiles

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SARNIA
123 Christine St. N
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: E-3 Laboratories Inc.

Report Date: 13-Jan-2014

Contract PO: 2514382

Project Description: City of Barrie

Order Date: 12-Dec-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Acenaphthene	3.74	0.05	ug/L	ND	74.8	50-140			
Acenaphthylene	3.67	0.05	ug/L	ND	73.3	50-140			
Anthracene	3.83	0.01	ug/L	ND	76.6	50-140			
Benzo [a] anthracene	3.80	0.01	ug/L	ND	76.0	50-140			
Benzo [a] pyrene	3.51	0.01	ug/L	ND	70.2	50-140			
Benzo [b] fluoranthene	4.41	0.05	ug/L	ND	88.3	50-140			
Benzo [g,h,i] perylene	4.08	0.05	ug/L	ND	81.6	50-140			
Benzo [k] fluoranthene	4.97	0.05	ug/L	ND	99.4	50-140			
Biphenyl	4.11	0.05	ug/L	ND	82.3	50-140			
Chrysene	3.94	0.05	ug/L	ND	78.7	50-140			
Dibenzo [a,h] anthracene	4.15	0.05	ug/L	ND	82.9	50-140			
Fluoranthene	4.09	0.01	ug/L	ND	81.8	50-140			
Fluorene	3.41	0.05	ug/L	ND	68.2	50-140			
Indeno [1,2,3-cd] pyrene	4.28	0.05	ug/L	ND	85.6	50-140			
1-Methylnaphthalene	3.72	0.05	ug/L	ND	74.4	50-140			
2-Methylnaphthalene	3.80	0.05	ug/L	ND	76.0	50-140			
Naphthalene	3.55	0.05	ug/L	ND	71.0	50-140			
Phenanthrene	4.04	0.05	ug/L	ND	80.8	50-140			
Pyrene	4.16	0.01	ug/L	ND	83.2	50-140			
Surrogate: 2-Fluorobiphenyl	15.6		ug/L		78.2	50-140			
Volatiles									
Acetone	85.6	5.0	ug/L	ND	85.6	50-140			
Benzene	44.6	0.5	ug/L	ND	112	60-130			
Bromodichloromethane	40.8	0.5	ug/L	ND	102	60-130			
Bromoform	31.4	0.5	ug/L	ND	78.5	60-130			
Bromomethane	41.3	0.5	ug/L	ND	103	50-140			
Carbon Tetrachloride	27.4	0.2	ug/L	ND	68.5	60-130			
Chlorobenzene	37.9	0.5	ug/L	ND	94.8	60-130			
Chloroethane	39.4	1.0	ug/L	ND	98.6	50-140			
Chloroform	46.4	0.5	ug/L	ND	116	60-130			
Chloromethane	32.7	3.0	ug/L	ND	81.7	50-140			
Dibromochloromethane	34.7	0.5	ug/L	ND	86.8	60-130			
Dichlorodifluoromethane	39.0	1.0	ug/L	ND	97.4	50-140			
1,2-Dibromoethane	35.5	0.2	ug/L	ND	88.8	60-130			
1,2-Dichlorobenzene	43.2	0.5	ug/L	ND	108	60-130			
1,3-Dichlorobenzene	39.4	0.5	ug/L	ND	98.4	60-130			
1,4-Dichlorobenzene	40.9	0.5	ug/L	ND	102	60-130			
1,1-Dichloroethane	40.7	0.5	ug/L	ND	102	60-130			
1,2-Dichloroethane	41.6	0.5	ug/L	ND	104	60-130			
1,1-Dichloroethylene	38.2	0.5	ug/L	ND	95.5	60-130			
cis-1,2-Dichloroethylene	40.8	0.5	ug/L	ND	102	60-130			
trans-1,2-Dichloroethylene	43.3	0.5	ug/L	ND	108	60-130			
1,2-Dichloropropane	48.9	0.5	ug/L	ND	122	60-130			
cis-1,3-Dichloropropylene	46.1	0.5	ug/L	ND	115	60-130			
trans-1,3-Dichloropropylene	42.4	0.5	ug/L	ND	106	60-130			
Ethylbenzene	38.0	0.5	ug/L	ND	95.0	60-130			
Hexane	33.3	1.0	ug/L	ND	83.4	60-130			
Methyl Ethyl Ketone (2-Butanone)	103	5.0	ug/L	ND	103	50-140			
Methyl Butyl Ketone (2-Hexanone)	108	10.0	ug/L	ND	108	50-140			
Methyl Isobutyl Ketone	113	5.0	ug/L	ND	113	50-140			

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Certificate of Analysis

Report Date: 13-Jan-2014

Client: E-3 Laboratories Inc.

Order Date: 12-Dec-2013

Client PO: 2514382

Project Description: City of Barrie

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	107	2.0	ug/L	ND	107	50-140			
Methylene Chloride	35.8	5.0	ug/L	ND	89.5	60-130			
Styrene	36.3	0.5	ug/L	ND	90.8	60-130			
1,1,1,2-Tetrachloroethane	29.2	0.5	ug/L	ND	73.0	60-130			
1,1,2,2-Tetrachloroethane	38.5	0.5	ug/L	ND	96.2	60-130			
Tetrachloroethylene	36.0	0.5	ug/L	ND	89.9	60-130			
Toluene	40.2	0.5	ug/L	ND	100	60-130			
1,2,4-Trichlorobenzene	41.3	0.5	ug/L	ND	103	60-130			
1,1,1-Trichloroethane	38.3	0.5	ug/L	ND	95.7	60-130			
1,1,2-Trichloroethane	47.4	0.5	ug/L	ND	119	60-130			
Trichloroethylene	41.8	0.5	ug/L	ND	105	60-130			
Trichlorofluoromethane	35.6	1.0	ug/L	ND	88.9	60-130			
1,3,5-Trimethylbenzene	36.7	0.5	ug/L	ND	91.7	60-130			
Vinyl chloride	29.3	0.5	ug/L	ND	73.2	50-140			
m,p-Xylenes	74.0	0.5	ug/L	ND	92.5	60-130			
o-Xylene	39.8	0.5	ug/L	ND	99.6	60-130			

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Certificate of Analysis

Client: E-3 Laboratories Inc.

PO: 2514382

Project Description: City of Barrie

Report Date: 13-Jan-2014

Order Date: 12-Dec-2013

Qualifier Notes:**Sample Qualifiers :**

- 1 : Elevated detection limit due to dilution required because of high target analyte concentration.
- 2 : Please note that this sample is a standard, therefore Paracels normal Holding Time does not apply.

QC Qualifiers :

- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.
- QR-07 : Duplicate result exceeds RPD limits due to non-homogeneity between multiple sample vials.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 - this report includes an updated Hardness result.

Other Report Notes:

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

PHC additional information:

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



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CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
 Christi Groves
 121 Commerce Park Drive, Unit L
 Barrie
 L4N 8X1
 Tel: 705-722-4492

Fax:
 Email: cgroves@golder.com

Work Order No.: 2510043
 Received : 2013-08-24
 PO Number:
 Reported: 2013-09-04
 Project Name: Barrie Historic Waste
 Chain of Custody No.: 21806

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
Dup 1	2013-08-23	340446	Alkalinity (CaCO ₃)	270	mg/LCaCO ₃	2.00	2013-08-30	APHA 2320B mod
			Ammonia (Total)	0.18	mg/L	0.03	2013-08-27	APHA 4500
			Chloride	286	mg/L	0.25	2013-09-03	HACH 8113
			Conductivity	1410	uS/cm	N/A	2013-08-27	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-08-30	Subcontracted
			Metals	See	Attached	N/A	2013-08-29	Subcontracted
			PAHs	See	Attached	N/A	2013-08-30	Subcontracted
			pH	7.76	SU	N/A	2013-08-26	APHA 4500 A,B MOD
			Sulfate (SO ₄)	30	mg/L	10	2013-09-03	HACH 8051
			VOC Scan	See	Attached	N/A	2013-08-30	Subcontracted
SW B1	2013-08-23	340447	Alkalinity (CaCO ₃)	264	mg/LCaCO ₃	2.00	2013-08-30	APHA 2320B mod
			Ammonia (Total)	0.29	mg/L	0.03	2013-08-27	APHA 4500
			Chloride	312	mg/L	0.25	2013-09-03	HACH 8113
			Conductivity	1400	uS/cm	N/A	2013-08-27	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-08-30	Subcontracted
			Metals	See	Attached	N/A	2013-08-29	Subcontracted
			PAHs	See	Attached	N/A	2013-08-30	Subcontracted
			pH	7.70	SU	N/A	2013-08-26	APHA 4500 A,B MOD
			Sulfate (SO ₄)	30	mg/L	10	2013-09-03	HACH 8051
			VOC Scan	See	Attached	N/A	2013-08-30	Subcontracted
SW B2	2013-08-23	340448	Alkalinity (CaCO ₃)	269	mg/LCaCO ₃	2.00	2013-08-30	APHA 2320B mod
			Ammonia (Total)	0.11	mg/L	0.03	2013-08-27	APHA 4500
			Chloride	370	mg/L	0.25	2013-09-03	HACH 8113
			Conductivity	1380	uS/cm	N/A	2013-08-27	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-08-30	Subcontracted
			Metals	See	Attached	N/A	2013-08-29	Subcontracted
			PAHs	See	Attached	N/A	2013-08-30	Subcontracted
			pH	7.72	SU	N/A	2013-08-26	APHA 4500 A,B MOD
			Sulfate (SO ₄)	30	mg/L	10	2013-09-03	HACH 8051
			VOC Scan	See	Attached	N/A	2013-08-30	Subcontracted
SW B3	2013-08-23	340449	Alkalinity (CaCO ₃)	259	mg/LCaCO ₃	2.00	2013-08-30	APHA 2320B mod
			Ammonia (Total)	0.11	mg/L	0.03	2013-08-27	APHA 4500
			Chloride	394	mg/L	0.25	2013-09-03	HACH 8113
			Conductivity	1390	uS/cm	N/A	2013-08-27	APHA 2510

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
 Laboratory Manager

Page 1 of 4

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E3 Laboratories Inc.
SS#4, 360 York Rd., Unit 10, Niagara-on-the-Lake, Ontario L0S 1J0
Email: info@e3labs.ca
Tel: (905) 641-9000, Fax: (905) 641-9001

CERTIFICATE OF ANALYSIS

Golder Associates Ltd.
Christi Groves
121 Commerce Park Drive, Unit L
Barrie
L4N 8X1
Tel: 705-722-4492

Fax:
Email: cgroves@golder.com

Work Order No.: 2510043
Received : 2013-08-24
PO Number:
Reported: 2013-09-04
Project Name: Barrie Historic Waste
Chain of Custody No.: 21806

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
WB3	2013-08-23	340449	F1-F4 PHC	See	Attached	N/A	2013-08-30	Subcontracted
			Metals	See	Attached	N/A	2013-08-29	Subcontracted
			PAHs	See	Attached	N/A	2013-08-30	Subcontracted
			pH	7.76	SU	N/A	2013-08-26	APHA 4500 A,B MOD
			Sulfate (SO4)	30	mg/L	10	2013-09-03	HACH 8051
			VOC Scan	See	Attached	N/A	2013-08-30	Subcontracted
WB4	2013-08-23	340450	Alkalinity (CaCO3)	268	mg/LCaCO3	2.00	2013-08-30	APHA 2320B mod
			Ammonia (Total)	0.15	mg/L	0.03	2013-08-27	APHA 4500
			Chloride	414	mg/L	0.25	2013-09-03	HACH 8113
			Conductivity	1450	uS/cm	N/A	2013-08-27	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-08-30	Subcontracted
			Metals	See	Attached	N/A	2013-08-29	Subcontracted
			PAHs	See	Attached	N/A	2013-08-30	Subcontracted
			pH	7.72	SU	N/A	2013-08-26	APHA 4500 A,B MOD
			Sulfate (SO4)	30	mg/L	10	2013-09-03	HACH 8051
			VOC Scan	See	Attached	N/A	2013-08-30	Subcontracted
WB5	2013-08-23	340451	Alkalinity (CaCO3)	259	mg/LCaCO3	2.00	2013-08-30	APHA 2320B mod
			Ammonia (Total)	<0.03	mg/L	0.03	2013-08-27	APHA 4500
			Chloride	358	mg/L	0.25	2013-09-03	HACH 8113
			Conductivity	1410	uS/cm	N/A	2013-08-27	APHA 2510
			F1-F4 PHC	See	Attached	N/A	2013-08-30	Subcontracted
			Metals	See	Attached	N/A	2013-08-29	Subcontracted
			PAHs	See	Attached	N/A	2013-08-30	Subcontracted
			pH	7.80	SU	N/A	2013-08-26	APHA 4500 A,B MOD
			Sulfate (SO4)	40	mg/L	10	2013-09-03	HACH 8051
			VOC Scan	See	Attached	N/A	2013-08-30	Subcontracted

Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 2 of 4

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Christi Groves
121 Commerce Park Drive, Unit L
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L4N 8X1
Tel: 705-722-4492

Fax:
Email: cgroves@golder.com

Work Order No.: 2510043
Received : 2013-08-24
PO Number:
Reported: 2013-09-04
Project Name: Barrie Historic Waste
Chain of Custody No.: 21806

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Reported by:

Nilou Ghazi, Ph.D., P.Eng.
Laboratory Manager

Page 3 of 4

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Received : 2013-08-24
PO Number:
Reported: 2013-09-04
Project Name: Barrie Historic Waste
Chain of Custody No.: 21806

Client Sample ID	Sample Date	Lab ID	Parameter	Result	Unit	RDL	Date Analyzed	Method
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Nilou Ghazi, Ph.D., P. Eng.
Laboratory Manager

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C.O.C.: --

REPORT No. B13-22318 (1)

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 04-Sep-13

P.O. NUMBER: 2510043

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	M.D.L.	Client I.D.		340446-Dup 1	340447-SW B1	340448-SW B2	340449-SW B3
			Sample I.D.		B13-22318-1	B13-22318-2	B13-22318-3	B13-22318-4
			Date Collected		23-Aug-13	23-Aug-13	23-Aug-13	23-Aug-13
			Reference Method	Date/Site Analyzed				
Hardness (as CaCO3)	mg/L	1	SM 3120	29-Aug-13/O	360	340	335	347
Aluminum	mg/L	0.01	SM 3120	29-Aug-13/O	0.05	0.04	0.04	0.04
Aluminum (total)	mg/L	0.01	SM 3120	29-Aug-13/O	0.16	0.08	0.11	0.20
Antimony	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0001	0.0002	< 0.0001	0.0001
Arsenic	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0004	0.0003	0.0003	0.0004
Barium	mg/L	0.001	SM 3120	29-Aug-13/O	0.163	0.163	0.173	0.181
Beryllium	mg/L	0.0001	EPA 200.8	29-Aug-13/O	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Boron	mg/L	0.005	SM 3120	29-Aug-13/O	0.018	0.019	0.018	0.019
Cadmium	mg/L	0.00002	EPA 200.8	29-Aug-13/O	0.00025	0.00013	0.00008	0.00008
Calcium	mg/L	0.02	SM 3120	29-Aug-13/O	121	123	132	136
Chromium	mg/L	0.0002	EPA 200.8	29-Aug-13/O	0.0042	0.0033	0.0021	0.0025
Cobalt	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0003	0.0002	< 0.0001	0.0001
Copper	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0100	0.0091	0.0053	0.0069
Iron (Total)	mg/L	0.005	SM 3120	29-Aug-13/O	1.02	0.675	0.731	1.20
Lead	mg/L	0.00002	EPA 200.8	29-Aug-13/O	0.00282	0.00207	0.00083	0.00162
Magnesium	mg/L	0.01	SM 3120	29-Aug-13/O	14.3	14.6	15.7	16.0
Manganese (Total)	mg/L	0.001	SM 3120	29-Aug-13/O	0.080	0.077	0.030	0.098
Mercury	mg/L	0.00002	SM 3112B	29-Aug-13/R	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0008	0.0008	0.0007	0.0007
Nickel	mg/L	0.01	SM 3120	29-Aug-13/O	< 0.01	< 0.01	< 0.01	< 0.01
Potassium	mg/L	0.1	SM 3120	29-Aug-13/O	2.5	2.6	2.7	2.8
Selenium	mg/L	0.001	EPA 200.8	29-Aug-13/O	< 0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.00002	EPA 200.8	29-Aug-13/O	0.00005	0.00002	< 0.00002	< 0.00002
Sodium	mg/L	0.2	SM 3120	29-Aug-13/O	163	170	179	180
Strontium	mg/L	0.001	SM 3120	29-Aug-13/O	0.482	0.490	0.519	0.530
Thallium	mg/L	0.00005	EPA 200.8	29-Aug-13/O	0.00006	< 0.00005	< 0.00005	< 0.00005
Titanium	mg/L	0.005	SM 3120	29-Aug-13/O	0.009	< 0.005	< 0.005	0.010
Tungsten	mg/L	0.01	SM 3120	29-Aug-13/O	0.03	0.02	0.02	0.01

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

O.C.: ---

REPORT No. B13-22318 (I)

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13
DATE REPORTED: 04-Sep-13
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:
P.O. NUMBER: 2510043
WATERWORKS NO.

Client I.D.	340446-Dup 1	340447-SW B1	340448-SW B2	340449-SW B3
Sample I.D.	B13-22318-1	B13-22318-2	B13-22318-3	B13-22318-4
Date Collected	23-Aug-13	23-Aug-13	23-Aug-13	23-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Uranium	mg/L	0.00005	EPA 200.8	29-Aug-13/O	0.00115	0.00110	0.00134	0.00146
Vanadium	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0009	0.0004	0.0005	0.0008
Zinc	mg/L	0.005	SM 3120	29-Aug-13/O	0.023	0.015	0.014	0.029
Zirconium	mg/L	0.003	SM 3120	29-Aug-13/O	< 0.003	< 0.003	< 0.003	< 0.003

M. Dubien

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

			Client I.D.		340450-SW B4	340451-SW B5:
			Sample I.D.		B13-22318-5	B13-22318-6
			Date Collected		23-Aug-13	23-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed		
Hardness (as CaCO ₃)	mg/L	1	SM 3120	29-Aug-13/O	335	359
Aluminum	mg/L	0.01	SM 3120	29-Aug-13/O	0.04	0.04
Aluminum (total)	mg/L	0.01	SM 3120	29-Aug-13/O	0.07	0.07
Antimony	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0002	< 0.0001
Arsenic	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0006	0.0004
Barium	mg/L	0.001	SM 3120	29-Aug-13/O	0.163	0.154
Beryllium	mg/L	0.0001	EPA 200.8	29-Aug-13/O	< 0.0001	< 0.0001
Boron	mg/L	0.005	SM 3120	29-Aug-13/O	0.022	0.016
Cadmium	mg/L	0.00002	EPA 200.8	29-Aug-13/O	0.00010	0.00012
Calcium	mg/L	0.02	SM 3120	29-Aug-13/O	130	133
Chromium	mg/L	0.0002	EPA 200.8	29-Aug-13/O	0.0026	0.0049
Cobalt	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0001	0.0001
Copper	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0089	0.0100
Iron (Total)	mg/L	0.005	SM 3120	29-Aug-13/O	1.01	0.605
Lead	mg/L	0.00002	EPA 200.8	29-Aug-13/O	0.00541	0.00142
Magnesium	mg/L	0.01	SM 3120	29-Aug-13/O	15.1	15.6
Manganese (Total)	mg/L	0.001	SM 3120	29-Aug-13/O	0.079	0.064
Mercury	mg/L	0.00002	SM 3112B	29-Aug-13/R	< 0.00002	< 0.00002
Molybdenum	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0008	0.0015
Nickel	mg/L	0.01	SM 3120	29-Aug-13/O	< 0.01	< 0.01
Potassium	mg/L	0.1	SM 3120	29-Aug-13/O	2.8	2.7
Selenium	mg/L	0.001	EPA 200.8	29-Aug-13/O	< 0.001	< 0.001
Silver	mg/L	0.00002	EPA 200.8	29-Aug-13/O	0.00002	0.00002
Sodium	mg/L	0.2	SM 3120	29-Aug-13/O	221	212
Strontium	mg/L	0.001	SM 3120	29-Aug-13/O	0.690	0.636
Thallium	mg/L	0.00005	EPA 200.8	29-Aug-13/O	< 0.00005	< 0.00005
Titanium	mg/L	0.005	SM 3120	29-Aug-13/O	< 0.005	< 0.005
Tungsten	mg/L	0.01	SM 3120	29-Aug-13/O	0.02	0.02

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien

Lab Manager

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Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

Client I.D.	340450-SW B4	340451-SW B5
Sample I.D.	B13-22318-5	B13-22318-6
Date Collected	23-Aug-13	23-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed		
Uranium	mg/L	0.00005	EPA 200.8	29-Aug-13/O	0.00144	0.00172
Vanadium	mg/L	0.0001	EPA 200.8	29-Aug-13/O	0.0006	0.0008
Zinc	mg/L	0.005	SM 3120	29-Aug-13/O	0.013	0.013
Zirconium	mg/L	0.003	SM 3120	29-Aug-13/O	< 0.003	< 0.003

M. Dubien

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien

Lab Manager

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DATE RECEIVED: 27-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 04-Sep-13

P.O. NUMBER: 2510043

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	M.D.L.	Client I.D.	
			Sample I.D.	
			Date Collected	
			Reference Method	Date/Site Analyzed
Hardness (as CaCO3)	mg/L	1	SM 3120	29-Aug-13/O
Aluminum	mg/L	0.01	SM 3120	29-Aug-13/O
Aluminum (total)	mg/L	0.01	SM 3120	29-Aug-13/O
Antimony	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Arsenic	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Barium	mg/L	0.001	SM 3120	29-Aug-13/O
Beryllium	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Boron	mg/L	0.005	SM 3120	29-Aug-13/O
Cadmium	mg/L	0.00002	EPA 200.8	29-Aug-13/O
Calcium	mg/L	0.02	SM 3120	29-Aug-13/O
Chromium	mg/L	0.0002	EPA 200.8	29-Aug-13/O
Cobalt	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Copper	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Iron (Total)	mg/L	0.005	SM 3120	29-Aug-13/O
Lead	mg/L	0.00002	EPA 200.8	29-Aug-13/O
Magnesium	mg/L	0.01	SM 3120	29-Aug-13/O
Manganese (Total)	mg/L	0.001	SM 3120	29-Aug-13/O
Mercury	mg/L	0.00002	SM 3112B	29-Aug-13/R
Molybdenum	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Nickel	mg/L	0.01	SM 3120	29-Aug-13/O
Potassium	mg/L	0.1	SM 3120	29-Aug-13/O
Selenium	mg/L	0.001	EPA 200.8	29-Aug-13/O
Silver	mg/L	0.00002	EPA 200.8	29-Aug-13/O
Sodium	mg/L	0.2	SM 3120	29-Aug-13/O
Strontium	mg/L	0.001	SM 3120	29-Aug-13/O
Thallium	mg/L	0.00005	EPA 200.8	29-Aug-13/O
Titanium	mg/L	0.005	SM 3120	29-Aug-13/O
Tungsten	mg/L	0.01	SM 3120	29-Aug-13/O

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

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Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13
DATE REPORTED: 04-Sep-13
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:
P.O. NUMBER: 2510043
WATERWORKS NO.

Client I.D.
Sample I.D.
Date Collected

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
Uranium	mg/L	0.00005	EPA 200.8	29-Aug-13/O
Vanadium	mg/L	0.0001	EPA 200.8	29-Aug-13/O
Zinc	mg/L	0.005	SM 3120	29-Aug-13/O
Zirconium	mg/L	0.003	SM 3120	29-Aug-13/O

M. Dubien

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: --

REPORT No. B13-22318 (ii)

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 04-Sep-13

P.O. NUMBER: 2510043

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

			Client I.D.	340446-Dup 1	340447-SW B1	340448-SW B2	340449-SW B3
			Sample I.D.	B13-22318-1	B13-22318-2	B13-22318-3	B13-22318-4
			Date Collected	23-Aug-13	23-Aug-13	23-Aug-13	23-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
Acetone	µg/L	30	EPA 8260	30-Aug-13/R	< 30	< 30	< 30
Benzene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Bromodichloromethane	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2	< 2
Bromoform	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5	< 5
Bromomethane	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride	µg/L	0.2	EPA 8260	30-Aug-13/R	< 0.2	< 0.2	< 0.2
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Chloroform	µg/L	1	EPA 8260	30-Aug-13/R	< 1	< 1	< 1
Dibromochloromethane	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2	< 2
Dichlorobenzene, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichlorobenzene, 1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichlorobenzene, 1,4-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2	< 2
Dichloroethane, 1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloroethane, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloroethylene, 1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloropropane, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Ethylbenzene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	30-Aug-13/R	< 0.2	< 0.2	< 0.2
Hexane	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5	< 5

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien

Lab Manager

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REPORT No. B13-22318 (II)

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E3 Labs Inc.
360 York Rd #10,
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Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

Client I.D.	340446-Dup 1	340447-SW B1	340448-SW B2	340449-SW B3
Sample I.D.	B13-22318-1	B13-22318-2	B13-22318-3	B13-22318-4
Date Collected	23-Aug-13	23-Aug-13	23-Aug-13	23-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Methyl Ethyl Ketone	µg/L	20	EPA 8260	30-Aug-13/R	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	30-Aug-13/R	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2	< 2	< 2
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5	< 5	< 5
Styrene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane, 1,1,1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane, 1,1,2,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorobenzene, 1,2,4-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane, 1,1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane, 1,1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5	< 5	< 5
Vinyl Chloride	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p-	µg/L	1.0	EPA 8260	30-Aug-13/R	< 1.0	< 1.0	< 1.0	< 1.0
Xylene, o-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p,o-	µg/L	1.1	EPA 8260	30-Aug-13/R	< 1.1	< 1.1	< 1.1	< 1.1
PHC F1 (C6-C10)	µg/L	50	MOE TPH-E3397A	30-Aug-13/R	< 50	< 50	< 50	< 50
Comment-purgeable	-	-	-	30-Aug-13	-	-	-	-
PHC F2 (>C10-C16)	µg/L	50	MOE PHC E3421	29-Aug-13/K	< 50	< 50	< 50	< 50
PHC F3 (>C16-C34)	µg/L	400	MOE PHC E3421	29-Aug-13/K	< 400	< 400	< 400	< 400
PHC F4 (>C34-C50)	µg/L	400	MOE PHC E3421	29-Aug-13/K	< 400	< 400	< 400	< 400
Comment-extractable	-	-	-	29-Aug-13	-	-	-	-

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien

Lab Manager

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REPORT No. B13-22318 (II)

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360 York Rd #10,

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Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

			Client I.D.	340446-Dup 1	340447-SW B1	340448-SW B2	340449-SW B3
			Sample I.D.	B13-22318-1	B13-22318-2	B13-22318-3	B13-22318-4
			Date Collected	23-Aug-13	23-Aug-13	23-Aug-13	23-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			

1 Note: Elevated MDL due to low sample volume.

M. Dubien

Michelle Dubien

Lab Manager

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

Client I.D.	340450-SW B4	340451-SW B5
Sample I.D.	B13-22318-5	B13-22318-6
Date Collected	23-Aug-13	23-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed		
Acetone	µg/L	30	EPA 8260	30-Aug-13/R	< 30	< 30
Benzene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Bromodichloromethane	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2
Bromoform	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5
Bromomethane	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Carbon Tetrachloride	µg/L	0.2	EPA 8260	30-Aug-13/R	< 0.2	< 0.2
Monochlorobenzene (chlorobenzene)	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Chloroform	µg/L	1	EPA 8260	30-Aug-13/R	< 1	< 1
Dibromochloromethane	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2
Dichlorobenzene, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichlorobenzene, 1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichlorobenzene, 1,4-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichlorodifluoromethane	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2
Dichloroethane, 1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloroethane, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloroethylene, 1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloropropane, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dichloropropene 1,3- cis+trans	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Ethylbenzene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	30-Aug-13/R	< 0.2	< 0.2
Hexane	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

Michelle Dubien
Lab Manager

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360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 04-Sep-13

P.O. NUMBER: 2510043

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	M.D.L.	Client I.D.		340450-SW B4		340451-SW B5	
			Sample I.D.		B13-22318-5		B13-22318-6	
			Date Collected		23-Aug-13		23-Aug-13	
			Reference Method	Date/Site Analyzed				
Methyl Ethyl Ketone	µg/L	20	EPA 8260	30-Aug-13/R	< 20	< 20		< 20
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	30-Aug-13/R	< 20	< 20		< 20
Methyl-t-butyl Ether	µg/L	2	EPA 8260	30-Aug-13/R	< 2	< 2		< 2
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5		< 5
Styrene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Tetrachloroethane, 1,1,1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Tetrachloroethane, 1,1,2,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Tetrachloroethylene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Toluene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Trichlorobenzene, 1,2,4-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Trichloroethane, 1,1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Trichloroethane, 1,1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Trichloroethylene	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Trichlorofluoromethane	µg/L	5	EPA 8260	30-Aug-13/R	< 5	< 5		< 5
Vinyl Chloride	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Xylene, m,p-	µg/L	1.0	EPA 8260	30-Aug-13/R	< 1.0	< 1.0		< 1.0
Xylene, o-	µg/L	0.5	EPA 8260	30-Aug-13/R	< 0.5	< 0.5		< 0.5
Xylene, m,p,o-	µg/L	1.1	EPA 8260	30-Aug-13/R	< 1.1	< 1.1		< 1.1
PHC F1 (C6-C10)	µg/L	50	MOE TPH-E3397A	30-Aug-13/R	60	< 50		< 50
Comment-purgeable	-	-	-	30-Aug-13	NDP	-		-
PHC F2 (>C10-C16)	µg/L	50	MOE PHC E3421	29-Aug-13/K	< 50	< 50		< 50
PHC F3 (>C16-C34)	µg/L	400	MOE PHC E3421	29-Aug-13/K	< 400	< 400		< 400
PHC F4 (>C34-C50)	µg/L	400	MOE PHC E3421	29-Aug-13/K	< 400	< 400		< 400
Comment-extractable	-	-	-	29-Aug-13	-	-		-

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

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Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

Client I.D.	340450-SW B4	340451-SW B5
Sample I.D.	B13-22318-5	B13-22318-6
Date Collected	23-Aug-13	23-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
-----------	-------	--------	------------------	--------------------

1 Note: Elevated MDL due to low sample volume.

M. Dubien

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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DATE REPORTED: 04-Sep-13

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SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	M.D.L.	Client I.D.	
			Sample I.D.	
			Date Collected	
			Reference Method	Date/Site Analyzed
Acetone	µg/L	30	EPA 8260	30-Aug-13/R
Benzene	µg/L	0.5	EPA 8260	30-Aug-13/R
Bromodichloromethane	µg/L	2	EPA 8260	30-Aug-13/R
Bromoform	µg/L	5	EPA 8260	30-Aug-13/R
Bromomethane	µg/L	0.5	EPA 8260	30-Aug-13/R
Carbon Tetrachloride	µg/L	0.2	EPA 8260	30-Aug-13/R
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	30-Aug-13/R
Chloroform	µg/L	1	EPA 8260	30-Aug-13/R
Dibromochloromethane	µg/L	2	EPA 8260	30-Aug-13/R
Dichlorobenzene, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichlorobenzene, 1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichlorobenzene, 1,4-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichlorodifluoromethane	µg/L	2	EPA 8260	30-Aug-13/R
Dichloroethane, 1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloroethane, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloroethylene, 1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloropropane, 1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	30-Aug-13/R
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	30-Aug-13/R
Ethylbenzene	µg/L	0.5	EPA 8260	30-Aug-13/R
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	30-Aug-13/R
Hexane	µg/L	5	EPA 8260	30-Aug-13/R

M. Dubien

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill

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DATE RECEIVED: 27-Aug-13

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SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

Client I.D.
Sample I.D.
Date Collected

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
Methyl Ethyl Ketone	µg/L	20	EPA 8260	30-Aug-13/R
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	30-Aug-13/R
Methyl-t-butyl Ether	µg/L	2	EPA 8260	30-Aug-13/R
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	30-Aug-13/R
Styrene	µg/L	0.5	EPA 8260	30-Aug-13/R
Tetrachloroethane, 1,1,1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
trachloroethane, 1,1,2,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Tetrachloroethylene	µg/L	0.5	EPA 8260	30-Aug-13/R
Toluene	µg/L	0.5	EPA 8260	30-Aug-13/R
Trichlorobenzene, 1,2,4-	µg/L	0.5	EPA 8260	30-Aug-13/R
Trichloroethane, 1,1,1-	µg/L	0.5	EPA 8260	30-Aug-13/R
Trichloroethane, 1,1,2-	µg/L	0.5	EPA 8260	30-Aug-13/R
Trichloroethylene	µg/L	0.5	EPA 8260	30-Aug-13/R
Trichlorofluoromethane	µg/L	5	EPA 8260	30-Aug-13/R
Vinyl Chloride	µg/L	0.5	EPA 8260	30-Aug-13/R
Xylene, m,p-	µg/L	1.0	EPA 8260	30-Aug-13/R
Xylene, o-	µg/L	0.5	EPA 8260	30-Aug-13/R
Xylene, m,p,o-	µg/L	1.1	EPA 8260	30-Aug-13/R
PHC F1 (C6-C10)	µg/L	50	MOE TPH-E3397A	30-Aug-13/R
Comment-purgeable	-	-	-	30-Aug-13
PHC F2 (>C10-C16)	µg/L	50	MOE PHC E3421	29-Aug-13/K
PHC F3 (>C16-C34)	µg/L	400	MOE PHC E3421	29-Aug-13/K
PHC F4 (>C34-C50)	µg/L	400	MOE PHC E3421	29-Aug-13/K
Comment-extractable	-	-	-	29-Aug-13

M. Dubien

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

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C.O.C.: --

REPORT No. B13-22318 (ii)

Report To:

E3 Labs Inc.
360 York Rd #10,
NOTL ON LOS 1J0 Canada
Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13
DATE REPORTED: 04-Sep-13
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:
P.O. NUMBER: 2510043
WATERWORKS NO.

			Client I.D.	
			Sample I.D.	
			Date Collected	
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed

1 Note: Elevated MDL due to low sample volume.

M. Dubien

Michelle Dubien
Lab Manager

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

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REPORT No. B13-22318 (iii)

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E3 Labs Inc.
360 York Rd #10,
NOTL ON L0S 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

JOB/PROJECT NO.:

DATE REPORTED: 04-Sep-13

P.O. NUMBER: 2510043

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	340446-Dup 1	340447-SW B1	340448-SW B2	340449-SW B3
Sample I.D.	B13-22318-1	B13-22318-2	B13-22318-3	B13-22318-4
Date Collected	23-Aug-13	23-Aug-13	23-Aug-13	23-Aug-13

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Acenaphthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	µg/L	0.01	EPA 8270	30-Aug-13/K	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b+k)fluoranthene	µg/L	0.1	EPA 8270	30-Aug-13/K	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	0.09
Fluorene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05	< 0.05	< 0.05	< 0.05

Elevated MDLs due to matrix interferences

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien
Lab Manager

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REPORT No. B13-22318 (iii)

Report To:

E3 Labs Inc.
360 York Rd #10,
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Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

			Client I.D.	340450-SW B4	340451-SW B5:
			Sample I.D.	B13-22318-5	B13-22318-6
			Date Collected	23-Aug-13	23-Aug-13
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed	
Acenaphthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Acenaphthylene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Benzo(a)anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Benzo(a)pyrene	µg/L	0.01	EPA 8270	30-Aug-13/K	< 0.01
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Benzo(b+k)fluoranthene	µg/L	0.1	EPA 8270	30-Aug-13/K	< 0.1
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Chrysene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Fluorene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Naphthalene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Phenanthrene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05
Pyrene	µg/L	0.05	EPA 8270	30-Aug-13/K	< 0.05

Elevated MDLs due to matrix interferences

M. Dubien

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Michelle Dubien

Lab Manager

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D.C.: --

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E3 Labs Inc.
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NOTL ON LOS 1J0 Canada

Attention: Kristy LeBrasseur

Caduceon Environmental Laboratories

285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 27-Aug-13

DATE REPORTED: 04-Sep-13

SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.:

P.O. NUMBER: 2510043

WATERWORKS NO.

			Client I.D.	
			Sample I.D.	
			Date Collected	
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed
Acenaphthene	µg/L	0.05	EPA 8270	30-Aug-13/K
Acenaphthylene	µg/L	0.05	EPA 8270	30-Aug-13/K
Anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K
Benzo(a)anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K
Benzo(a)pyrene	µg/L	0.01	EPA 8270	30-Aug-13/K
Benzo(b)fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K
Benzo(b+k)fluoranthene	µg/L	0.1	EPA 8270	30-Aug-13/K
Benzo(g,h,i)perylene	µg/L	0.05	EPA 8270	30-Aug-13/K
Benzo(k)fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K
Chrysene	µg/L	0.05	EPA 8270	30-Aug-13/K
Dibenzo(a,h)anthracene	µg/L	0.05	EPA 8270	30-Aug-13/K
Fluoranthene	µg/L	0.05	EPA 8270	30-Aug-13/K
Fluorene	µg/L	0.05	EPA 8270	30-Aug-13/K
Indeno(1,2,3,-cd)pyrene	µg/L	0.05	EPA 8270	30-Aug-13/K
Methylnaphthalene,1-	µg/L	0.05	EPA 8270	30-Aug-13/K
Methylnaphthalene,2-	µg/L	0.05	EPA 8270	30-Aug-13/K
Naphthalene	µg/L	0.05	EPA 8270	30-Aug-13/K
Phenanthrene	µg/L	0.05	EPA 8270	30-Aug-13/K
Pyrene	µg/L	0.05	EPA 8270	30-Aug-13/K

Elevated MDLs due to matrix interferences

M.D.L. = Method Detection Limit

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

M. Dubien

Michelle Dubien
Lab Manager

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Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1
Attention: Ms. Christl Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Page 1 of 25

Dear Christl Groves:

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

Report Comments:

APPROVAL:

Lorna Wilson
Inorganic Laboratory Supervisor

APPROVAL:

Tanya Baillargeon
Organic Laboratory Team Leader

Exova (Ottawa) is certified and accredited for specific parameters by:

CALA, Canadian Association for Laboratory Accreditation (to ISO 17025), OMAF, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils), Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is accredited for specific parameters by:

SCC, Standards Council of Canada (to ISO 17025)

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

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1
Attention: Ms. Christi Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022297 Surfacewater 2013-04-23 SWB1	1022298 Surfacewater 2013-04-23 SWB2	1022299 Surfacewater 2013-04-23 SWB3	1022300 Surfacewater 2013-04-23 SWB4
Calculations General Chemistry	Hardness as CaCO ₃	1	mg/L		389	389	380	377
	Alkalinity as CaCO ₃	5	mg/L		267	264	264	262
	Cl	1	mg/L		511	526	589	649
	Conductivity	5	uS/cm		2150	2180	2400	2580
Hydrocarbons	pH	1.00		6.5-8.5	7.96	7.99	7.95	7.95
	SO ₄	3	mg/L		32	32	35	37
	F1 (C6-C10)	0.1	mg/L		<0.1	<0.1	<0.1	<0.1
	F1-BTEX (C6-C10)	0.1	mg/L		<0.1	<0.1	<0.1	<0.1
	F2 (C10-C16)	0.1	mg/L		<0.1	<0.1	<0.1	<0.1
	F3 (C16-C34)	0.2	mg/L		<0.2	<0.2	<0.2	<0.2
Mercury	F4 (C34-C50)	0.2	mg/L		<0.2	<0.2	<0.2	<0.2
	Hg	0.0001	mg/L	PWQO-0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Metals	Hg Dissolved	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001
	Ag	0.0001	mg/L	PWQO-0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	Al	0.01	mg/L	IPWQO-0.075	0.04	0.06	0.05	0.03
	As	0.001	mg/L	PWQO-0.100	<0.001	<0.001	<0.001	<0.001
	B	0.01	mg/L	IPWQO-0.200	0.01	0.01	0.01	0.01
	Ba	0.01	mg/L		0.14	0.14	0.15	0.14
	Be	0.0005	mg/L	PWQO-0.011	<0.0005	<0.0005	<0.0005	<0.0005
	Ca	1	mg/L		131	131	129	128
	Cd	0.0001	mg/L	PWQO-0.0002	<0.0001	<0.0001	<0.0001	<0.0001
	Co	0.0002	mg/L	PWQO-0.0009	0.0004	0.0004	0.0004	0.0004
Filtration	Cr	0.001	mg/L		0.003	0.003	0.003	0.003
	Cu	0.001	mg/L	PWQO-0.005	0.002	0.002	0.002	0.002
	Fe	0.03	mg/L	PWQO-0.30	1.11*	1.01*	1.20*	1.19*
	Filtration		mg/L		yes			

Guideline = PWQO - Ontario

* = Guideline Exceedence

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

** = Analysis completed at Mississauga, Ontario.

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

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

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Barrie, ON
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Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022297 Surfacewater 2013-04-23 SWB1	1022298 Surfacewater 2013-04-23 SWB2	1022299 Surfacewater 2013-04-23 SWB3	1022300 Surfacewater 2013-04-23 SWB4
Metals	K	1	mg/L		3	3	3	3
	Mg	1	mg/L		15	15	14	14
	Mn	0.01	mg/L		0.11	0.10	0.13	0.12
	Mo	0.005	mg/L	IPWQO-0.040	<0.005	<0.005	<0.005	<0.005
	Na	2	mg/L		288	315	382	428
	Ni	0.005	mg/L	PWQO-0.025	<0.005	<0.005	<0.005	<0.005
	Pb	0.001	mg/L	PWQO-0.005	<0.001	<0.001	<0.001	<0.001
	Sb	0.0005	mg/L	IPWQO-0.020	<0.0005	<0.0005	<0.0005	<0.0005
	Se	0.001	mg/L	PWQO-0.100	<0.001	<0.001	<0.001	<0.001
	Sr	0.001	mg/L		0.607	0.615	0.715	0.763
	Ti	0.01	mg/L		<0.01	<0.01	<0.01	<0.01
	Tl	0.0001	mg/L	IPWQO-0.0003	<0.0001	<0.0001	<0.0001	<0.0001
	U	0.001	mg/L	IPWQO-0.005	0.001	0.001	0.001	0.001
	V	0.001	mg/L	IPWQO-0.006	0.001	0.002	0.001	0.001
	Zn	0.01	mg/L	PWQO-0.030	<0.01	<0.01	<0.01	0.02
Nutrients Semi-Volatiles	Zr	0.002	mg/L	IPWQO-0.004	<0.002	<0.002	<0.002	<0.002
	N-NH3	0.02	mg/L		0.72	0.54	0.54	0.40
	1-methylnaphthalene	0.1	ug/L	IPWQO-2	<0.1	<0.1	<0.1	<0.1
	2-methylnaphthalene	0.1	ug/L	IPWQO-2	<0.1	<0.1	<0.1	<0.1
	Acenaphthene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Acenaphthylene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Anthracene	0.1	ug/L	IPWQO-0.0008	<0.1	<0.1	<0.1	<0.1
	Benzo(a)anthracene	0.1	ug/L	IPWQO-0.0004	<0.1	<0.1	<0.1	<0.1
	Benzo(a)pyrene	0.01	ug/L		<0.01	<0.01	<0.01	<0.01
	Benzo(b)fluoranthene	0.05	ug/L		<0.05	<0.05	<0.05	<0.05
	Benzo(g,h,i)perylene	0.1	ug/L	IPWQO-0.00002	<0.1	<0.1	<0.1	<0.1

Guideline = PWQO - Ontario

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Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022297 Surfacewater 2013-04-23 SWB1	1022298 Surfacewater 2013-04-23 SWB2	1022299 Surfacewater 2013-04-23 SWB3	1022300 Surfacewater 2013-04-23 SWB4
Semi-Volatiles	Benzo(k)fluoranthene	0.05	ug/L	IPWQO-0.0002	<0.05	<0.05	<0.05	<0.05
	Chrysene	0.05	ug/L	IPWQO-0.0001	<0.05	<0.05	<0.05	<0.05
	Dibenzo(a,h)anthracene	0.1	ug/L	IPWQO-0.002	<0.1	<0.1	<0.1	<0.1
	Fluoranthene	0.1	ug/L	IPWQO-0.0008	<0.1	<0.1	<0.1	<0.1
	Fluorene	0.1	ug/L	IPWQO-0.2	<0.1	<0.1	<0.1	<0.1
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	Naphthalene	0.1	ug/L	IPWQO-7	<0.1	<0.1	0.1	<0.1
	Phenanthrene	0.1	ug/L	IPWQO-0.03	<0.1	<0.1	<0.1	<0.1
	Pyrene	0.1	ug/L		<0.1	<0.1	<0.1	<0.1
	W	0.005	mg/L	IPWQO-0.030	<0.005	<0.005	<0.005	<0.005
	1,1,1,2-tetrachloroethane	0.5	ug/L	IPWQO-20	<0.5	<0.5	<0.5	<0.5
	1,1,1-trichloroethane	0.4	ug/L	IPWQO-10	<0.4	<0.4	<0.4	<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L	IPWQO-70	<0.5	<0.5	<0.5	<0.5
	1,1,2-trichloroethane	0.4	ug/L	IPWQO-800	<0.4	<0.4	<0.4	<0.4
Subcontract VOCs	1,1-dichloroethane	0.4	ug/L	IPWQO-200	<0.4	<0.4	<0.4	<0.4
	1,1-dichloroethylene	0.5	ug/L	IPWQO-40	<0.5	<0.5	<0.5	<0.5
	1,2,4-trichlorobenzene	0.5	ug/L	PWQO-0.5	<0.5	<0.5	<0.5	<0.5
	1,2-dibromoethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	1,2-dichlorobenzene	0.4	ug/L	PWQO-2.5	<0.4	<0.4	<0.4	<0.4
	1,2-dichloroethane	0.2	ug/L	IPWQO-100	<0.2	<0.2	<0.2	<0.2
	1,2-dichloroethane-d4	1	%		102	110	101	108
	1,2-dichloropropane	0.5	ug/L	IPWQO-0.7	<0.5	<0.5	<0.5	<0.5
	1,3,5-trimethylbenzene	0.3	ug/L		<0.3	<0.3	<0.3	<0.3
	1,3-dichlorobenzene	0.4	ug/L	PWQO-2.5	<0.4	<0.4	<0.4	<0.4
	1,4-dichlorobenzene	0.4	ug/L	PWQO-4.0	<0.4	<0.4	<0.4	<0.4
	2-Hexanone (MBK)	10	ug/L		<10	<10	<10	<10

Guideline = PWQO - Ontario

Y

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Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum
Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality
Guideline, IPWQO = Interim Provincial Water Quality Objective.

Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christli Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline	1022297 Surfacewater 2013-04-23 SWB1	1022298 Surfacewater 2013-04-23 SWB2	1022299 Surfacewater 2013-04-23 SWB3	1022300 Surfacewater 2013-04-23 SWB4
VOCs	4-bromofluorobenzene	1	%		109	110	109	108
	Acetone	50	ug/L		<50	<50	<50	<50
	Benzene	0.5	ug/L	IPWQO-100	<0.5	<0.5	<0.5	<0.5
	Bromodichloromethane	0.3	ug/L	IPWQO-200	<0.3	<0.3	<0.3	<0.3
	Bromoforn	0.4	ug/L	IPWQO-60	<0.4	<0.4	<0.4	<0.4
	Bromomethane	0.5	ug/L	IPWQO-0.9	<0.5	<0.5	<0.5	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L	IPWQO-200	<0.4	<0.4	<0.4	<0.4
	c-1,3-Dichloropropylene	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Carbon Tetrachloride	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Chloroethane	0.2	ug/L		<0.2	<0.2	<0.2	<0.2
	Chloroform	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Chloromethane	0.2	ug/L	IPWQO-700	<0.2	<0.2	<0.2	<0.2
	Dibromochloromethane	0.3	ug/L	IPWQO-40	<0.3	<0.3	<0.3	<0.3
	Dichlorodifluoromethane	0.5	ug/L		<0.5	<0.5	<0.5	<0.5
	Dichloromethane	4.0	ug/L	IPWQO-100	<4.0	<4.0	<4.0	<4.0
	Ethylbenzene	0.5	ug/L	IPWQO-8	<0.5	<0.5	<0.5	<0.5
	Hexane	5	ug/L		<5	<5	<5	<5
	m/p-xylene	0.5	ug/L	IPWQO-2	<0.5	<0.5	<0.5	<0.5
	Methyl Ethyl Ketone (MEK)	10	ug/L	IPWQO-400	<10	<10	<10	<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L		<10	<10	<10	<10
	Methyl Tert Butyl Ether (MTBE)	10	ug/L	IPWQO-200	<10	<10	<10	<10
	Monochlorobenzene	0.2	ug/L	IPWQO-15	<0.2	<0.2	<0.2	<0.2
	o-xylene	0.5	ug/L	IPWQO-40	<0.5	<0.5	<0.5	<0.5
	Styrene	0.5	ug/L	IPWQO-4	<0.5	<0.5	<0.5	<0.5
	t-1,2-Dichloroethylene	0.4	ug/L	IPWQO-200	<0.4	<0.4	<0.4	<0.4
	t-1,3-Dichloropropylene	0.2	ug/L	IPWQO-7	<0.2	<0.2	<0.2	<0.2

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Attention: Ms. Christli Groves
PO#: PO25698

Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022301 Surfacewater 2013-04-23 SWB5	1022302 Surfacewater 2013-04-23 Field Blank 2
Mercury Metals	Hg Dissolved	0.0001	mg/L	PWQO-0.0001	<0.0001	<0.0001
	Ag	0.0001	mg/L	IPWQO-0.075	0.05	<0.01
	Al	0.01	mg/L	PWQO-0.100	<0.001	<0.001
	As	0.001	mg/L	IPWQO-0.200	<0.01	<0.01
	B	0.01	mg/L	PWQO-0.011	0.12	<0.01
	Ba	0.01	mg/L	PWQO-0.0002	<0.0005	<0.0005
	Be	0.0005	mg/L	PWQO-0.0009	125	<1
	Ca	1	mg/L	PWQO-0.0001	<0.0001	<0.0001
	Cd	0.0001	mg/L	PWQO-0.0004	0.0004	<0.0002
	Co	0.0002	mg/L	PWQO-0.0001	0.003	<0.001
	Cr	0.001	mg/L	PWQO-0.005	0.002	<0.001
	Cu	0.001	mg/L	PWQO-0.30	0.54*	<0.03
	Fe	0.03	mg/L		3	<1
	K	1	mg/L		13	<1
	Mg	1	mg/L		0.10	<0.01
	Mn	0.01	mg/L	IPWQO-0.040	<0.005	<0.005
	Mo	0.005	mg/L	PWQO-0.025	416	<2
	Na	2	mg/L	PWQO-0.005	<0.005	<0.005
	Ni	0.005	mg/L	IPWQO-0.020	<0.001	<0.001
	Pb	0.001	mg/L	PWQO-0.100	<0.0005	<0.0005
	Sb	0.0005	mg/L		<0.001	<0.001
	Se	0.001	mg/L		0.684	<0.001
	Sr	0.001	mg/L		<0.01	<0.01
	Ti	0.01	mg/L	IPWQO-0.0003	<0.0001	<0.0001
	Tl	0.0001	mg/L	IPWQO-0.005	0.001	<0.001
	U	0.001	mg/L			

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L4N 8X1
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Invoice to: The City of Barrie - Finance Dept.

Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample ID	1022301 Surfacewater 2013-04-23 SWB5	1022302 Surfacewater 2013-04-23 Field Blank 2
Metals	V	0.001	mg/L	IPWQO-0.006	0.001	<0.001
	Zn	0.01	mg/L	PWQO-0.030	<0.01	<0.01
	Zr	0.002	mg/L	IPWQO-0.004	<0.002	<0.002
Nutrients Semi-Volatiles	N-NH3	0.02	mg/L		0.14	0.03
	1-methylnaphthalene	0.1	ug/L	IPWQO-2	<0.1	<0.1
	2-methylnaphthalene	0.1	ug/L	IPWQO-2	<0.1	<0.1
	Acenaphthene	0.1	ug/L		<0.1	<0.1
	Acenaphthylene	0.1	ug/L		<0.1	<0.1
	Anthracene	0.1	ug/L	IPWQO-0.0008	<0.1	<0.1
	Benzo(a)anthracene	0.1	ug/L	IPWQO-0.0004	<0.1	<0.1
	Benzo(a)pyrene	0.01	ug/L		<0.01	<0.01
	Benzo(b)fluoranthene	0.05	ug/L		<0.05	<0.05
	Benzo(g,h,i)perylene	0.1	ug/L	IPWQO-0.00002	<0.1	<0.1
	Benzo(k)fluoranthene	0.05	ug/L	IPWQO-0.0002	<0.05	<0.05
	Chrysene	0.05	ug/L	IPWQO-0.0001	<0.05	<0.05
Subcontract VOCs	Dibenzo(a,h)anthracene	0.1	ug/L	IPWQO-0.002	<0.1	<0.1
	Fluoranthene	0.1	ug/L	IPWQO-0.0008	<0.1	<0.1
	Fluorene	0.1	ug/L	IPWQO-0.2	<0.1	<0.1
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L		<0.1	<0.1
	Naphthalene	0.1	ug/L	IPWQO-7	<0.1	<0.1
	Phenanthrene	0.1	ug/L	IPWQO-0.03	<0.1	<0.1
	Pyrene	0.1	ug/L		<0.1	<0.1
	W	0.005	mg/L	IPWQO-0.030	<0.005	<0.005
	1,1,1,2-tetrachloroethane	0.5	ug/L	IPWQO-20	<0.5	<0.5
	1,1,1-trichloroethane	0.4	ug/L	IPWQO-10	<0.4	<0.4
	1,1,2,2-tetrachloroethane	0.5	ug/L	IPWQO-70	<0.5	<0.5

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Report Number: 1307214
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Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1022301 Surfacewater 2013-04-23 SWB5	1022302 Surfacewater 2013-04-23 Field Blank 2
VOCs	1,1,2-trichloroethane	0.4	ug/L	IPWQO-800	<0.4	<0.4
	1,1-dichloroethane	0.4	ug/L	IPWQO-200	<0.4	<0.4
	1,1-dichloroethylene	0.5	ug/L	IPWQO-40	<0.5	<0.5
	1,2,4-trichlorobenzene	0.5	ug/L	PWQO-0.5	<0.5	<0.5
	1,2-dibromoethane	0.2	ug/L		<0.2	<0.2
	1,2-dichlorobenzene	0.4	ug/L	PWQO-2.5	<0.4	<0.4
	1,2-dichloroethane	0.2	ug/L	IPWQO-100	<0.2	<0.2
	1,2-dichloroethane-d4	1	%		105	105
	1,2-dichloropropane	0.5	ug/L	IPWQO-0.7	<0.5	<0.5
	1,3,5-trimethylbenzene	0.3	ug/L		<0.3	<0.3
	1,3-dichlorobenzene	0.4	ug/L	PWQO-2.5	<0.4	<0.4
	1,4-dichlorobenzene	0.4	ug/L	PWQO-4.0	<0.4	<0.4
	2-Hexanone (MBK)	10	ug/L		<10	<10
	4-bromofluorobenzene	1	%		103	105
	Acetone	50	ug/L		<50	<50
	Benzene	0.5	ug/L	IPWQO-100	<0.5	<0.5
	Bromodichloromethane	0.3	ug/L	IPWQO-200	<0.3	<0.3
	Bromoform	0.4	ug/L	IPWQO-60	<0.4	<0.4
	Bromomethane	0.5	ug/L	IPWQO-0.9	<0.5	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L	IPWQO-200	<0.4	<0.4
	c-1,3-Dichloropropylene	0.2	ug/L		<0.2	<0.2
	Carbon Tetrachloride	0.2	ug/L		<0.2	<0.2
	Chloroethane	0.2	ug/L		<0.2	<0.2
	Chloroform	0.5	ug/L		<0.5	0.8
	Chloromethane	0.2	ug/L	IPWQO-700	<0.2	<0.2
	Dibromochloromethane	0.3	ug/L	IPWQO-40	<0.3	<0.3

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Group	Analyte	MRL	Units	Lab ID Sample Matrix Sample Type Sampling Date Sample I.D.	1022301 Surfacewater 2013-04-23 SWB5	1022302 Surfacewater 2013-04-23 Field Blank 2
VOCs	Dichlorodifluoromethane	0.5	ug/L		<0.5	<0.5
	Dichloromethane	4.0	ug/L	IPWQO-100	<4.0	<4.0
	Ethylbenzene	0.5	ug/L	IPWQO-8	<0.5	<0.5
	Hexane	5	ug/L		<5	<5
	m/p-xylene	0.5	ug/L	IPWQO-2	<0.5	<0.5
	Methyl Ethyl Ketone (MEK)	10	ug/L	IPWQO-400	<10	<10
	Methyl Isobutyl Ketone (MIBK)	10	ug/L		<10	<10
	Methyl Tert Butyl Ether (MTBE)	10	ug/L	IPWQO-200	<10	<10
	Monochlorobenzene	0.2	ug/L	IPWQO-15	<0.2	<0.2
	o-xylene	0.5	ug/L	IPWQO-40	<0.5	<0.5
	Styrene	0.5	ug/L	IPWQO-4	<0.5	<0.5
	t-1,2-Dichloroethylene	0.4	ug/L	IPWQO-200	<0.4	<0.4
	t-1,3-Dichloropropylene	0.2	ug/L	IPWQO-7	<0.2	<0.2
	Tetrachloroethylene	0.3	ug/L	IPWQO-50	<0.3	<0.3
	Toluene	0.5	ug/L	IPWQO-0.8	<0.5	<0.5
	Toluene-d8	1	%		90	93
	Trichloroethylene	0.3	ug/L	IPWQO-20	<0.3	<0.3
	Trichlorofluoromethane	0.5	ug/L		<0.5	<0.5
	Vinyl Chloride	0.2	ug/L	IPWQO-600	<0.2	<0.2
	Xylene; total	1.0	ug/L		<1.0	<1.0

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Date Submitted: 2013-04-24
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Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Calculations General Chemistry	Hardness as CaCO ₃	1	mg/L	
	Alkalinity as CaCO ₃	5	mg/L	
	Cl	1	mg/L	
	Conductivity	5	uS/cm	
	pH	1.00		6.5-8.5
Hydrocarbons	SO ₄	3	mg/L	
	F1 (C6-C10)	0.1	mg/L	
	F1-BTEX (C6-C10)	0.1	mg/L	
	F2 (C10-C16)	0.1	mg/L	
	F3 (C16-C34)	0.2	mg/L	
Mercury	F4 (C34-C50)	0.2	mg/L	
	Hg	0.0001	mg/L	PWQO-0.0002
	Hg Dissolved	0.0001	mg/L	
Metals	Ag	0.0001	mg/L	PWQO-0.0001
	Al	0.01	mg/L	IPWQO-0.075
	As	0.001	mg/L	PWQO-0.100
	B	0.01	mg/L	IPWQO-0.200
	Ba	0.01	mg/L	
	Be	0.0005	mg/L	PWQO-0.011
	Ca	1	mg/L	
	Cd	0.0001	mg/L	PWQO-0.0002
	Co	0.0002	mg/L	PWQO-0.0009
	Cr	0.001	mg/L	
	Cu	0.001	mg/L	PWQO-0.005
	Fe	0.03	mg/L	PWQO-0.30
	K	1	mg/L	

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Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.
Metals	Mg	1	mg/L	
	Mn	0.01	mg/L	
	Mo	0.005	mg/L	IPWQO-0.040
	Na	2	mg/L	
	Ni	0.005	mg/L	PWQO-0.025
	Pb	0.001	mg/L	PWQO-0.005
	Sb	0.0005	mg/L	IPWQO-0.020
	Se	0.001	mg/L	PWQO-0.100
	Sr	0.001	mg/L	
	Ti	0.01	mg/L	
	Tl	0.0001	mg/L	IPWQO-0.0003
	U	0.001	mg/L	IPWQO-0.005
	V	0.001	mg/L	IPWQO-0.006
	Zn	0.01	mg/L	PWQO-0.030
Nutrients Semi-Volatiles	Zr	0.002	mg/L	IPWQO-0.004
	N-NH3	0.02	mg/L	
	1-methylnaphthalene	0.1	ug/L	IPWQO-2
	2-methylnaphthalene	0.1	ug/L	IPWQO-2
	Acenaphthene	0.1	ug/L	
	Acenaphthylene	0.1	ug/L	
	Anthracene	0.1	ug/L	IPWQO-0.0008
	Benzo(a)anthracene	0.1	ug/L	IPWQO-0.0004
	Benzo(a)pyrene	0.01	ug/L	
	Benzo(b)fluoranthene	0.05	ug/L	
	Benzo(g,h,i)perylene	0.1	ug/L	IPWQO-0.00002
	Benzo(k)fluoranthene	0.05	ug/L	IPWQO-0.0002

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Group	Analyte	MRL	Units	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. Guideline
Semi-Volatiles	Chrysene	0.05	ug/L	IPWQO-0.0001
	Dibenzo(a,h)anthracene	0.1	ug/L	IPWQO-0.002
	Fluoranthene	0.1	ug/L	IPWQO-0.0008
	Fluorene	0.1	ug/L	IPWQO-0.2
	Indeno(1,2,3-c,d)pyrene	0.1	ug/L	
	Naphthalene	0.1	ug/L	IPWQO-7
	Phenanthrene	0.1	ug/L	IPWQO-0.03
	Pyrene	0.1	ug/L	
	W	0.005	mg/L	IPWQO-0.030
	1,1,1,2-tetrachloroethane	0.5	ug/L	IPWQO-20
VOCs	1,1,1-trichloroethane	0.4	ug/L	IPWQO-10
	1,1,2,2-tetrachloroethane	0.5	ug/L	IPWQO-70
	1,1,2-trichloroethane	0.4	ug/L	IPWQO-800
	1,1-dichloroethane	0.4	ug/L	IPWQO-200
	1,1-dichloroethylene	0.5	ug/L	IPWQO-40
	1,2,4-trichlorobenzene	0.5	ug/L	PWQO-0.5
	1,2-dibromoethane	0.2	ug/L	
	1,2-dichlorobenzene	0.4	ug/L	PWQO-2.5
	1,2-dichloroethane	0.2	ug/L	IPWQO-100
	1,2-dichloroethane-d4	1	%	
	1,2-dichloropropane	0.5	ug/L	IPWQO-0.7
	1,3,5-trimethylbenzene	0.3	ug/L	
	1,3-dichlorobenzene	0.4	ug/L	PWQO-2.5
	1,4-dichlorobenzene	0.4	ug/L	PWQO-4.0
	2-Hexanone (MBK)	10	ug/L	
	4-bromofluorobenzene	1	%	

Guideline = PWQO - Ontario

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Y

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Certificate of Analysis



Client: Golder Associates
121 Commerce Park Drive Unit L
Barrie, ON
L4N 8X1

Attention: Ms. Christi Groves
PO#: PO25698
Invoice to: The City of Barrie - Finance Dept.

Report Number:	1307214
Date Submitted:	2013-04-24
Date Reported:	2013-05-10
Project:	11-1170-0043
COC #:	762318

Group	Analyte	MRL	Units	Guideline
VOCs	Acetone	50	ug/L	
	Benzene	0.5	ug/L	IPWQO-100
	Bromodichloromethane	0.3	ug/L	IPWQO-200
	Bromoform	0.4	ug/L	IPWQO-60
	Bromomethane	0.5	ug/L	IPWQO-0.9
	c-1,2-Dichloroethylene	0.4	ug/L	IPWQO-200
	c-1,3-Dichloropropylene	0.2	ug/L	
	Carbon Tetrachloride	0.2	ug/L	
	Chloroethane	0.2	ug/L	
	Chloroform	0.5	ug/L	
	Chloromethane	0.2	ug/L	IPWQO-700
	Dibromochloromethane	0.3	ug/L	IPWQO-40
	Dichlorodifluoromethane	0.5	ug/L	
	Dichloromethane	4.0	ug/L	IPWQO-100
	Ethylbenzene	0.5	ug/L	IPWQO-8
	Hexane	5	ug/L	
	m/p-xylene	0.5	ug/L	IPWQO-2
	Methyl Ethyl Ketone (MEK)	10	ug/L	IPWQO-400
	Methyl Isobutyl Ketone (MIBK)	10	ug/L	
	Methyl Tert Butyl Ether (MTBE)	10	ug/L	IPWQO-200
Semi-VOCs	Monochlorobenzene	0.2	ug/L	IPWQO-15
	o-xylene	0.5	ug/L	IPWQO-40
	Styrene	0.5	ug/L	IPWQO-4
	t-1,2-Dichloroethylene	0.4	ug/L	IPWQO-200
	t-1,3-Dichloropropylene	0.2	ug/L	IPWQO-7
	Tetrachloroethylene	0.3	ug/L	IPWQO-50

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Report Number: 1307214
Date Submitted: 2013-04-24
Date Reported: 2013-05-10
Project: 11-1170-0043
COC #: 762318

Group	Analyte	MRL	Units	Lab I.D.	
				Sample Matrix	Guideline
VOCs	Toluene	0.5	ug/L	Sample Type	IPWQO-0.8
	Toluene-d8	1	%	Sampling Date	
	Trichloroethylene	0.3	ug/L	Sample I.D.	IPWQO-20
	Trichlorofluoromethane	0.5	ug/L		
	Vinyl Chloride	0.2	ug/L		IPWQO-600
	Xylene, total	1.0	ug/L		

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Date Submitted: 2013-04-24
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Project: 11-1170-0043
COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 0	Analysis Date 2013-04-29	Method C SM2340B	
Hardness as CaCO3			
Xylene, total			
Run No 249387	Analysis Date 2013-04-25	Method O OCME	
F1 (C6-C10)	<0.1 mg/L	94	80-120
Run No 249389	Analysis Date 2013-04-25	Method O OCME	
F1-BTEX (C6-C10)			
Run No 249421	Analysis Date 2013-04-24	Method V 8260B	
1,1,1,2-tetrachloroethane	<0.5 ug/L	92	80-120
1,1,1-trichloroethane	<0.4 ug/L	94	80-120
1,1,2,2-tetrachloroethane	<0.5 ug/L	93	80-120
1,1,2-trichloroethane	<0.4 ug/L	88	80-120
1,1-dichloroethane	<0.4 ug/L	98	80-120
1,1-dichloroethylene	<0.5 ug/L	92	80-120
1,2,4-trichlorobenzene	<0.5 ug/L	94	

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Project: 11-1170-0043
COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
1,2-dibromoethane	<0.2 ug/L	88	80-120
1,2-dichlorobenzene	<0.4 ug/L	107	80-120
1,2-dichloroethane	<0.2 ug/L	100	80-120
1,2-dichloroethane-d4	104 %	98	80-120
1,2-dichloropropane	<0.5 ug/L	94	80-120
1,3,5-trimethylbenzene	<0.3 ug/L	90	80-120
1,3-dichlorobenzene	<0.4 ug/L	93	80-120
1,4-dichlorobenzene	<0.4 ug/L	91	80-120
Benzene	<0.5 ug/L	95	80-120
Bromodichloromethane	<0.3 ug/L	88	80-120
Bromoform	<0.4 ug/L	95	80-120
Bromomethane	<0.5 ug/L	84	70-130
c-1,2-Dichloroethylene	<0.4 ug/L	83	80-120
c-1,3-Dichloropropylene	<0.2 ug/L	86	80-120
Carbon Tetrachloride	<0.2 ug/L	92	80-120
Chloroethane	<0.2 ug/L	86	70-130
Chloroform	<0.5 ug/L	92	80-120

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Project: 11-1170-0043
COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Chloromethane	<0.2 ug/L	85	70-130
Dibromochloromethane	<0.3 ug/L	83	80-120
Dichlorodifluoromethane	<0.5 ug/L	109	70-130
Dichloromethane	<4.0 ug/L	114	60-200
Ethylbenzene	<0.5 ug/L	90	80-120
Hexane	<5 ug/L	100	70-130
m/p-xylene	<0.5 ug/L	95	80-120
Monochlorobenzene	<0.2 ug/L	88	80-120
o-xylene	<0.5 ug/L	92	80-120
Styrene	<0.5 ug/L	87	80-120
t-1,2-Dichloroethylene	<0.4 ug/L	91	80-120
t-1,3-Dichloropropylene	<0.2 ug/L	90	80-120
Tetrachloroethylene	<0.3 ug/L	90	80-120
Toluene	<0.5 ug/L	98	80-120
Toluene-d8	95 %	95	80-120
Trichloroethylene	<0.3 ug/L	95	80-120
Trichlorofluoromethane	<0.5 ug/L	99	80-120

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Project: 11-1170-0043
COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Vinyl Chloride	<0.2 ug/L	117	70-130
Run No 249436	Analysis Date 2013-04-26	Method O CCMF	
F2 (C10-C16)	<0.1 mg/L	88	50-120
F3 (C16-C34)	<0.2 mg/L	88	50-120
F4 (C34-C50)	<0.2 mg/L	88	50-120
Run No 249444	Analysis Date 2013-04-26	Method C SM4500-NH3D	
NH3	<0.02 mg/L	100	85-115
Run No 249448	Analysis Date 2013-04-25	Method P 8270	
1-methylnaphthalene	<0.1 ug/L	44	20-140
2-methylnaphthalene	<0.1 ug/L	44	20-140
Acenaphthene	<0.1 ug/L	46	20-140
Acenaphthylene	<0.1 ug/L	44	20-140
Anthracene	<0.1 ug/L	48	20-140
Benzo(a)anthracene	<0.1 ug/L	54	20-140
Benzo(a)pyrene	<0.01 ug/L	49	20-140
Benzo(b)fluoranthene	<0.05 ug/L	57	20-140
Benzo(g,h,i)perylene	<0.1 ug/L	54	20-140

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Benzo(k)fluoranthene	<0.05 ug/L	97	20-140
Chrysene	<0.05 ug/L	51	20-140
Dibenzo(a,h)anthracene	<0.1 ug/L	50	20-140
Fluoranthene	<0.1 ug/L	56	20-140
Fluorene	<0.1 ug/L	46	20-140
Indeno(1,2,3-c,d)pyrene	<0.1 ug/L	66	20-140
Naphthalene	<0.1 ug/L	44	20-140
Phenanthrene	<0.1 ug/L	52	20-140
Pyrene	<0.1 ug/L	56	20-140
Run No 249467	Analysis Date 2013-04-25	Method SM 2320B	
Alkalinity as CaCO ₃	<5 mg/L	100	95-105
Conductivity	<5 uS/cm	99	95-105
pH	5.84	100	90-110
Run No 249481	Analysis Date 2013-04-24	Method V 8260B	
2-Hexanone (MBK)	<10 ug/L	115	80-120
Acetone	<50 ug/L	87	80-120
Methyl Ethyl Ketone (MEK)	<10 ug/L	97	80-120

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Barrie, ON
L4N 8X1

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COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Methyl Isobutyl Ketone (MIBK)	<10 ug/L	103	80-120
Methyl Tert Butyl Ether (MTBE)	<10 ug/L	110	80-120
Run No 249496	Analysis Date 2013-04-26	Method SM 4110C	
Cl	<1 mg/L	101	90-110
SO4	<3 mg/L	106	90-110
Run No 249512	Analysis Date 2013-04-26	Method EPA 200.8	
Zr	<0.002 mg/L	90	0-1000
Run No 249535	Analysis Date 2013-04-26	Method M SM3120B-3500C	
Ca	<1 mg/L	98	80-120
K	<1 mg/L	102	80-120
Mg	<1 mg/L	97	80-120
Na	<2 mg/L	102	80-120
Run No 249543	Analysis Date 2013-04-29	Method C SM4500-NH3D	
N-NH3	<0.02 mg/L	96	85-115
Run No 249545	Analysis Date 2013-04-26	Method SM 4110C	
Cl	<1 mg/L	101	90-112
Run No 249565	Analysis Date 2013-04-29	Method M SM3120B-3500C	

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COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Na	<2 mg/L	96	80-120
Run No 249600	Analysis Date 2013-04-29	Method EPA 200.8	
Ag	<0.0001 mg/L	98	89-111
Al	<0.01 mg/L	99	90-110
As	<0.001 mg/L	102	81-119
B	<0.01 mg/L	88	81-119
Ba	<0.01 mg/L	101	91-109
Be	<0.0005 mg/L	98	82-118
Cd	<0.0001 mg/L	98	86-114
Co	<0.0002 mg/L	97	88-112
Cr	<0.001 mg/L	98	89-111
Cu	<0.001 mg/L	101	86-114
Fe	<0.03 mg/L	107	88-112
Filtration			
Mn	<0.01 mg/L	100	91-109
Mo	<0.005 mg/L	102	84-116
Ni	<0.005 mg/L	99	92-108

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COC #: 762318

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Pb	<0.001 mg/L	99	89-111
Sb	<0.0005 mg/L	101	77-123
Se	<0.001 mg/L	103	77-123
Sr	<0.001 mg/L	105	91-109
Ti	<0.01 mg/L	96	88-112
Tl	<0.0001 mg/L	99	88-112
U	<0.001 mg/L	97	87-113
V	<0.001 mg/L	99	88-112
Zn	<0.01 mg/L	99	89-111
Run No 249720	Analysis Date 2013-05-01	Method M SM3112B-3500B	
Hg	<0.0001 mg/L	99	70-130
Hg Dissolved	<0.0001 mg/L		
Run No 249727	Analysis Date 2013-04-30	Method M SM3112B-3500B	
Hg	<0.0001 mg/L	105	70-130
Hg Dissolved	<0.0001 mg/L		
Run No 249747	Analysis Date 2013-05-01	Method SUBCONTRACT-PC-INORG	
W	<0.005 mg/L		

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COC #: 762318

Sample Comment Summary

Sample ID: 1022297 SWB1 Samples were filtered prior to Mercury analysis for entire report. Samples were subcontracted for Tungsten analysis for entire report.

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COC #:	762318

Petroleum Hydrocarbons - CCME Checklist

Samples were analysed by Exova Ottawa Method AMCCME2, "Petroleum Hydrocarbons in Water and Soil, CCME/TPH". This method complies with the reference method for the CCME CWS PHC and is validated for use in the laboratory. Exova Ottawa is accredited by CALA (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Data for QC samples (blank, duplicate, spike) are available on request.

Holding/Analysis Times	Yes/No	If NO, then reasons
All fractions analyzed within recommended hold times/analysis times?	Yes	
F1		
nC6 and nC10 response factors within 30% of toluene	Yes	
BTEX was subtracted from F1 fraction	Yes	
If YES, was F1-BTEX (C6-C10) reported	Yes	
F2		
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	Yes	
Linearity within 15% (F2-F4)	Yes	
Naphthalene was subtracted from F2 fraction	No	Naphthalene (PAH) not requested/analysed
If YES was F2-Naphthalene reported		
F3		
PAH (selected compounds) subtracted from F3 fraction	No	PAH not requested/analysed
If YES was F3-PAH reported		
F4		
C50 response factor within 70% of nC10+nC16+nC34 average	Yes	
Chromatogram descended to baseline by retention time of C50	Yes	
If NO was F4 (C34-C50) gravimetric reported		

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