



2009 ANNUAL REPORT

**KILLALOE WASTE DISPOSAL SITE
(A412306)**

**TOWNSHIP OF KILLALOE, HAGARTY AND RICHARDS
COUNTY OF RENFREW, ONTARIO**

Prepared for

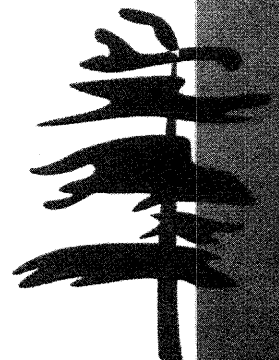
**THE CORPORATION OF THE
TOWNSHIP OF KILLALOE, HAGARTY AND RICHARDS**

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EXECUTIVE SUMMARY

This report has been prepared to document the results of the 2009 environmental monitoring program for the Killaloe waste disposal site, located on Lot 7, Concession 8, within the geographic Township of Hagarty, in the amalgamated Township of Killaloe, Hagarty and Richards. The site is located approximately two kilometres north of the Village of Killaloe, accessed by Mask Road.

The Killaloe waste disposal site operates in accordance with Provisional Certificate of Approval A412306, for the disposal of municipal solid waste generated within the Township of Killaloe, Hagarty and Richards. The site consists of 1.88 hectares of approved landfilling area, within 11.51 hectares of licensed site area.

In 2009, the direction of groundwater flow within the shallow overburden of the Killaloe site, in the vicinity of the waste mound, is predominantly to the east towards County Road 58. The low-lying, seasonally wet area east of the site can be defined as the downgradient receiver of groundwater. A component of groundwater flow observed to flow towards the northwest, from the general direction of monitoring wells MW07-3S and MW07-3D located along County Road 58. Therefore, the area east of the site can be described as a groundwater discharge area, receiving groundwater flow from the west and from the southeast. Average horizontal gradient at the Killaloe waste disposal site in the vicinity of the waste mound, and to the east in the seasonally wet, low-lying area was calculated in May 2009 to be 0.003. The average horizontal gradient flowing to the northwest in the vicinity of monitoring wells MW07-3S and MW07-3D was calculated in May 2009 to be 0.011.

Exceedances above Ontario Ministry of the Environment's Ontario Drinking Water Standards were noted for several parameters at the downgradient monitoring wells BH00-4, BH00-4A(D), BH00-4B(S), BH00-5, BH04-1S, BH04-1D, and MW07-5. Based on the elevated parameter concentrations, the monitoring wells downgradient of the site appear to exhibit water quality impacts as a result of landfill-related activities at the site. Groundwater quality at MW07-4 is relatively similar to background water quality at the site, and is of enhanced quality compared to MW07-5 and MW07-6, which is likely attributed to its location partially cross-gradient to the primary direction of groundwater flow at the site. Both monitoring wells MW07-5 and MW07-6 exhibit slight landfill-related impacts; however, monitoring well MW07-6 appears to exhibit groundwater quality results with decreased parameter concentrations from those observed at monitoring well MW07-5, which is most likely resultant of its location partially cross-gradient to groundwater flow and its distance from the waste mound. Groundwater quality data from monitoring wells BH04-1S, BH04-1D, BH00-5, MW07-4, MW07-5, and MW07-6 were compared to the Ontario Ministry of the Environment's Provincial Water Quality Objectives based on the proximity of groundwater to surface. Exceedances above

Ontario Ministry of the Environment's Provincial Water Quality Objectives criteria were noted at select wells for the parameters aluminum, boron, cobalt, iron, phosphorus, phenols, and zinc.

With the inclusion of 2009 groundwater quality results obtained from monitoring wells MW06-1S, MW06-1D, MW06-2S, MW06-2D, MW07-3S, MW07-3D, and MW07-6, exceedances of the Reasonable Use Concept and Ministry of the Environment *Guideline B-7* were observed for aluminum, barium, chloride, dissolved organic carbon, manganese, sodium and total dissolved solids at select wells; however, in the absence of road maintenance activities along the County Road 58 and Mask Road, parameter concentrations related to naturally-occurring conditions within the low-lying area at the site, and elevated parameters naturally-occurring in the background, the Killaloe site is interpreted to be in conformance with Ontario Ministry of the Environment *Guideline B-7* at the downgradient monitoring wells MW06-1S, MW06-1D, MW06-2S, MW06-2D, MW07-3S, MW07-3D, and MW07-6. As such, the contaminant attenuation zone downgradient of the site is interpreted to be sufficient to attenuate leachate at the Killaloe waste disposal site.

Surface water quality downstream of the site exhibited elevated concentrations of aluminum, cobalt, dissolved oxygen (low), iron, pH (low), phenols, and phosphorus at select locations; however, the elevated parameters are not interpreted to be solely related to landfill activities as the majority of the exceedances are elevated at the background surface water location (SW8). The background groundwater regime may be contributing to elevated parameters in the surface water suite, given the interpreted discharge of groundwater to surface downgradient of the site; parameter concentrations at the locations are interpreted to be partially impacted as a result of low-water conditions, as well as by factors involving naturally-occurring conditions within the low-lying area east of the site.

The volume of waste (and cover) landfilled at the Killaloe site from October 2008 through to November 2009 was 1,805 cubic metres. Assuming a twenty-five percent waste to cover ratio, this results in a volume of 1,354 cubic metres of waste disposed of at the site in 2009. Based on final contours at closure and the annual fill rate, the remaining capacity at the Killaloe site is approximately 8,638 cubic metres, with a corresponding remaining site life of approximately four years as of November 2, 2009.

Based on Township records, approximately 49,030 bags of residential waste, 200 bags and 211 half-ton truck/or trailer loads of commercial waste 120 cubic yards of construction and demolition waste, and 249 bags and 152 half-ton/or trailer loads of leaf and yard waste were received at the Killaloe site in 2009. Waste volumes collected from curbside collection within the Village of Killaloe, and transferred from the Township's Round Lake and Red Rock waste disposal sites are included in the above waste volumes. Construction and demolition waste was processed on-site on December 28, 2009. Additionally, based on

Township records approximately 446 cubic yards of clean fill material (sourced on-site), and 890 cubic metres (sourced off-site) was applied at the Killaloe waste disposal site in 2009.

Recycling tonnage records provided by Beaumen Waste Management for the Township indicate that a total of approximately 202 tonnes of recyclable material was collected from the Killaloe waste disposal site in 2009. Recyclable quantities contributing to this total included approximately 65 tonnes of containers (tin/aluminum/plastic/glass), 74 tonnes of fibres, and 63 tonnes of old corrugated cardboard collected from the site. Recyclable quantities from curbside collection within the Village of Killaloe by the Township, and recyclable quantities transferred from the Township's Round Lake, and Red Rock waste disposal sites are included in the above recycling tonnages provided by Beaumen Waste Management.

According to Township records, approximately 264 cubic metres of scrap metal, 10 white goods, 12 tagged appliances/refrigerators, and 4 non-tagged refrigerators were collected from the Killaloe waste disposal site by a local recycling contractor in 2009. Additionally, nine loads totalling 4.48 tonnes of organics were diverted from landfill at the Killaloe site, using the MOLOK system as part of the Organics Diversion Program which commenced at the site in 2008. As a Registered Steward with the Ontario Tire Stewardship program, Ontario Tire Recovery transported the following quantities and types of tires from the Killaloe site in 2009; 2004 car/or light truck, 23 medium truck, 2 agricultural/or logger skidder, 137 large and small industrial, 19 small off-road, 2 medium off-road, 2 large off-road, and 1 giant off-road.

In accordance with Condition 31 (a) of the Provisional Certificate of Approval, a Certificate of Requirement for the Killaloe waste disposal site was registered on title by the Township of Killaloe, Hagarty and Richards on May 14, 2009.

TABLE OF CONTENTS

1.0 INTRODUCTION..... 1

1.1 SITE INFORMATION 1

1.2 BACKGROUND 1

1.3 PURPOSE AND SCOPE 2

2.0 SITE DESCRIPTION 3

2.1 TOPOGRAPHY AND DRAINAGE 3

2.2 GEOLOGIC CONDITIONS 3

2.3 OPERATIONAL SETTING 3

3.0 2009 ENVIRONMENTAL MONITORING PROGRAM 5

3.1 GROUNDWATER MONITORING..... 5

3.2 SURFACE WATER MONITORING 5

3.3 ANALYTICAL LABORATORY ACCREDITATION 6

3.4 LANDFILL GAS MONITORING 6

3.5 OPERATIONAL MONITORING 7

4.0 ENVIRONMENTAL MONITORING RESULTS 8

4.1 GROUNDWATER QUALITY ASSESSMENT 8

4.1.1 Groundwater Configuration..... 8

4.1.2 Groundwater Quality 9

4.1.3 Reasonable Use Concept Assessment 15

4.2 SURFACE WATER QUALITY ASSESSMENT 18

4.3 OPERATIONS SUMMARY 21

4.3.1 Site Operations 22

4.3.2 Waste Disposal / Transfer Summary 22

4.3.3 Site Inspections and Maintenance 24

4.3.4 Complaints 25

5.0 CONCLUSIONS AND RECOMMENDATIONS 26

6.0 CLOSING 31

7.0 REFERENCES..... 32

LIST OF TABLES

Table 1	2009 Groundwater and Surface Water Monitoring Program
Table 2	Groundwater Elevations
Table 3	Groundwater Quality
Table 4	Groundwater Compared to PWQO
Table 5	Surface Water Quality

LIST OF FIGURES

Figure 1	Regional Location Plan
Figure 2	Environmental Monitoring Location Plan
Figure 3	Surface Water Monitoring Location Plan
Figure 4	Existing Site Conditions Plan

LIST OF APPENDICES

Appendix A	Provisional Certificate of Approval A412306 and Certificate of Requirement
Appendix B	Correspondence
Appendix C	Borehole Logs
Appendix D	Field Sampling Records
Appendix E	Laboratory Certificates of Analysis
Appendix F	Statement of Service Conditions and Limitations

1.0 INTRODUCTION

1.1 SITE INFORMATION

The Killaloe waste disposal site operates as an active waste disposal site and recycling transfer station in accordance with Provisional Certificate of Approval (PC of A) A412306, as amended on May 13, 2008 (Appendix A). The Killaloe site is located approximately two (2) kilometres (km) north of the Village of Killaloe and is bound to the north and east by Mask Road and County Road 58 (Figure 1), respectively, and is the only site receiving solid waste from the municipality for disposal (landfilling). The Killaloe site is located on Part of Lot 7, within the geographic Township of Hagarty, in the amalgamated Township of Killaloe, Hagarty and Richards (Township), in the County of Renfrew.

1.2 BACKGROUND

The Killaloe waste disposal site is currently approved to service residents of the entire Township, and presently accepts waste from the Township's Round Lake and Red Rock waste transfer stations for disposal, and curbside collection from the Village of Killaloe.

In 2007, the Township received provincial funding to complete several operational upgrades at the site including upgrades to the existing recycling depot (complete with a new retaining wall), establishment of the construction and demolition (C&D) and bulky waste stockpiling and shredding area, establishment of a leaf and yard area, composting, and organics waste containers. These operational upgrades were completed in 2008.

Further to the Ontario Ministry of Environment (MOE) Technical Support Section (TSS) groundwater review comments (Greenview, 2008), residential water quality results from the 2009 annual monitoring programs were provided to residents adjacent to the Killaloe waste disposal site, summarizing the 2009 residential sampling results at each respective location.

In accordance with Condition 31 (a) of the PC of A (A412306; Appendix A), the Township completed the registration of the Certificate of Requirement for the Killaloe waste disposal site on title on May 14, 2009 (Appendix A).

A site inspection was conducted by the Ottawa District MOE Office on March 17, 2010 (Appendix B) which primarily focused on the compliance status of the site. The findings of the MOE inspection were presented

to the Township in an Inspection Report dated March 22, 2010 (Appendix D); no action items on behalf of the Township were required.

Greenview was retained by the Township to complete the 2009 environmental monitoring and reporting program at the Killaloe waste disposal site.

1.3 PURPOSE AND SCOPE

The purpose of this report is to provide an overview of the annual environmental monitoring, environmental compliance, and operations at the Killaloe waste disposal site, in accordance with Condition 26 of the PC of A (A412306), including the following:

- Groundwater quality assessment and Reasonable Use Concept (RUC; MOE *Guideline B-7*) compliance (Section 4.1).
- Surface water quality assessment (Section 4.2)
- Site operational overview and capacity assessment (Section 4.3).
- Conclusions and recommendations for future monitoring programs at the site (Section 5.0).

2.0 SITE DESCRIPTION

The following sections present a summary of the physical characteristics for the Killaloe waste disposal site.

2.1 TOPOGRAPHY AND DRAINAGE

The Killaloe waste disposal site is located on a generally flat, sandy plain which extends north from the Village of Killaloe. The existing waste mound at the site is located approximately 125 metres (m) west of a seasonally wet, low-lying area extending to the west boundary of County Road 58 (Figure 2). The surficial geology at the Killaloe site is interpreted to consist of interbedded sands and gravels (Jp2g Consultants Inc. [Jp2g] and Golder Associates Ltd. [Golder], 2004).

Local groundwater from the waste area has historically been interpreted to discharge into the seasonally wet, low-lying area east of the site (Jp2g and Golder, 2004). Surface water drainage in the low-lying area maintains a generally discernible flow pattern, with minor flow to the northeast in the northeast corner of the low area. Surface water to the south, southeast, and southwest of the site is directed by local topography to the south, towards Wildlife Road, approximately 1 km south of the site (Figure 3).

2.2 GEOLOGIC CONDITIONS

The Killaloe waste disposal site is located on a lowland region of glacial and glacial-fluvial overburden geology consisting of fine to medium grey sand with localized pockets of medium to coarse grey sand and sandy silt. Depth of overburden geology to the underlying bedrock unit is not currently known as all groundwater monitors installed at the site are screened in the overburden unit. Minimum depths of sandy overburden in the vicinity of the site range from 3.75 to 10.95 m in depth, overlying a grey Precambrian granite bedrock unit (Jp2g and Golder, 2004).

All available borehole logs for monitoring wells on-site are included in Appendix C.

2.3 OPERATIONAL SETTING

The Killaloe waste disposal site consists of a licensed waste disposal area of 1.88 hectares (ha) within a total licensed property area of 11.51 ha inclusive of a contaminant attenuation zone (CAZ), in accordance with PC of A A412306, as amended on May 13, 2008 (Appendix A). The amended PC of A (A412306) approves unused capacity below the existing waste mound to be utilized with waste cell development on top

of the waste mound in Phase 1 and Phase 2 areas of the western portion of the waste disposal site (Figure 4).

Based on the amended PC of A (Appendix A), the Township is also approved to stockpile, shred, and use received C&D material and bulky wastes as alternative daily cover (ADC) at the site, in an effort to optimize remaining capacity at the site.

Facilities and operations at the Killaloe site include the active disposal area, recycling depot for blue box recyclables, organics depot, site attendant's office, stockpiled recyclable materials (scrap metals, tires), and burn area. The recycling depot at the site consists of two (2) standard roll-off containers, and several 360 litre (L) bins for acceptance of regular blue-box recyclables including: plastics, glass, paper, and aluminum/tin. The Township also maintains a small compactor (16 cubic metres [m³]) for old corrugated cardboard (OCC) recycling purposes. The Killaloe site receives domestic waste and recyclables collected via mobile waste transfer stations at the Township's Round Lake and Red Rock waste disposal sites for disposal/market. Additionally, the Township operates a reuse facility at the Killaloe site, for use by residents of the Township.

In order to maintain waste disposal operations at the Killaloe site, the Township utilizes heavy equipment including a John Deere 700 bulldozer for compaction and grading of the active waste mound, and support as necessary to maintain slopes, grade the waste mound, and install waste cover materials. Additionally, a waste compaction truck was purchased by the Township in 2007, for use within the Township, and at the Killaloe waste disposal site.

On May 13, 2008, the MOE issued an amended PC of A to allow for the collection and transfer of organic waste as part of an organic waste depot program at the site (Condition 51 and 52, Appendix A). The amended PC of A states that organic waste can be stored in a maximum of two (2) specialized MOLOK containers with a total storage capacity of 1.6 m³.

Additionally, Condition 53 of the amended PC of A defines the volume limits of recycling materials on-site including corrugated cardboard, scrap metal, blue box recyclables, organic waste, and tires (Appendix A).

As a result of the provincial funding received in 2007 for operational upgrades, construction of the upgraded operational facilities was completed at the Killaloe waste disposal site in 2008.

3.0 2009 ENVIRONMENTAL MONITORING PROGRAM

The following sections present a methodology of the environmental monitoring program conducted at the Killaloe waste disposal site in 2009.

3.1 GROUNDWATER MONITORING

As part of the 2009 environmental monitoring program, groundwater monitoring and sampling was conducted at the site by Greenview on May 14, 2009, August 24, 2009, and October 8, 2009 from the established network of groundwater monitoring wells (Table 1). During each of the May, August and October 2009 sampling events, groundwater elevations were measured using an electronic water level tape prior to the purging and sampling of the wells. Based on the groundwater elevation obtained, a well purge volume equivalent to approximately three (3) borehole volumes was calculated in-situ using a standard conversion factor relevant to the respective well diameter.

Groundwater samples were collected from each monitoring well on-site using dedicated polyethylene tubing and inertial lift foot-valves, and were analyzed for the parameter suite listed in Table 1. Samples were collected into appropriate sample bottles as provided by an accredited laboratory and the designated sample bottle for metal parameters was field-filtered using a dedicated High Capacity 45 micron filter to reduce the potential for turbidity induced bias in the analytical results for the metal parameters.

A duplicate groundwater sample for Quality Assurance and Quality Control (QA/QC) purposes was obtained from monitoring well BH00-2 during the May 2009 sampling event, MW07-3S during the August 2009 sampling event, and MW06-1S during the October 2009 sampling event.

Field measurements of pH, conductivity, dissolved oxygen (DO) and temperature were recorded at each respective groundwater well immediately following the collection of the groundwater samples. Field sampling records completed during the 2009 monitoring program are included in Appendix D. The groundwater samples were recorded on a laboratory Chain of Custody Form, and the samples were placed in coolers packed with contained ice for preservation during transport to the analytical laboratory.

The results of the 2009 groundwater monitoring program are presented in Section 4.1.

3.2 SURFACE WATER MONITORING

Surface water sampling was conducted by Greenview on May 14, 2009, August 24, 2009, and October 8, 2009 from the established surface water monitoring network at the site (Table 1, Figure 3).

In the May 2009 sampling event, sample collection was possible at all surface water locations, however no discernable flow was observed at any location. In the August 2009 sampling event, surface water sampling was possible at all sampling locations, with the exception of SW3 that was observed to be dry; however, all sampled locations were observed to have no discernable flow. In the October 2009 sampling event, surface water locations SW2, SW3, and SW5 were observed to be dry and no samples were obtained. Surface water locations SW1, SW6, SW8, and SW9 were observed to have no discernable flow.

Where available, surface water samples were collected by submerging a dedicated, non-preserved, sample container into the water body and decanting into preserved sample bottles so as not to displace preservative chemicals. The collected surface water samples were analyzed for the parameter suite listed in Table 1.

A duplicate surface water sample for QA/QC purposes was obtained from surface water sampling location SW9 during the May, August, and October 2009 sampling events.

Where able, field measurements of pH, conductivity, DO, and temperature were recorded at each respective surface water sampling location immediately following the collection of the surface water samples. Physical characteristics of each respective surface water location including depth, width, and flow velocity were recorded at the time of sampling. Field sampling records completed during the 2009 monitoring program are included in Appendix D. The surface water samples were recorded on a laboratory Chain of Custody Form, and the samples were placed in coolers packed with contained ice for preservation during transport to the analytical laboratory.

The results of the 2009 surface water monitoring program are presented in Section 4.2.

3.3 ANALYTICAL LABORATORY ACCREDITATION

Collected groundwater and surface water samples were submitted for analysis to the SGS Environmental Laboratory, located in Lakefield, Ontario. The SGS Environmental Analytical Laboratory is accredited by the Standards Council of Canada (SCC) and the Canadian Association for Environmental Analytical Laboratories (CAEAL), for specific environmental testing procedures listed in the scope of accreditation. The SGS Environmental Analytical Laboratory is licensed by the MOE to perform analysis on Drinking Water in Ontario in accordance with the *Safe Drinking Water Act*.

3.4 LANDFILL GAS MONITORING

Landfill gas monitoring is not part of the current environmental monitoring program for the Killaloe waste disposal site. Based on the sandy physical characteristics of the overburden, the dense underlying bedrock,

and the extended distance to the nearest residence, the likelihood of landfill gases impinging off-site receivers is minimal.

3.5 OPERATIONAL MONITORING

Operational monitoring at the Killaloe waste disposal site is conducted regularly to document routine waste disposal and recycling activities at the site.

Topographic and grade stake surveys were conducted at the site on June 17, 2009, October 28, 2009, and November 2, 2009 in order to determine the capacity status of the site, update site features, and update grade stakes to facilitate continued waste disposal operations at the Killaloe waste disposal site.

Weekly waste record keeping activities at the Killaloe site are completed as part of regular operations at the site to monitor landfilling activities, vehicular traffic, recycling operations and segregation of scrap metals, and tires.

The Township submits annual waste diversion reports in accordance with the Municipal Datacall, inclusive of the Killaloe site, to Waste Diversion Ontario.

The results of the 2009 operational monitoring at the site are presented in Section 4.3.

4.0 ENVIRONMENTAL MONITORING RESULTS

The following sections present a summary of the environmental monitoring results obtained during the Killaloe waste disposal site 2009 environmental monitoring program.

4.1 GROUNDWATER QUALITY ASSESSMENT

The results of the 2009 groundwater monitoring program conducted at the site are presented as follows.

4.1.1 GROUNDWATER CONFIGURATION

In 2009, the direction of groundwater flow within the shallow overburden of the Killaloe site, in the vicinity of the waste mound, is predominantly to the east towards County Road 58. The low-lying, seasonally wet area east of the site can be defined as the downgradient receiver of groundwater (Figure 2). A component of groundwater flow in the vicinity of monitoring wells MW07-3S and MW07-3D is observed to flow towards the northwest, in the general direction of the low-lying area (Figure 2). Therefore, the seasonally wet, low-lying area to the east of the site can be described as a groundwater discharge area, receiving groundwater flow from the west and southeast. The 2009 interpretation of groundwater flow within the shallow overburden at the Killaloe site is generally consistent with historical interpretations (Greenview, 2009).

Average horizontal gradient at the Killaloe waste disposal site in the vicinity of the waste mound, and to the east in the seasonally wet, low-lying area was calculated in May 2009 to be 0.003. The average horizontal gradient flowing to the northwest in the vicinity of monitoring wells MW07-3S and MW07-3D was calculated in May 2009 to be 0.011.

Using groundwater elevations measured in 2009 (Table 2), vertical hydraulic gradients were calculated at each pair of shallow and deep monitoring wells for the May, August and October 2009 sampling events. The nested monitoring wells BH00-4A(D)/BH00-4B(S) located along the eastern border of the approved waste disposal area were found to have upward vertical gradients of 0.020, 0.009, and 0.004 in May, August, and October 2009, respectively. The nested monitoring wells BH04-1S/BH04-1D, located downgradient of the waste mound, were calculated to have upward vertical gradients of 0.008 and 0.061 in May and October 2009, respectively. A vertical gradient of zero (0.000) was calculated for the August 2009 sampling event. Upward vertical gradients were calculated at the eastern CAZ boundary using monitoring wells MW06-1S and MW06-1D, with magnitudes of 0.002 and 0.007 in May and October 2009, respectively. A vertical gradient of zero (0.000) was calculated for the August 2009 sampling event. At the northern CAZ boundary, an upward vertical gradient of 0.003 was calculated in May 2009 at monitoring wells MW06-2S

and MW06-2D, while a downward vertical gradient of 0.025 was noted in August 2009; a vertical gradient of zero (0.000) was calculated for the October 2009 sampling event at MW06-2S and MW06-2D. Finally, at the south-eastern extent of the CAZ boundary, monitoring wells MW07-3S and MW07-3D were measured to have downward vertical gradients of 0.039, 0.037, and 0.008 during the sampling events in May, August, and October 2009, respectively.

4.1.2 GROUNDWATER QUALITY

The results of the 2009 groundwater monitoring program at the Killaloe site are presented in Table 3 and the accredited laboratory Certificates of Analysis (SGS) are attached in Appendix E. Analytical data obtained from respective groundwater wells have been compared to the *Ontario Drinking Water Standards* (ODWS; MOE, 2003), background water quality at the site, and MOE *Guideline B-7* and the RUC (MOE, 1994a). Given the close proximity of monitoring wells BH04-1S, BH04-1D, BH00-5, MW07-4, MW07-5, and MW07-6 to the seasonally wet, low-lying area east of the site, the water quality results from these monitoring wells have also been compared to the *Provincial Water Quality Objectives* (PWQO; MOE 1994b).

In order to evaluate the potential impacts of the waste disposal on the groundwater regime in the area surrounding the Killaloe site, background water quality must be established. Historically, background water quality has been determined using monitoring wells BH00-1 and BH00-2, which are located approximately 25 m north and 25 m west of the approved waste disposal area, respectively (Figure 2). Monitoring well BH00-1 is located cross-gradient to the waste area at the site, whereas monitoring well BH00-2 is upgradient of the waste mound. At monitoring well BH00-1, ODWS exceedances were noted for alkalinity (low), iron, and manganese during each of the May, August and October 2009 sampling events, and for pH (low) in October 2009; similarly, at monitoring well BH00-2, ODWS exceedances were noted for alkalinity (low) in October 2009, for pH (low) during the May and October 2009 sampling events, manganese in May 2009, and iron during each of the May, August and October 2009 events (Table 3). Elevated concentrations of aluminum and cobalt were noted at both background groundwater monitoring wells (Table 3). An increasing trend was observed for aluminum at monitoring well BH00-1 following inclusion of 2009 data; whereas, at monitoring well BH00-2, a decreasing trend was noted for pH, and an increasing trend for aluminum (Table 3). Volatile organic compounds (VOC) were analyzed during the August 2009 sampling event at monitoring well BH00-1, and all parameters were observed to be below the laboratory method detection limits (Table 3).

Groundwater quality immediately downgradient of the waste mound was evaluated using monitoring wells BH00-4, BH00-4B(S), BH00-4A(D), and BH00-5, and have historically been used to characterize leachate quality. In 2009, groundwater quality at these monitoring wells exhibited elevated concentrations above the background for most parameters included in the suite (Table 3). Monitoring well BH00-4A(D) appears to exhibit enhanced water quality when compared with monitoring wells BH00-4, BH00-4B(S), and BH00-5; however, many parameter concentrations remain elevated above background concentrations found at monitoring wells BH00-1 and BH00-2.

In 2009, monitoring well BH00-4, which is located along the eastern boundary of the approved waste disposal area (Figure 2), exceeded ODWS for barium, dissolved organic carbon (DOC), iron, and manganese in each of the May, August, and October 2009 sampling events, and for alkalinity and total dissolved solids (TDS) in August and October 2009 (Table 3). Decreasing trends were noted for chemical oxygen demand (COD), DOC, and magnesium following inclusion of 2009 results at monitoring well BH00-4 (Table 3). Situated adjacent to BH00-4 are nested monitoring wells BH00-4B(S) and BH00-4A(D). Monitoring well BH00-4B(S) exhibited ODWS exceedances similar to BH00-4; barium, DOC, iron, manganese, and TDS during all sampling events in 2009, while alkalinity exceeded ODWS in August and October 2009. An increasing trend was noted for aluminum, and a decreasing trend was observed for DOC following inclusion of 2009 results at BH00-4B(S) (Table 3). Monitoring well BH00-4A(D) appears to have slightly enhanced water quality in comparison to monitoring well BH00-4B(S). ODWS exceedances were noted for alkalinity (low) in May 2009, and for aluminum, iron and manganese in May, August and October 2009 (Table 3). An increasing trend was noted for aluminum following the inclusion of 2009 results at BH00-4A(D), and all ODWS exceedances at monitoring wells BH00-4S(B) and BH00-4A(D) are consistent with historical results. Approximately 70 m east of the eastern boundary of the approved waste disposal area is monitoring well BH00-5, which shares many characteristics with the monitoring wells described above (Figure 2). ODWS exceedances at BH00-5 were noted for alkalinity, barium, DOC, iron, manganese and TDS during each of the May, August and October 2009 sampling events (Table 3). The observed ODWS exceedances at monitoring well BH00-5 are consistent with historical results. Increasing trends were noted for aluminum, ammonia, barium, manganese, potassium, and total kjeldahl nitrogen (TKN) following the inclusion of 2009 results for BH00-5 (Table 3).

As part of the 2009 environmental monitoring program at the site, monitoring well BH00-5 was sampled for VOCs during the August 2009 sampling event. Consistent with historical results (Greenview, 2009), concentrations of ethylbenzene (0.004 mg/L) were observed to be elevated above the ODWS (0.0024 mg/L), while reported values of benzene, chlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, cis-1,2-dichloroethene, toluene, vinyl chloride, total xylene, and m-p xylene were elevated above

background concentrations (Table 3). Additionally, monitoring wells MW06-1S, MW06-1D, MW06-2S, MW06-2D, MW06-3S, and MW06-3D were sampled for VOCs as part of the August 2009 sampling event at the Killaloe site, and all parameters were observed to be below the minimum detection limits (Table 3).

Monitoring wells BH04-1S, BH04-1D and MW07-5 are located east and downgradient of the site (Figure 2). Monitoring wells BH04-1S and BH04-1D are located approximately 130 m east of the approved waste disposal area, and MW07-5 is located approximately 140 m southeast the approved waste disposal area (Figure 2). The majority of the parameter concentrations at these three (3) monitoring wells exceed background concentrations; however, they exceed background levels to a lesser extent than wells to the west at the downgradient boundary of the approved waste disposal area (Table 3). ODWS exceedances at both the shallow (BH04-1S) and deep (BH04-1D) monitoring wells include DOC, iron, and manganese in May, August, and October 2009, and for TDS in October 2009, and are consistent with historical results (Table 3). An increasing trend for aluminum was noted for both monitoring well BH04-1S and BH04-1D (Table 3). Decreasing trends were noted at monitoring well BH04-1S for chloride, iron, sodium, and sulphate following inclusion of 2009 results, while decreasing trends were observed for alkalinity, barium, calcium, chloride, COD, conductivity, DOC, iron, magnesium, sodium, and TDS at BH04-1D (Table 3). Monitoring well MW07-5 exceeded ODWS for DOC, iron, manganese, and zinc in May, August, and October 2009 (Table 3). The observed ODWS exceedances at monitoring well MW07-5 are consistent with historical results, and the elevated concentrations of zinc measured at monitoring wells MW07-4, MW07-5, and MW07-6 are not interpreted to be landfill-related, due to the lack of similar concentrations of zinc at monitoring wells closer to the waste mound (Figure 2; Table 3). The most likely source of zinc at these wells is interpreted to be related to the inadvertent use of galvanized couplings used in well construction in 2007. Increasing trends were observed at MW07-5 for alkalinity, barium, calcium, COD, conductivity, magnesium, manganese, and TDS, in addition to a decreasing trend for sulphate following the inclusion of 2009 results (Table 3).

Groundwater quality data from monitoring wells BH00-5, BH04-1S, BH04-1D, MW07-4, MW07-5, and MW07-6 were compared to the PWQO based on the proximity of groundwater to the ground surface at these locations, as per MOE TSS comments dated October 20, 2005. Similar to historical results, exceedances above PWQO limits were noted at BH00-5, BH04-1S, and BH04-1D for boron, cobalt, iron, and phosphorus during the May, August, and October 2009 sampling events (Table 4). Monitoring well BH00-5 also exceeded PWQO for phenols for the May and October 2009 sampling events, while monitoring well BH04-1D exceeded PWQO for aluminum in the May and August 2009 sampling events (Table 4). Monitoring wells MW07-4 and MW07-6 were observed to exceed PWQO for cobalt and zinc in May, August, and October 2009, while MW07-4 was also noted to exceed PWQO for iron in August 2009 (Table 4).

Similarly, monitoring well MW07-5 was observed to exceed PWQO for cobalt, iron, and zinc in May, August, and October 2009, for phenols in May 2009, and phosphorus in May and October 2009 (Table 4). The elevated concentrations of zinc at monitoring wells MW07-4, MW07-5, and MW07-6 are interpreted to be related to the inadvertent use of galvanized couplings during well construction in 2007. All PWQO exceedances are consistent with historical results (Greenview, 2009).

Groundwater quality south and southeast of the waste mound is assessed using monitoring wells BH00-3 and MW07-6. Monitoring well BH00-3 is situated approximately 50 m south of the southeast corner of the approved waste disposal area, whereas monitoring well MW07-6 is located 170 m southeast of the southeast corner of the approved waste disposal area, at the former eastern property boundary (Figure 2). In 2009, ODWS exceedances for aluminum, iron, and manganese in May, August, and October 2009, and for pH (low) in May 2009 (Table 3). Increasing trends were observed at monitoring well BH00-3 for alkalinity, aluminum, iron and manganese (Table 3). Monitoring well BH00-3 appears to be slightly impacted from landfill-related activities; however, naturally-occurring conditions in the low-lying wet area adjacent to the monitoring well may also be contributing to the elevated parameter concentrations noted in 2009. Monitoring well MW07-6 was observed to have ODWS exceedances for the parameters manganese and zinc for each of the May, August and October 2009 sampling events; however, the exceedances of zinc are interpreted to be related to the inadvertent use of galvanized couplings during well construction and therefore not interpreted to be landfill-related. ODWS exceedances at both monitoring wells BH00-3 and MW07-6 are historically evident at their respective locations, and in the background at the site, with the exception of zinc. Decreasing trends were observed at monitoring well MW07-6 for DOC and sulphate following the inclusion of 2009 results (Table 3). Similar to monitoring well BH00-3, groundwater monitor MW07-6 is located within the low-lying wet area east of the site, and parameters observed are likely related to naturally-occurring conditions, rather than landfill leachate. Parameter concentrations at monitoring well MW07-6 are significantly different from those found at groundwater monitor MW07-5, suggesting there is minimal influence of landfill leachate near the southern property and CAZ boundary.

Downgradient groundwater quality north of the site is monitored at monitoring wells MW07-4, MW06-2S, and MW06-2D. Monitoring well MW07-4 is located approximately 135 m northeast of the northeast corner of the approved waste disposal area (Figure 2), and is not interpreted to be impacted by landfill leachate. In 2009, ODWS exceedances were noted for alkalinity (low) and zinc during the May, August, and October sampling events, and for iron in August 2009 (Table 3). Similar to both monitoring wells MW07-5 and MW07-6, elevated zinc concentrations are interpreted to be related to the unintended use of galvanized couplings during well installation. An increasing trend was observed at monitoring well MW07-4 for sulphate following inclusion of the 2009 results (Table 3). With the exception of zinc, groundwater quality at

MW07-4 is relatively similar to background water quality at the site, and is of enhanced quality compared to MW07-5, likely due to its location partially cross-gradient to the primary direction of groundwater flow at the site (Figure 2). Located approximately 270 m to the north of the northeastern corner of the approved waste disposal area, adjacent to Mask Road and along the northern CAZ boundary are monitoring wells MW06-2S and MW06-2D (Figure 2). Monitoring well MW06-2S was observed to exceed ODWS for iron and magnesium in May, August, and October 2009, for alkalinity (low) in May 2009, and for aluminum in August and October 2009 (Table 3). Similarly, monitoring well MW06-2D was noted to exceed ODWS for aluminum and iron in May and August 2009, pH (low) in August 2009, and for manganese in May, August, and October 2009 (Table 3). Monitoring well MW06-2D exceeded background concentrations for most of the parameters in the 2009 environmental monitoring program; however, wells MW06-2S and MW07-4 were elevated above background concentrations for only a few parameters (Table 3). Trends observed include an increase in aluminum at monitoring well MW06-2S, and a decrease in sodium at MW06-2D (Table 3). Ultimately, water quality at these three (3) monitoring wells is similar, and in some cases enhanced, in comparison to background water quality. The source of the historically elevated barium concentrations at monitoring well MW06-2D is not known at this time given that monitoring well MW06-2D is located cross-gradient to the waste mound, and the concentration of barium is not apparent in groundwater quality at MW06-2S and MW07-4 (Table 3). Based on the groundwater configuration at the site in 2009, and similar to historical results (Greenview, 2009), the elevated concentrations may be a result of off-site influences based on the southeasterly groundwater flow component in the vicinity of the wells MW06-2S and MW06-2D (Figure 2). Groundwater quality at monitoring wells MW06-2S and MW06-2D is also interpreted to be partially impacted by winter road maintenance, due to their location adjacent to Mask Road (Figure 2).

Groundwater quality at the eastern property and CAZ boundary at the site is assessed using monitoring wells MW06-1S and MW06-1D. With the inclusion of 2009 groundwater quality results at monitoring wells MW06-1S and MW06-1D, which are located approximately 500 m east of the site and adjacent to County Road 58 (Figure 2), parameter concentrations are interpreted to be of enhanced quality in comparison to monitoring wells closer to the waste mound; however, most parameter concentrations remain elevated above background water quality (Table 3). ODWS exceedances were noted at monitoring well MW06-1S for pH (low) for the May 2009 event, aluminum for the August and October events, and DOC, iron, and manganese for all three sampling events in 2009. A decreasing trend was observed for sulphate at monitoring well MW06-1S following inclusion of 2009 results (Table 3). For monitoring well MW06-1D, ODWS exceedances were noted for aluminum, iron, and manganese in May, August, and October 2009 and for TDS in the May 2009 sampling event. An increasing trend was noted at monitoring well MW06-1D

for aluminum following inclusion of 2009 results (Table 3). The observed elevated parameter concentrations at monitoring well MW06-1S and MW06-1D can partially be attributed to surface water present in the seasonally wet, low-lying area in the vicinity of these wells. Additionally, water quality may be partially attributed to landfill-related activities, with the exception of iron and manganese, which are interpreted to be naturally-occurring as they are elevated in the background water quality (Table 3). Some elevated parameters, including chloride, sodium and TDS, are interpreted to be related to winter road maintenance along County Road 58. All ODWS exceedances observed at monitoring wells MW06-1S and MW06-1D are historically evident.

Groundwater quality at the southeastern extent of the CAZ is assessed using monitoring wells MW07-3S and MW07-3D, which were installed at the site in 2007 approximately 195 m south of monitoring wells MW06-1S and MW06-1D, in the western portion of the County Road 58 right-of-way (Figure 2). When compared with background concentrations observed at monitoring wells BH00-1 and BH00-2 upgradient of the waste mound, water quality at monitoring wells MW07-3S and MW07-3D exceed background concentrations for many of the parameters in the 2009 environmental monitoring program (Table 3). ODWS exceedances were noted for aluminum and manganese in May, August, and October 2009, and iron in August 2009 for monitoring well MW07-3D (Table 3). The shallow monitoring well, MW07-3S, exceeded ODWS for aluminum, iron, manganese, and TDS in August 2009 (Table 3). All ODWS exceedances in 2009 at monitoring wells MW07-3S and MW07-3D are historically evident at both wells and or in the background groundwater quality at the site. Increasing trends were observed for aluminum and iron at monitoring well MW07-3D; monitoring well MW07-3S was noted to have an increasing trend for aluminum, and a decreasing trend for manganese (Table 3). Groundwater elevations at monitoring wells MW07-3S and MW07-3D are the highest of any other monitoring well at the site, and groundwater elevation contours generated in the vicinity of these wells indicate that groundwater flow is in a northwest direction. Therefore, it is interpreted that water quality in the southeast corner of the CAZ is not influenced by landfill-related activities (Figure 2). Any elevated parameters are inferred to be related to winter road maintenance along County Road 58, and to naturally-occurring conditions in the vicinity of MW07-3S and MW07-3D.

As part of the 2009 groundwater monitoring program at the site, groundwater samples were collected from residential sampling locations R1, R2, and R3 (Figure 2). Several parameter concentrations at R1, R2, and R3 were observed to be elevated above background conditions at the Killaloe site in 2009. No ODWS exceedances were observed at R1 and R2 following the inclusion of 2009 results (Table 3). Residential location R3, a dug well, was noted to exceed ODWS for pH (high) in October 2009 (Table 3). At R1, decreasing trends were noted for conductivity, nitrate, and sulphate, while no trends were observed at R2

(Table 3). Residential sampling location R3 was observed to have increasing trends for alkalinity, DOC, and pH, and decreasing trends for chloride, conductivity, and nitrate (Table 3). Since R1, R2 and R3 are located upgradient and at a considerable distance from the waste mound, it is interpreted that impacts associated with landfill-related activities are unlikely, and that elevated parameter concentration are resultant of naturally-occurring conditions.

A duplicate groundwater sample for QA/QC purposes was obtained from monitoring well BH00-2 during the May 2009 sampling event, from MW07-3S for the August 2009 event, and from MW06-1S for October 2009 sampling event. The QA/QC samples were similar to the identified sample indicating that the results of the 2009 groundwater monitoring program can be interpreted with confidence.

4.1.3 REASONABLE USE CONCEPT ASSESSMENT

In an effort to assess potential leachate impacts migrating beyond the site boundary, the MOE's RUC was used as an assessment tool to monitor downgradient impacts from the waste disposal site. Downgradient impacts are typically assessed using the MOE RUC at monitoring wells located at, or in close proximity to, the downgradient CAZ boundary. The downgradient monitoring wells located near the downgradient CAZ boundary were compared to trigger concentrations for specific parameters as determined by leachate quality at the site using the MOE's RUC for groundwater (MOE Procedure B-7-1, 1994a).

The MOE Procedure B-7-1: *Determination of Contaminant Limits and Attenuation Zones* iterates that in accordance with the appropriate criteria for particular uses, a change in groundwater quality on an adjacent property as a result of landfilling activities will only be accepted by the MOE as follows:

The quality cannot be degraded by an amount in excess of 50% of the difference between background and the Ontario Drinking Water Standards for non-health related parameters and in excess of 25% of the difference between background and the Ontario Drinking Water Standards for health related parameters. Background is considered to be the quality of the groundwater prior to any man made contamination.

MOE Procedure B-7-1

The RUC assessment was conducted using the concepts and procedures outlined in MOE Procedure B-7-1 (MOE, 1994a), specifically using the median value of individual background parameter concentrations from monitoring well BH00-1 and BH00-2, to characterize natural groundwater quality at the site. Monitoring wells MW06-1S and MW06-1D were used to monitor downgradient impacts at the eastern CAZ boundary,

monitoring well MW07-6 was used for monitoring downgradient impacts at the southern CAZ boundary, monitoring wells MW06-2S and MW06-2D were used for monitoring impacts at the northern CAZ boundary, and monitoring wells MW07-3S and MW07-3D were used for monitoring impacts at the southeastern extent of the CAZ. All of the above monitoring wells were used for assessing site compliance with the MOE RUC and conformance with MOE *Guideline B-7*.

Only the parameters as identified as leachate indicators in the *Site Operations and Development Plan, Killaloe Waste Disposal Site (ODP; SGS, 2004)*, including alkalinity, barium, boron, chloride, chromium, DOC, hardness, nitrate, sodium, sulphate, TDS, and zinc were used as groundwater triggers, and a respective RUC criteria value was calculated for each these parameters at the Killaloe waste disposal site. The trigger concentrations used to assess RUC compliance for the groundwater regime at the site is based on the MOE RUC for each of the respective parameters.

The RUC values for individual parameters should be generated each year based on analytical results obtained from the groundwater monitoring program. If RUC exceedances are noted, then action will be undertaken as appropriate and necessary in accordance with a defined groundwater contingency plan for the site. In cases where a groundwater contingency plan is not defined, a meeting with representatives of the district MOE office should be held to develop an appropriate contingency plan, as necessary and appropriate for the particular site.

Monitoring wells MW06-1S and MW06-1D are located approximately 500 m east and downgradient from the site, adjacent to County Road 58, and are used to characterize the RUC at the eastern CAZ boundary (Figure 2). Similar to historical results, DOC and TDS (October 2009 only) concentrations at monitoring well MW06-1S, in addition to chloride and TDS concentrations at MW06-1D, exceeded the RUC during the May, August, and October 2009 sampling events (Table 3). Based on the proximity of these wells to the seasonally wet, low-lying area to the east of the site, the elevated concentrations of DOC can most likely be attributed to natural wetland chemistry. Given the proximity of the monitoring wells MW06-1S and MW06-1D to County Road 58, the observed RUC exceedances of chloride and TDS at these locations are interpreted to be the result of winter road maintenance activities. At these locations, with the absence of the adjacent winter road maintenance activities, it is expected that parameter concentrations would meet the RUC, and the Killaloe site would be in conformance with MOE *Guideline B-7*.

Monitoring well MW07-6, located approximately 170 m southeast of the southeastern corner of the approved waste disposal area, is used to characterize the RUC at the southern CAZ boundary (Figure 2). Similar to historical results, there were no RUC exceedances at the southern CAZ boundary, with the

exception of zinc which exceeded RUC limits in May, August and October 2009 sampling events. As discussed previously, elevated zinc levels at monitoring well MW07-6 are interpreted to be related to the inadvertent use of galvanized couplings during well construction. Therefore, it is interpreted that groundwater quality at monitoring well MW07-6 meets the RUC criteria in 2009, and remains in conformance with MOE *Guideline B-7* at the southern CAZ boundary.

Monitoring wells MW06-2S and MW06-2D are located adjacent to Mask Road and approximately 270 m northeast of the northeastern corner of the approved waste disposal area, and are used to characterize the RUC at the northern CAZ boundary (Figure 2). Similar to historical results, there were no RUC exceedances in the shallow monitor (MW06-2S) for the 2009 environmental monitoring program (Table 3). At the deeper monitoring well (MW06-2D) barium and DOC exceeded RUC limits for all three sampling events in 2009 (Table 3). RUC exceedances of barium and DOC at monitoring well MW06-2D have been historically evident. Elevated levels of DOC can likely be attributed to natural wetland chemistry in the vicinity of monitoring wells MW06-2S and MW06-2D (Figure 2), and therefore compliance with RUC is anticipated at the northern CAZ boundary with respect to DOC. The source of the historically elevated barium concentrations noted in monitoring well MW06-2D is not known at this time given that monitoring well MW06-2D is located partially cross-gradient to the waste mound, with a potential component of groundwater flow in the vicinity of the wells originating from off-site sources to the northwest (Figure 2). As such, the elevated barium concentrations may be the result of off-site influences based on groundwater configuration indicating a southeasterly flow component in the vicinity of monitoring wells MW06-2S and MW06-2D in 2009. As a result, it is anticipated, in the absence of barium entering the CAZ from an unknown northerly, off-site source, the site is in compliance with RUC in 2009 and is in conformance with MOE *Guideline B-7* with respect to barium at the northern CAZ boundary. Therefore, the Killaloe site is interpreted to meet the intent of MOE *Guideline B-7* and RUC at the northern CAZ boundary in 2009.

Monitoring wells MW07-3S and MW07-3D are located approximately 195 m south of monitoring wells MW06-1S and MW06-1D, in the western portion of the County Road 58 right-of-way (Figure 2), and were used to assess compliance with RUC and conformance with MOE *Guideline B-7* at the southeastern extent of the CAZ. Similar to results in 2008, RUC exceedances were observed for chloride, sodium, and TDS at MW07-3S in all three (3) sampling events in 2009 (Table 3), and the exceedances are interpreted to be resultant of winter road maintenance along County Road 58. No RUC exceedances were noted at monitoring well MW07-3D in 2009. Equipotential contours in the vicinity of monitoring wells MW07-3S and MW07-3D indicate that localized groundwater flow is predominantly to the northwest, and therefore the probability of landfill-related impacts at these monitoring wells is unlikely. In the absence of impacts related to winter road maintenance near monitoring wells MW07-3S and MW07-3D, and allowing for the interpreted

groundwater flow directions in the vicinity of both monitoring wells, it is interpreted that the Killaloe site is in compliance with RUC and conformance with MOE *Guideline B-7* at the southeastern extent of the CAZ.

4.2 SURFACE WATER QUALITY ASSESSMENT

As part of the May, August and October 2009 surface water sampling events, physical characteristics of sampling locations SW1, SW2, SW3, SW5, SW6, SW8, and SW9 were recorded. Monitoring locations SW4 and SW7 were removed from the 2009 environmental monitoring program, based on recommendations in the *2008 Annual Report* (Greenview, 2009; Figure 3).

For the May 2009 sampling event, surface water samples were obtained at all locations (SW1, SW2, SW3, SW5, SW6, SW8, SW9), however no discernible flow was observed at all sampling stations (Appendix D).

For the August 2009 sampling event, surface water samples were obtained at all sampling locations, with the exception of SW3 which was observed to be dry. All sampled locations were observed to have no discernible flow (Appendix D).

For the October 2009 sampling event, surface water sampling locations SW2, SW3, and SW5 were dry and no samples were obtained. Samples were collected at surface water locations SW1, SW6, SW8 and SW9; however, all sampled locations were observed to have no discernible flow (Appendix D).

Surface water field sampling records are provided in Appendix D.

Surface water quality results for the Killaloe site were compared with MOE PWQO (MOE, 1994b) and the results of the 2009 surface water monitoring program are presented in Table 5. Accredited laboratory Certificates of Analysis for the surface water quality results are provided in Appendix E.

Surface water samples were obtained at SW8, which is located approximately 650 m west and upgradient of the approved waste disposal area, for all sampling events at the Killaloe site in 2009 (Figure 3). Surface water location SW8 is interpreted to represent background conditions at the Killaloe site, due to its location upgradient of the waste mound. No discernible flow was observed at SW8 during the 2009 environmental monitoring program, and surface water in the vicinity of SW8 was observed to exist as small, shallow pools within a low-lying area with many small trees and shrubs. PWQO exceedances were noted for DO (low) during all sampling events in 2009, for phosphorus in the May and August 2009 events, for pH (low) during the May 2009 event, and for aluminum and iron in the August 2009 event (Table 5). No trends were observed at this location due to insufficient data, as sampling at SW8 commenced in May 2008 (Table 5).

Surface water location SW8 is interpreted to continue to be representative of background surface water quality.

As noted in previous reports (Greenview, 2009; Greenview, 2008), surface water quality at sampling location SW1 has historically been considered to be representative of background surface water conditions at the site, as it is located approximately 160 m south of and cross-gradient to the waste mound in the low-lying area to the south of the site (Figure 2); however, following its inclusion in the environmental monitoring program, SW8 is interpreted to be more representative of background surface water quality at the Killaloe site. Therefore, SW1 is no longer considered an appropriate background surface water location. Surface water location SW1 was sampled in May, August, and October 2009; however, during each sampling event SW1 was observed to be a small, shallow pool of water with no discernable flow. The pools of water in the vicinity of SW1 were observed to have decaying organic matter. Exceedances of PWQO criteria were noted for aluminum, DO (low), and iron in May, August, and October 2009, for phenols and phosphorus in May and August 2009, pH (low) in August and October 2009, and cobalt in August 2009 (Table 5). A decreasing trend was observed for sulphate with the inclusion of 2009 results.

Surface water sampling location SW2 is located approximately 100 m northeast of SW1, and 100 m southeast of the waste mound, in the seasonally wet, low-lying area east of the site (Figure 2). During each sampling event SW2 was observed to be a small, shallow pool of water with no discernable flow. In 2009, a surface water sample was obtained during the May and August sampling events, and many parameters were noted to exceed background concentrations. The parameters including aluminum, cobalt, DO, iron, and phosphorous exceeded PWQO; aluminum, DO, iron and phosphorous concentrations are consistent with historical results at the location, and similar exceedances are noted in background concentrations (SW8; Table 5). The concentration observed for cobalt, 0.0009 mg/L, was equal to the PWQO limit; however, elevated concentrations of cobalt are observed in background groundwater quality at the site in 2009 (BH00-1 and BH00-2), and at wells located upgradient of surface water location SW2 (BH00-3, BH00-4, BH00-4A(D), and BH00-4B(S)). With the inclusion of 2009 water quality results, the parameters cobalt and manganese were observed to have slightly increasing trends (Table 5).

Surface water location SW3 is located approximately 105 m northeast of the northeast corner of the waste disposal site, in the vicinity of monitoring well MW07-4 (Figure 2). Surface water location SW3 was observed to be a small, shallow pool of water with no discernable flow in May 2009; SW3 was not sampled in August 2009 or October 2009 as it was noted to be dry (Appendix D). In 2009, most parameter concentrations at SW3 were observed to be elevated above background water quality (SW8; Table 5). Similar to background location SW8, PWQO exceedances at SW3 were observed for aluminum, cobalt, iron,

phenols and phosphorus; phenols were noted to equal the PWQO limit (0.001 mg/L; Table 5). Exceedances of PWQO at surface water location SW3 are similar to historical results at the Killaloe site.

Surface water location SW5 is located approximately 125 m east of the site, approximately 20 m south of monitoring wells BH04-1S and BH04-1D (Figure 2). Surface water location SW5 was sampled in May and August 2009 and was observed to be small, shallow pool of water; SW5 was not sampled in October 2009 as it was observed to be dry (Appendix D). Similar to historical results, the majority of water quality parameters at SW5 were elevated in comparison to background (SW8) in 2009 (Table 5). PWQO exceedances were observed for DO, iron, and phosphorous for the May and August 2009 sampling events, and for cobalt in August 2009 (Table 5); similarly, with the exception of cobalt in August 2009, these are parameters that also exceed PWQO in background (SW8). No trends were observed at SW5 following inclusion of 2009 results. The slightly elevated parameter concentrations noted at this surface water location may be partially attributed to landfill-related impacts; however, parameter concentrations may also be affected by naturally-occurring conditions in the background (SW8) and suspended sediment in the sample as a result of low-water conditions at SW5.

Surface water location SW6 was included in the environmental monitoring program in 2008 to further establish surface water quality south of the site, and is located approximately 1,800 m south of the Killaloe site, adjacent to Wildlife Road (Figure 3). Surface water location SW6 was observed to be a flooded area adjacent to Wildlife Road, with many small trees and shrubs and a large amount of decaying organic matter. Surface water samples were obtained for SW6 in each of the May, August, and October 2009 sampling events, and the majority of parameters exceeded background water quality at the site (Table 5). PWQO exceedances were noted for aluminum in October 2009, DO (low) in August 2009, and iron and phosphorus in May, August, and October 2009 sampling events (Table 5). The exceedances of aluminum, DO (low), iron and phosphorous are similar to background surface water quality at SW8, and therefore are not interpreted to be landfill-related from the Killaloe site (Table 5). The elevated parameter concentrations observed at SW6 are interpreted to be the result of the location of SW6 within a low-lying, no discernable flow, flooded area. Since SW6 is located adjacent to Wildlife Road, some impacts involving water quality are interpreted to be related to winter road maintenance, and due to the flooding and shallow surface water level observed at the location, the samples may have been affected by suspended sediment. There were no trends noted at SW6 during the 2009 environmental monitoring program, and generally the water quality data at SW6 is similar to the background water quality at the Killaloe site.

Surface water location SW9 is located 615 m northeast of the active landfill area at the Killaloe site, adjacent to the southwest corner of County Road 58 and Mask Road and along the northeastern border of the CAZ

(Figure 2). Surface water samples were obtained at SW9 for each of the May, August and October 2009 sampling events, yet no discernable flow was detected for any of the 2009 sampling events, and many parameters exceeded background water quality at SW8 (Table 5). PWQO exceedances were observed for aluminum in May and October 2009, DO (low) and pH (low) in August and October 2009, phenols in October 2009, phosphorus in May and August 2009, and for iron in May, August, and October 2009 (Table 5). Exceedances of DO, iron, phosphorous and aluminum are consistent with historical data obtained at the background sample location SW8, and thus are interpreted related to naturally-occurring conditions within the low-lying area at the site; the elevated phenols concentration in October 2009 is interpreted to be resultant of organic decay within the low-lying area. Similar to surface water location SW6, there were no trends observed at surface water location in 2009 due to insufficient data, as only six (6) sampling events have occurred thus far for both locations. There may be some parameters slightly impacted by landfill leachate at SW9; however, the distance of surface water location SW9 from the waste mound, and the affects of naturally-occurring conditions within the low-lying area and winter road maintenance along County Road 58 are interpreted to impact surface water quality at the northeast property boundary.

In conclusion, the elevated parameter concentrations noted in the surface water regime downstream of the site are not solely attributed to landfill operations as several parameter concentrations including aluminum, DO (low), iron, pH (low), and phosphorus were elevated at the background surface water location SW8. Further, given that groundwater is interpreted to discharge to the surface downgradient of the site, background groundwater quality may be attributing to the elevated surface water concentrations downstream of the site including cobalt, iron, and manganese. Also, based on the physical characteristics of the surface water locations being in low-lying depressional areas of the seasonally wet area east of the site, elevated parameter concentrations at the locations are expected to be partially influenced as a result of suspended sediment in the samples related to low-water conditions at the surface water locations, and to natural wetland chemistry.

Blind duplicate samples were collected for QA/QC purposes at SW9 for the May, August, and October 2009 sampling events and were similar to the identified samples indicating that the results of the 2009 surface water monitoring program can be interpreted with confidence.

4.3 OPERATIONS SUMMARY

A summary of 2009 waste management operations at the Killaloe waste disposal site is presented below.

4.3.1 SITE OPERATIONS

The site is currently operating as a municipal solid waste landfill, accepting domestic waste and recyclables for disposal. The Killaloe site accepts solid waste from the Township's Round Lake, and Red Rock waste transfer stations for final disposal, and curbside collection from the Village of Killaloe.

A sign is posted at the entrance to the waste disposal site that provides hours of operation, accepted waste and recycling, permitted users, applicable Township waste management by-laws, and emergency contact numbers. The site is accessed from the site road extending to the north from Mask Road (Figure 4).

Hours of operation at the Killaloe site, are as follows:

Operational Hours (Year Round)

Wednesday	7:30 a.m. – 11:30 a.m.
Friday	12:00 p.m. – 4:00 p.m.
Saturday	8:00 a.m. – 4:00 p.m.

Access to the Killaloe site is restricted by a lockable gate and page wire fence around the site. The site is surrounded by forested lands to the north, west and south, and by a seasonally wet, low-lying area to the east and southeast (Figure 4), which provides adequate screening and restricted access to the site. An electric bear fence was installed at the Killaloe site in 2009, in order to restrict access by vectors to the active disposal area (Figure 4)

The site access road extending from Mask Road has sufficient width at the entrance and within the site to allow for unimpeded winter travel and access for emergency and snow removal equipment. The site access road was observed to be in serviceable condition during the routine site inspections conducted by Greenview during site visits in 2009.

The Township maintains an attendant's office, re-use centre, organics (MOLOK) waste depot, an upgraded recycling area, cardboard compactor, and a mobile garbage compactor truck at the Killaloe site, in addition to staging areas for waste tires, scrap metal, leaf and yard waste, C&D and bulky waste (Figure 4).

4.3.2 WASTE DISPOSAL / TRANSFER SUMMARY

The Killaloe waste disposal site is approved to receive waste and recyclables from residents of the entire Township, as well as transferred domestic waste received from the Township's Red Rock and Round Lake waste transfer sites, and curbside collection from the Village of Killaloe.

In 2009, the volume of waste disposed of at the Killaloe waste disposal site was determined using digital terrain modelling (DTM). The DTM method is a computer based process that compares two (2) topographic surfaces or digital terrain models, and calculates the prismatic volumetric difference.

To calculate the volume of waste disposed at the site in 2009, the topographic survey conducted on November 2, 2009 was compared to the topographic survey conducted on October 31, 2008. The volumetric difference, or waste (and cover) disposed at the site over the identified 12-month period was 1,805 m³, which is less than the pro-rated volume reported in the *2008 Annual Report* (Greenview, 2009). The 2009 annual fill rate of 1,805 m³ corresponds to a volume of waste in place of 72,250 m³ as of November 2, 2009. Assuming a twenty-five percent (25%) waste to cover ratio (3:1), this results in a volume of 1,354 m³ of waste disposed of at the site in 2009. The volume of waste disposed of at the Killaloe site in 2009 was disposed of utilizing the area method, thereby providing for a reasonably accurate volume determination of waste disposed at the site.

Utilizing the final contours at closure (FCC) at the site (Figure 4), the remaining capacity of the Killaloe site is approximately 8,638 m³, as of November 2, 2009. Utilizing the 2009 annual fill rate at the site of 1,805 m³, the remaining site life of the Township's Killaloe waste disposal site is approximately four (4) years.

The Township continues to complete a method of waste record keeping (consistent with Condition 35 of the PC of A at the Killaloe site) which was implemented in November 2006 at the Township's sites, to more accurately document waste materials received and transferred at each site, respectively.

In comparison to the DTM method, and as based on Township records, approximately 8,075 vehicles, 49,030 bags of residential waste, 200 bags and 211 half-ton truck/or trailer loads of commercial waste, 120 cubic yards of C&D waste, and 249 bags and 152 half-ton/or trailer loads of leaf and yard waste were received at the Killaloe site in 2009. Waste volumes collected from curbside collection within the Village of Killaloe, and transferred from the Township's Round Lake and Red Rock waste disposal sites are included in the above waste volumes. C&D and bulky waste was processed at the Killaloe site on December 28, 2009 by Nad-Core Environmental of Midhurst, Ontario in accordance with the site's PC of A. Additionally, based on Township records approximately 446 cubic yards of clean fill material (sourced on-site), and 890 m³ (sourced off-site) was applied at the Killaloe waste disposal site in 2009.

Recycling tonnage records provided by Beaumen Waste Management for the Township indicate that a total of approximately 202 tonnes of recyclable material was collected from the Killaloe waste disposal site in 2009. Recyclable quantities contributing to this total included approximately 65 tonnes of containers (tin/aluminum/plastic/glass), 74 tonnes of fibres, and 63 tonnes of OCC collected from the site. Recyclable

quantities from curbside collection within the Village of Killaloe by the Township, and recyclable quantities transferred from the Township's Round Lake, and Red Rock waste disposal sites are included in the above recycling tonnages provided by Beaumen Waste Management.

According to Township records, approximately 264 m³ of scrap metal, 10 white goods, 12 tagged appliances/refrigerators, and 4 non-tagged refrigerators were collected from the Killaloe waste disposal site by a local recycling contractor in 2009. Additionally, 9 loads totalling 4.48 tonnes of organics were diverted from landfill at the Killaloe site, using the MOLOK system as part of the Organics Diversion Program which commenced at the site in 2008. As a Registered Steward with the Ontario Tire Stewardship program, Ontario Tire Recovery transported the following quantities and types of tires from the Killaloe site in 2009; 2004 car/or light truck, 23 medium truck, 2 agricultural, 137 large and small industrial, 19 small off-road, 2 medium off-road, 2 large off-road, and 1 giant off-road.

The Township conducted a household hazardous waste collection event at the Township's Municipal Garage, located at 16370 Highway 60, on August 29, 2009 for residents of the Township.

4.3.3 SITE INSPECTIONS AND MAINTENANCE

Site inspections of the waste disposal area and property at the Killaloe site were conducted by Greenview on May 14, 2009, August 24, 2009, and October 8, 2009 during the May, August, and October 2009 sampling events. Additional site inspections were completed by Greenview on June 17, 2009, October 28, 2009, and November 2, 2009 during topographic and grade stake surveys at the site. The Township also conducted regular investigations to verify the compliance status of the site. The site inspections included a cursory investigation of housekeeping/litter control aspects, monitoring well maintenance requirements in accordance with O. Reg. 903 (Wells), and a general site overview for MOE regulatory compliance issues. There were no compliance items requiring immediate action on the part of the Township, observed during the routine site inspections completed in 2009.

In first part of 2009, bear activity at the site was apparent in non-operational hours and evenings; however, the Township completed the installation of bear fencing in accordance with the Ontario Ministry of Natural Resources (MNR) Bear Wise Program on September 11, 2009, and no further bear activity was observed.

The Township completes regular winter road maintenance throughout the winter months including ploughing, and applying sand

The Township conducts routine maintenance and repairs on operating equipment at the site consistent with normal operating procedures. In addition, the Township purchased a waste compaction truck in 2007 for use at the Killaloe waste disposal site, and within the Township.

A site inspection was conducted by the Ottawa District MOE Office on March 17, 2010 which primarily focused on the compliance status of the site with the PC of A (A412306; Appendix A), *O. Regulation 347*, as amended, and the *Environmental Protection Act*. The findings of the MOE inspection were presented to the Township in an Inspection Report dated March 22, 2010 (Appendix B), which detailed the compliance status of the site, and noted that no action items were required on behalf of the Township.

4.3.4 COMPLAINTS

Based on Township records, three (3) complaints were received in 2009 with respect to waste management operations within the Township, and at the Killaloe waste disposal site in 2009. Complaints were received regarding bag tags – their use and payment for them. The Township clarified the specific use of tags, and is reviewing its policies and procedures in this regard. The final complaint was regarding the height of the ash bin at the Killaloe site. Township operations staff rectified the situation by lowering the bin.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the 2009 environmental monitoring program completed for the Killaloe waste disposal site, the following conclusions are provided:

- In 2009, the direction of groundwater flow within the shallow overburden of the Killaloe site, in the vicinity of the waste mound, is predominantly to the east towards County Road 58. The low-lying, seasonally wet area east of the site can be defined as the downgradient receiver of groundwater (Figure 2). A component of groundwater flow in the vicinity of monitoring wells MW07-3S and MW07-3D is observed to flow towards the northwest, in the general direction of the low-lying area (Figure 2). Therefore, the seasonally wet, low-lying area to the east of the site can be described as a groundwater discharge area, receiving groundwater flow from the west and southeast. Average horizontal gradient at the Killaloe waste disposal site in the vicinity of the waste mound, and to the east in the seasonally wet, low-lying area was calculated in May 2009 to be 0.003. The average horizontal gradient flowing to the northwest in the vicinity of monitoring wells MW07-3S and MW07-3D was calculated in May 2009 to be 0.011.
- Vertical hydraulic gradients were calculated at each pair of shallow and deep monitoring wells for the May, August and October 2009 sampling events. The nested monitoring wells BH00-4A(D)/BH00-4B(S) located along the eastern border of the approved waste disposal area were found to have upward vertical gradients of 0.020, 0.009, and 0.004 in May, August, and October 2009, respectively. The nested monitoring wells BH04-1S/BH04-1D, located downgradient of the waste mound, were calculated to have upward vertical gradients of 0.008 and 0.061 in May and October 2009, respectively. A vertical gradient of zero (0.000) was calculated for the August 2009 sampling event. Upward vertical gradients were calculated at the eastern CAZ boundary using monitoring wells MW06-1S and MW06-1D, with magnitudes of 0.002 and 0.007 in May and October 2009, respectively. A vertical gradient of zero (0.000) was calculated for the August 2009 sampling event. At the northern CAZ boundary, an upward vertical gradient of 0.003 was calculated in May 2009 at monitoring wells MW06-2S and MW06-2D, while a downward vertical gradient of 0.025 was noted in August 2009; a vertical gradient of zero (0.000) was calculated for the October 2009 sampling event at MW06-2S and MW06-2D. Finally, at the south-eastern extent of the CAZ boundary, monitoring wells MW07-3S and MW07-3D were measured to have downward vertical gradients of 0.039, 0.037, and 0.008 during the sampling events in May, August, and October 2009, respectively.

- Exceedances above ODWS criteria were noted for several parameters at the downgradient monitoring wells BH00-4, BH00-4A(D), BH00-4B(S), BH00-5, BH04-1S, BH04-1D, and MW07-5. Based on the elevated parameter concentrations, the monitoring wells downgradient of the site exhibit water quality impacts as a result of landfill-related activities.
- Groundwater quality data from monitoring wells BH04-1S, BH04-1D, BH00-5, MW07-4, MW07-5, and MW07-6 were compared to the PWQO based on the proximity of groundwater to the ground surface. Exceedances above PWQO criteria were noted at select wells for the parameters aluminum, boron, cobalt, iron, phosphorus, phenols, and zinc.
- With the inclusion of 2009 groundwater quality results at the Killaloe waste disposal site, RUC exceedances exist at the CAZ boundary. However, in the absence of road maintenance activities along the County Road 58 and Mask Road right-of-ways, and concentrations of parameters associated with natural-occurring conditions within the low-lying area, the Killaloe site is expected to be in conformance with MOE *Guideline B-7* at downgradient monitoring wells MW06-1S, MW06-1D, MW06-2S, MW06-2D, MW07-3S, MW07-3D, and MW07-6. Therefore, the CAZ lands are deemed sufficient to attenuate leachate derived from the site.
- Surface water present in the seasonally wet, low-lying area to the east of the site, combined with groundwater derived from the waste mound, is interpreted to be contributing to the water quality at monitoring wells MW06-1S, MW06-1D, MW06-2S, and MW06-2D at the site's CAZ boundaries. Water quality at these monitoring wells exhibit some elevated parameter concentrations; however, they can be partially-attributed to road maintenance activities on the adjacent County Road 58 and Mask Road, and naturally-occurring conditions within the low-lying area. Monitoring wells MW07-3S and MW07-3D are not impacted by the waste disposal site, as they are interpreted to be upgradient of the waste mound, based on the local direction of groundwater flow.
- Surface water quality downstream of the site exhibited elevated concentrations of aluminum, cobalt, DO (low), iron, pH (low), and phosphorus; however, they are not interpreted to be solely related to landfill activities as the majority of the exceedances are elevated at the background surface water location (SW8). The background groundwater regime may be contributing to surface water parameter concentrations given the interpreted discharge of groundwater to surface, and parameter concentrations at the locations are interpreted to be influenced as a result of low-water conditions, naturally-occurring conditions within the low-lying area, and winter road maintenance activities.

Surface water locations SW4 and SW7 were not sampled as part of the 2009 environmental monitoring program, based on recommendations in the *2008 Annual Report* (Greenview, 2009).

- The volume of waste (and cover) landfilled at the Killaloe site from October 2008 through to November 2009 was 1,805 m³. Assuming a twenty-five percent (25%) waste to cover ratio (3:1), this results in a volume of 1,354 m³ of waste disposed of at the site in 2009. Based on FCC and the annual fill rate, the remaining capacity at the Killaloe site is approximately 8,638 m³, with a corresponding remaining site life of approximately four (4) years as of November 2, 2009.
- Based on Township records, approximately 49,030 bags of residential waste, 200 bags and 211 half-ton truck/or trailer loads of commercial waste 120 cubic yards of C&D waste, and 249 bags and 152 half-ton/or trailer loads of leaf and yard waste were received at the Killaloe site in 2009. Waste volumes collected from curbside collection within the Village of Killaloe, and transferred from the Township's Round Lake and Red Rock waste disposal sites are included in the above waste volumes. C&D waste was processed on-site on December 28, 2009 by Nad-Core Environmental of Midhurst, Ontario using size-reducing equipment. Additionally, based on Township records approximately 446 cubic yards of clean fill material (sourced on-site), and 890 m³ (sourced off-site) was applied at the Killaloe waste disposal site in 2009.
- Recycling tonnage records provided by Beaumen Waste Management for the Township indicate that a total of approximately 202 tonnes of recyclable material was collected from the Killaloe waste disposal site in 2009. Recyclable quantities contributing to this total included approximately 65 tonnes of containers (tin/aluminum/plastic/glass), 74 tonnes of fibres, and 63 tonnes of old corrugated cardboard (OCC) collected from the site. Recyclable quantities from curbside collection within the Village of Killaloe by the Township, and recyclable quantities transferred from the Township's Round Lake, and Red Rock waste disposal sites are included in the above recycling tonnages provided by Beaumen Waste Management.
- According to Township records, approximately 264 m³ of scrap metal, 10 white goods, 12 tagged appliances/refrigerators, and 4 non-tagged refrigerators were collected from the Killaloe waste disposal site by a local recycling contractor in 2009. Additionally, 9 loads totalling 4.48 tonnes of organics were diverted from landfill at the Killaloe site, using the MOLOK system as part of the Organics Diversion Program which commenced at the site in 2008. As a Registered Steward with the Ontario Tire Stewardship program, Ontario Tire Recovery transported the following quantities and types of tires from the Killaloe site in 2009; 2004 car/or light truck, 23 medium truck, 2 agricultural/or logger skidder,

137 large and small industrial, 19 small off-road, 2 medium off-road, 2 large off-road, and 1 giant off-road.

- In accordance with Condition 31 (a) of the PC of A (A412306; Appendix A), the Township completed the registration of the Certificate of Requirement for the Killaloe waste disposal site on title on May 14, 2009 (Appendix A).

The following recommendations are provided to the Township for consideration as part of the 2010 work program for the Killaloe waste disposal site:

- The 2010 groundwater monitoring program for the site should include sampling events in the spring, summer, and fall for all wells in the established monitoring well network to continue to monitor the groundwater regime at the site.
- Further to recommendations in the *2008 Annual Report* (Greenview, 2009), sampling of monitoring wells MW07-3S, MW07-3D, MW07-4, and MW07-6 should be discontinued in future environmental monitoring programs, as results from each well are relatively consistent with historical results, and are not interpreted to be impacted from landfill-related activities. Specifically, MW07-3S and MW07-3D are interpreted to be upgradient of the direction of groundwater flow from the site, and therefore not impacted by the Killaloe waste disposal site. Similarly, impacts related to landfill-leachate are interpreted to be effectively characterized by monitoring well MW07-5, and limited to no groundwater quality impacts are observed at MW07-4 and MW07-6. Groundwater flow directions appear to be consistent with historical interpretations at the Killaloe site. Groundwater elevations should be measured at monitoring wells MW07-3S, MW07-3D, MW07-4, and MW07-6 during the spring, summer, and fall sampling events at the Killaloe site in future environmental monitoring programs.
- In 2010, the surface water monitoring program at the site should include sampling events in the spring, summer, and fall, inclusive of surface water sampling stations SW3, SW5, SW6, SW8, and SW9 to monitor the surface water regime at the site. Collection of surface water samples during scheduled sample events should only be conducted if sufficient quantities of water are available at the sampling location to avoid potentially biased results.
- It is recommended that SW1 and SW2 be removed from the 2010 environmental monitoring program, as both surface water locations have consistently been observed to be shallow pools of water with no discernable flow in previous *Annual Reports*, and since SW-8 is interpreted to be a more suitable background surface water location at the site.

- The Township should continue topographic surveys at the site to accurately document site capacity, and corresponding site life.

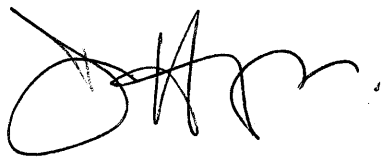
6.0 CLOSING

Greenview has prepared the *2009 Annual Report* in accordance with MOE guidelines, and in accordance with Condition 26 of the PC of A (A412306), to document the results of the 2009 environmental monitoring program for the Killaloe waste disposal site.

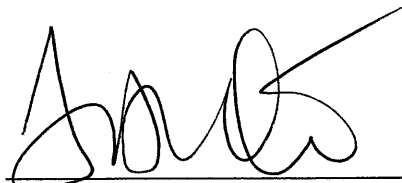
This report is governed by the attached statement of service conditions and limitations (Appendix F).

Prepared by:

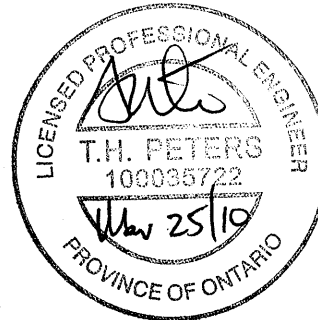
GREENVIEW ENVIRONMENTAL MANAGEMENT LIMITED



Dan Hagan, B.Sc. (Geology)
Project Technologist



Tyler H. Peters, P.Eng.
Project Manager



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7.0 REFERENCES

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TABLES

Table 1
2009 Groundwater and Surface Water Monitoring Program
Killaloe Waste Disposal Site

Location	Frequency	Parameters
<u>Groundwater</u> BH00-1, BH00-2, BH00-3, BH00-4D, BH00-4S, BH04-1S, BH04-1D MW06-1S, MW06-1D, MW06-2S, MW06-2D, MW07-3S, MW07-3D R1, R2, R3 1 QA/QC	Three Times (Spring, Summer, Fall) Field Measurements (pH, Conductivity, Temperature)	Alkalinity, aluminum, ammonia, barium, boron, calcium, chloride, chromium, cobalt, COD, copper, DOC, iron, magnesium, manganese, nitrate, nitrite, potassium, silicon, sodium, strontium, sulphate, TDS, TKN, total phosphorus, zinc
BH00-1, BH00-5, MW06-1S, MW06-1D, MW06-2S, MW06-2D, MW07-3S, MW07-3D	Once (Summer)	EPA 624 VOC's
<u>Surface Water</u> SW1, SW2, SW3, SW5 SW6, SW8, SW9 1 QA/QC	Three Times (Spring, Summer, Fall) Field Measurements (pH, Conductivity, Dissolved Oxygen, Temperature, Unionized Ammonia [calculation])	Alkalinity, aluminum, ammonia, barium, boron, calcium, chloride, chromium, cobalt, COD, copper, DOC, iron, magnesium, manganese, nitrate, nitrite, phenols, potassium, silicon, sodium, strontium, sulphate, TDS, TKN, total phosphorus, zinc
Monitoring wells BH00-4, BH00-5, MW07-4, MW07-5, MW07-6	Three Times (Spring, Summer, Fall) Field Measurements (pH, Conductivity, Temperature)	Same as above surface water parameters



Table 2
Groundwater Elevations
Killaloe Waste Disposal Site

Monitor	Ground Elevation (m)	Top of Pipe Elevation (m)	Original Stick-Up (m)	Depth of Well (m)	Well Diameter (mm)	Groundwater Elevation (m)													
						10-May-05	8-Aug-05	16-Aug-06	11-Oct-06	20-Dec-06	28-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	8-Oct-09
BH00-1	98.65	99.55	0.90	9.00	50.8	96.46	96.13	96.08	96.12	96.36	96.50	96.10	95.98	96.68	96.21	96.09	96.47	96.20	96.04
BH00-2	101.75	102.63	0.88	8.80	50.8	96.57	96.37	96.24	96.22	96.41	96.59	96.30	96.11	96.99	96.45	96.28	96.62	96.35	96.22
BH00-3	97.22	98.07	0.85	8.53	50.8	95.91	95.55	95.61	95.75	-	95.95	95.66	95.66	95.99	95.67	95.70	95.90	95.79	95.73
BH00-4	100.06	100.94	0.88	8.89	50.8	96.19	95.78	95.78	95.88	-	96.19	95.78	95.75	96.27	95.87	95.82	96.14	95.92	95.82
BH00-4A(D)	100.11	101.05	0.94	11.82	32.1	96.19	95.80	95.80	95.90	-	96.21	95.80	95.76	96.28	95.88	95.84	96.21	95.93	95.83
BH00-4B(S)	100.11	101.05	0.94	7.28	32.1	96.16	95.78	95.78	95.88	-	96.18	95.77	95.74	96.26	95.85	95.81	96.12	95.89	95.81
BH04-1S	95.66	96.75	1.09	4.52	32.1	95.73	95.56	95.59	95.73	95.77	95.82	95.63	95.64	95.42	95.63	95.65	95.78	95.74	95.45
BH04-1D	95.66	96.69	1.03	9.25	32.1	95.83	95.55	95.60	95.71	95.79	95.85	95.63	95.60	95.75	95.67	95.69	95.82	95.70	95.74
BH04-5	96.44	97.34	0.90	8.90	50.8	95.97	95.60	95.61	95.75	-	95.98	95.59	95.58	95.72	95.66	95.65	95.40	95.70	95.63
MW06-1S	96.35	97.09	0.74	5.16	50.8	-	-	95.10	95.37	95.34	95.43	95.22	95.29	95.42	95.18	95.28	95.41	95.44	95.45
MW06-1D	96.27	96.89	0.62	9.55	50.8	-	-	95.08	95.36	95.34	95.45	95.23	95.31	95.44	95.21	95.31	95.41	95.44	95.45
MW06-2S	95.30	97.11	0.81	5.50	50.8	-	-	95.33	95.62	95.64	95.70	95.42	95.51	95.68	95.37	95.50	95.68	95.61	95.60
MW06-2D	96.33	97.10	0.77	9.50	50.8	-	-	95.34	95.58	95.60	95.70	95.43	95.51	95.70	95.41	95.51	95.67	95.51	95.60
MW07-3S	99.42	100.23	0.81	6.21	50.8	-	-	-	-	-	98.53	98.92	98.93	98.47	97.11	97.28	98.52	97.67	97.13
MW07-3D	99.41	100.23	0.82	11.36	50.8	-	-	-	-	-	98.32	98.81	98.80	98.26	96.96	97.14	98.32	97.48	97.09
MW07-4	95.65	96.67	1.02	2.98	50.8	-	-	-	-	-	95.72	95.60	95.59	95.73	95.61	95.64	95.66	95.62	95.62
MW07-5	95.51	96.61	1.10	2.98	50.8	-	-	-	-	-	95.63	95.47	95.51	95.61	95.53	95.53	95.80	95.60	95.60
MW07-6	95.51	96.66	1.15	2.98	50.8	-	-	-	-	-	95.50	95.42	95.46	95.54	95.42	95.50	95.65	95.56	95.56

Notes:
 1. Original stick-ups based on surveyed ground and top of pipe elevations.
 2. All elevations are meters above sea level (masl), relative to a site specific benchmark elevation of 100.00 m.
 - indicates water level is not available.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-1															
			21-Jul-00	9-Oct-00	27-Jul-01	29-Oct-01	20-Jul-04	8-Aug-05	15-Aug-05	11-Oct-06	29-Apr-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	263	30 - 500	15	23	18	16	32	0.012	0.010	0.012	0.012	0.013	0.014	0.022	0.031	0.0508	0.0670	0.0574
Aluminium	0.08	0.1	0.02	<0.05	0.2	0.3	0.2	0.2	<0.1	0.4	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2
Ammonia, Total (as N)	NIL	NIL	0.3	0.2	0.2	0.2	0.2	0.068	0.074	0.077	0.080	0.076	0.076	0.074	0.073	0.0744	0.0819	0.0754
Barium	0.3	1.0	0.08	0.05	0.06	0.06	0.068	0.074	0.076	0.077	0.080	0.076	0.076	0.074	0.073	0.0744	0.0819	0.0754
Boron	1.3	5.0	<0.01	0.05	0.01	0.07	<0.01	0.030	0.046	0.053	0.010	0.008	0.007	0.013	0.008	0.0079	0.0089	0.0201
Calcium	NIL	NIL	6.0	7.0	11.0	7.3	8.0	9.0	8.3	8.7	8.2	8.3	12.8	8.4	7.7	8.29	8.00	8.28
Chloride	131	250	9	8	9	10	13	16	16	17	15	18	18	14	17	14	16	16
Chromium	0.01	0.05	<0.01	<0.001	0.002	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.0009	0.0015	0.0017
Chemical Oxygen Demand	NIL	NIL	21	11	19	8	12	<8	<8	9	8	9	8	12	<8	11	<8	12
Cobalt	NIL	NIL	<0.01	0.0002	<0.0002	<0.0002	<0.0003	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.012	0.0007	0.0205	0.0104	0.0075
Conductivity (µS/cm) ³	NIL	NIL	140	110	120	120	188	168	119	134	122	115	118	120	108	115	109	119
Copper	0.5	1	<0.001	<0.001	0.005	<0.005	<0.005	0.001	0.0003	0.001	0.001	0.002	0.001	0.002	0.004	0.0014	0.0015	0.0010
Dissolved Organic Carbon	3.3	5	3.6	2.4	2.9	2.2	2.4	2.4	1.6	1.3	2.0	1.6	1.9	2.4	1.2	1.9	1.8	1.1
Hardness (as CaCO ₃)	100	80 - 100	32	32	34	40	-	-	-	-	-	-	-	-	-	-	-	-
Iron	8.9	0.3	15.9	11.2	16.4	16.8	16.8	16.4	20.4	18.1	20.3	20.3	20.3	19.1	19.8	19.4	19.3	19.3
Magnesium	NIL	NIL	4.0	4.0	4.0	3.0	4.28	4.43	4.80	4.70	4.89	4.84	4.69	4.88	4.81	4.56	4.83	4.60
Manganese	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Nitrate (as N)	3	10	<0.10	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	0.3	1	-	-	-	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.3	6.23	7.4	7.4	6.37	6.77	6.91	6.86	6.75	7.34	7.08	6.90	6.88	7.19	6.69	6.79
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	7.54	2.29	0.67	0.80	2.31	0.02	0.02	0.04	0.02	0.04	0.02	0.05	0.02	0.03	0.02	0.02
Potassium	NIL	NIL	1.0	1.0	1.0	1.0	1.3	1.58	1.72	1.45	1.74	1.63	1.62	1.87	1.40	1.26	1.39	1.36
Silicon	NIL	NIL	7.1	6.24	5.51	6.64	6.46	7.8	7.46	6.74	7.88	7.26	7.66	7.49	7.37	7.47	6.49	7.77
Sodium	102	200	5.0	4.0	4.0	3.0	3.81	5.69	5.68	5.50	5.72	5.27	5.08	5.24	3.95	3.50	4.09	4.18
Sulphate	NIL	NIL	0.098	0.031	0.038	0.035	0.040	0.046	0.050	0.046	0.050	0.046	0.048	0.048	0.048	0.047	0.0480	0.0476
Total Dissolved Solids	292	500	17	17	17	19	20	17	19	20	19	21	19	19	20	19	19	20
Total Kjeldahl Nitrogen	NIL	NIL	0.5	0.29	0.27	0.35	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	3	5	<0.01	<0.01	<0.01	<0.01	0.004	0.013	0.012	0.009	0.013	0.010	0.009	0.015	0.005	0.022	0.005	0.003

Notes:

- Reasonable Use Criteria (RUC) criteria.
- Ontario Drinking Water Standards (ODWS).
- Results obtained from field analysis.

Labels BH00-4(A) and BH00-4(B) have been switched.

Results expressed in mg/L unless otherwise noted.

Bold and Italic values exceed the ODWS.

Bold and Italic values exceed RUC limits.

NIL indicates no limit specified.

.. means parameter not analyzed.



Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-2																
			21-Jul-00	9-Oct-00	27-Jul-01	29-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	263	30 - 500	28	20	25	25	23	24	26	27	27	25	25	28	31	31	31	31	28
Aluminum	0.06	0.1	1.15	0.75	<0.05	<0.05	0.03	0.022	0.022	0.010	<0.01	0.004	0.019	0.032	0.057	0.035	0.0713	0.0977	0.0507
Ammonia, Total (as N)	NIL	NIL	0.07	0.07	0.06	0.03	0.2	0.2	<0.1	0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	0.3	1.0	0.15	0.13	0.05	0.05	0.049	0.061	0.063	0.068	0.075	0.071	0.070	0.070	0.071	0.0716	0.0815	0.0737	0.0737
Boron	1.3	5.0	<0.01	<0.01	0.01	0.02	<0.01	0.023	0.011	0.010	0.009	0.009	0.009	0.010	0.009	0.009	0.0089	0.0194	0.0176
Calcium	NIL	NIL	7.0	5.0	6.0	6.0	6.32	7.60	8.53	8.28	8.91	8.59	8.89	10.10	8.74	8.73	10.90	9.17	9.26
Chloride	131	250	5.0	5.0	5.0	5.0	5.3	6.0	7.1	7.1	6.7	11.0	11.0	9.8	10.0	12.0	9.2	11.0	12.0
Chemium	0.01	0.05	<0.01	<0.01	<0.001	0.002	<0.001	0.001	<0.0003	0.0011	<0.0003	0.0003	<0.0003	0.0003	0.0006	<0.0005	<0.0005	0.0007	0.0010
Chemical Oxygen Demand	NIL	NIL	5	22	5	5	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
Cobalt	NIL	NIL	<0.01	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.002	0.013	0.003	0.0158	0.0130	0.0122
Conductivity (µS/cm) ³	NIL	NIL	80	120	450	525	78	108	70	86	80	76	82	71	82	85	85	89	86
Copper	0.5	1	0.066	0.008	<0.001	<0.001	<0.005	0.002	0.001	0.001	0.001	0.004	0.001	0.002	0.002	0.001	0.0013	0.0012	0.0008
Dissolved Organic Carbon	3.3	5	1.5	1.8	1.2	<0.5	1.5	1.4	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0
Hardness (as CaCO ₃)	100	80 - 100	34	28	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Iron	9.9	0.3	6.12	4.26	3.99	2.96	2.69	1.72	1.23	1.13	1.06	1.39	0.96	0.96	0.90	0.72	1.38	1.37	0.90
Magnesium	NIL	NIL	4	4	4	4	3.87	4.53	5.17	5.26	5.58	5.65	5.64	6.11	5.68	5.71	6.67	5.81	5.92
Manganese	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.026	0.029	0.031	0.028	0.022	0.039	0.043	0.028	0.033	0.0450	0.0410
Nitrate (as N)	3	10	<0.10	<0.10	<0.10	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	0.06	<0.05	0.08	<0.05	<0.05	<0.05
Nitrite (as N)	0.3	1	-	-	-	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
pH (Units) ³	6.5 - 8.5	6.5 - 8.5	6.20	6.20	7.40	7.30	6.70	6.91	6.49	6.79	6.92	7.60	7.43	7.37	7.34	6.09	6.38	6.83	6.12
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	10.1	9.4	3.05	3.99	9.37	<0.02	0.02	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01	<0.01	<0.01
Potassium	NIL	NIL	2	2	2	2	1.79	2.23	2.33	2.10	2.44	2.27	2.36	2.58	2.12	1.99	2.16	2.21	2.09
Silicon	NIL	NIL	7.03	5.91	4.65	5.37	5.02	5.64	5.24	5.24	6.50	5.42	5.76	6.19	5.69	5.92	7.60	6.32	6.11
Sodium	102	200	5	5	3	<2	3.88	6.02	6.07	5.85	5.85	5.95	5.97	5.90	4.82	4.19	4.00	4.89	4.65
Strontium	NIL	NIL	0.059	0.031	0.033	0.034	0.033	0.040	0.044	0.044	0.049	0.045	0.048	0.052	0.047	0.049	0.0566	0.0509	0.0505
Sulphate	269	500	12	12	12	12	12	12	12	13	13	15	14	14	18	15	15	16	17
Total Dissolved Solids	292	500	72	68	64	68	69	69	69	69	69	69	69	69	69	69	69	69	69
Total Kjeldahl Nitrogen	NIL	NIL	0.19	0.06	0.20	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	3	5	<0.01	<0.01	<0.01	<0.01	0.005	0.006	0.012	0.007	0.005	0.020	0.010	0.014	0.005	0.018	0.003	0.005	0.005

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.

Labels BH00-4A(D) and BH00-4B(S) have been switched.
 Results expressed in mg/L unless otherwise noted.
 Bold and Italic values exceed the ODWS.
 NIL Indicates no limit specified.
 '-' means parameter not analyzed.



Table 3
Groundwater Quality
Killalee Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-3																
			27-Jul-00	8-Oct-00	27-Jul-01	29-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	26-Apr-07	28-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	263	30 - 500	27	18	21	21	24	27	29	31	30	27	29	36	34	47	59	49	45
Aluminum	0.06	0.1	3.56	0.71	<0.05	0.023	0.045	0.059	0.038	0.040	<0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.305	0.30
Ammonia, Total (as N)	NIL	NIL	0.08	<0.02	0.03	0.07	<0.1	0.2	<0.1	<0.1	<0.1	0.1	0.1	<0.1	0.2	0.1	0.2	<0.1	0.1
Barium	0.3	1.0	0.16	0.06	0.01	0.01	0.015	0.022	0.025	0.026	0.030	0.025	0.026	0.031	0.043	0.033	0.025	0.0441	0.0424
Boron	1.3	5.0	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.017	0.007	0.006	0.005	0.005	0.007	0.006	0.006	0.0079	0.0075	0.0133
Cadmium	NIL	NIL	5.0	5.0	4.0	4.0	4.06	6.11	6.54	7.21	7.99	6.29	6.71	8.84	7.66	7.86	12.3	8.4	9.8
Chloride	131	250	1	1	1	1	1.1	1.2	1.9	1.8	2.2	2.1	2.2	2.7	3.2	2.7	4.4	3.8	3.8
Chromium	0.01	0.05	<0.01	<0.01	0.002	0.001	0.004	0.001	0.001	<0.0003	0.0006	0.0004	0.0004	<0.0005	0.001	<0.0005	0.0009	0.0009	0.0009
Chemical Oxygen Demand	NIL	NIL	5	6	<5	<5	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8
Cobalt	NIL	NIL	<0.01	0.0007	<0.0002	<0.0003	<0.0003	0.0001	0.00005	0.00005	0.0001	0.0001	0.0001	0.0001	0.014	0.003	0.0191	0.0126	0.0113
Conductivity (µS/cm) ³	NIL	NIL	35	80	485	550	52	70	54	195	57	49	36	69	60	66	86	78	70
Copper	0.5	1	0.008	0.003	<0.001	<0.001	<0.005	<0.005	0.010	0.0005	0.001	0.004	0.001	0.004	0.003	0.001	0.0018	0.0017	0.0017
Disolved Organic Carbon	3.3	5	0.9	0.4	0.6	<0.5	1.2	1.2	<1	<1	1.2	<1	<1	<1	1.2	<1	<1.0	<1.0	1.4
Hardness (as CaCO ₃)	100	80 - 100	29	41	22	18	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	4.5	0.73	0.03	0.03	0.02	0.04	0.06	0.03	0.05	0.05	0.13	0.07	0.97	0.21	0.43	0.39	0.47
Magnesium	NIL	NIL	4.0	7.0	3.0	2.0	2.8	3.3	3.7	3.9	4.3	3.7	3.6	4.8	4.3	4.6	6.58	5.28	5.53
Manganese	0.05	0.05	0.12	0.04	<0.01	<0.01	0.005	0.016	0.024	0.022	0.022	0.022	0.021	0.025	0.061	0.035	0.067	0.240	0.272
Nitrate (as N)	3	10	0.21	0.21	0.19	0.19	0.26	0.2	0.32	0.52	0.90	0.67	0.71	0.90	0.78	0.91	2.20	0.44	0.36
Nitrite (as N)	0.3	1	-	-	-	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.3	7.5	8.3	7.7	7.45	7.41	6.90	7.24	7.01	8.79	8.21	6.95	6.81	6.40	6.33	7.22	6.65
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	139.0	10.9	11.9	11.5	17.2	<0.02	0.01	0.04	0.01	0.02	<0.01	0.03	0.04	0.02	0.03	0.03	0.03
Potassium	NIL	NIL	4.0	7.0	1.0	1.0	1.1	1.5	1.6	1.4	1.7	1.5	1.6	1.8	1.4	1.3	1.73	1.53	1.56
Silicon	NIL	NIL	11.4	6.95	5.95	6.67	6.12	7.09	7.21	6.75	7.80	6.97	7.57	7.42	7.78	7.85	8.75	8.05	8.41
Sodium	102	200	8.0	7.0	2.0	<2	2.86	4.85	5.34	4.82	4.97	4.29	4.37	4.51	3.21	3.07	4.04	3.74	3.66
Strontium	NIL	NIL	0.026	0.021	0.017	0.017	0.019	0.029	0.031	0.033	0.040	0.031	0.032	0.042	0.036	0.041	0.0626	0.0484	0.0492
Sulphate	259	500	9.0	10.0	8.0	8.0	7.4	7.3	7.1	6.3	5.9	6.8	6.6	6.3	6.5	6.8	9.5	6.2	6.0
Total Dissolved Solids	292	500	328	52	40	36	146	106	129	123	120	120	120	151	66	120	126	89	126
Total Kjeldahl Nitrogen	NIL	NIL	0.44	<0.05	<0.05	0.08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	3	5	0.02	<0.01	<0.01	<0.01	0.004	0.005	0.005	0.006	0.008	0.010	0.009	0.014	0.006	0.003	0.005	0.005	0.005

Notes:

- Reasonable Use Criteria (RUC) criteria.
- Ontario Drinking Water Standards (ODWS).
- Results obtained from field analysis.

Labels BH00-4AD and BH00-4BS have been switched.

Results expressed in mg/L unless otherwise noted.

Bold and Shaded values exceed the ODWS.

NIL indicates no limit specified.

-, means parameter not analyzed.



Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-4																
			21-Jul-00	9-Oct-00	27-Jul-01	29-Oct-01	20-Jul-04	8-Aug-05	15-Aug-05	11-Oct-06	26-Apr-07	26-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	283	30-500	1120	1110	1010	815	690	807	835	889	664	834	630	595	576	582	437	577	536
Aluminum	0.06	0.1	0.18	0.17	0.12	0.08	0.013	0.010	0.002	0.017	0.020	0.020	0.010	0.012	0.011	0.011	0.0121	0.0163	0.0173
Ammonia, Total (as N)	NL	NL	48.2	49.3	44.8	32.6	31.6	24.8	24.2	29.5	27.5	32.6	35.8	35.1	35.0	35.2	25.4	30.5	31.3
Boron	0.3	1.0	3.43	3.33	2.70	3.01	2.86	2.26	1.55	2.17	1.82	2.74	2.33	2.14	2.54	2.12	1.74	2.06	2.04
Bromine	1.3	5.0	0.91	0.84	0.95	0.91	0.720	0.790	0.900	0.854	0.833	0.836	0.867	0.889	0.456	0.488	0.361	0.408	0.449
Calcium	NL	NL	155	160	140	139	103	100	96	97	84	110	105	85	97	94	71.9	86.1	86.9
Chloride	131	250	171	171	141	136	84	75	62	72	71	75	75	76	95	96	52	75	84
Chromium	0.01	0.05	<0.01	<0.01	0.023	0.015	0.014	0.008	0.008	0.005	0.005	0.004	0.004	0.007	0.004	0.003	0.0030	0.0040	0.0034
Chemical Oxygen Demand	NL	NL	182	184	130	158	102	81	65	77	69	74	70	71	76	64	64	69	47
Cobalt	NL	NL	<0.01	0.0008	0.0013	0.0012	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.013	0.010	0.0183	0.0088	0.0120
Conductivity (µS/cm) ³	NL	NL	2100	245	2000	2190	1316	1360	953	1083	1044	1098	1146	1032	1947	1119	843	947	1001
Copper	0.5	1	0.002	<0.001	<0.001	<0.001	<0.0005	<0.0005	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.0010	0.0009	0.0009
Dissolved Organic Carbon	3.3	5	64.3	64.3	49.3	49.6	23.0	25.2	25.7	19.0	15.9	18.5	18.0	14.5	18.6	22.7	9.6	23.3	10.8
Hardness (as CaCO ₃)	100	80-100	682	434	593	598	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	78.7	72.7	77.4	67.8	71.3	46.2	42.4	41.1	35.3	40.9	36.8	28.5	27.5	27.4	23.7	23.7	23.6
Magnesium	NL	NL	71.0	62.0	59.0	58.0	44.4	43.5	42.4	41.1	35.3	40.9	36.8	28.5	27.5	27.4	23.7	23.7	23.6
Manganese	0.05	0.05	4.42	4.86	5.12	4.04	1.84	1.40	1.42	1.70	1.44	1.89	2.05	1.53	2.09	1.53	0.68	1.21	1.33
Nitrate (as N)	3	10	0.23	<0.1	<0.1	<0.1	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	0.3	1	-	-	-	-	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
pH (units) ³	6.5-8.5	6.5-8.5	6.70	6.80	6.40	6.20	6.58	6.67	6.82	6.89	7.18	6.59	6.56	6.74	6.77	6.62	6.62	6.66	6.68
Phenols	NL	NL	-	-	-	-	-	-	0.009	0.012	0.002	0.011	0.004	0.011	0.007	0.004	0.003	0.002	0.004
Phosphorus, Total	NL	NL	6.80	0.85	0.22	0.22	0.30	0.07	0.05	0.06	0.04	0.11	0.10	0.08	0.04	0.03	0.04	0.03	0.03
Potassium	NL	NL	122.0	134.0	99.0	77.0	57.8	51.9	40.6	44.9	47.6	53.4	53.3	56.3	56.5	54.9	52.8	52.7	52.3
Silicon	NL	NL	9.8	9.1	7.9	8.8	8.5	11.2	8.9	9.6	11.2	11.3	10.7	11.4	12.2	12.7	12.0	13.0	13.0
Sodium	102	200	172.0	159.0	129.0	129.0	87.7	83.1	78.2	77.3	66.0	79.5	76.4	74.0	79.9	78.6	52.7	47.6	62.8
Strontium	NL	NL	1.09	0.942	0.924	0.762	0.657	0.656	0.574	0.672	0.599	0.770	0.689	0.622	0.704	0.657	0.507	0.599	0.604
Sulphate	259	500	9.0	2.0	1.0	1.0	1.1	1.7	2.8	2.9	3.9	0.8	1.1	2.0	1.5	1.5	3.3	1.2	1.2
Total Dissolved Solids	292	500	1344	1336	1140	837	723	520	520	703	569	757	674	597	594	466	474	591	631
Total Kjeldahl Nitrogen	NL	NL	49.2	56.6	48.3	32.6	33.4	29.2	22.3	33.3	26.1	34.7	33.1	32.4	35.3	34.9	24.2	30.8	31.0
Zinc	3	5	<0.01	<0.01	<0.01	<0.01	0.017	0.009	0.012	0.012	0.016	0.020	0.010	0.014	0.006	0.005	0.005	0.005	0.005

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.

Labels BH00-4AD and BH00-4BS have been switched.
 Results expressed in mg/L unless otherwise noted.
 Bold and Italic values exceed the ODWS.
 Bold and Italic values exceed RUC limits.
 NL indicates no limit specified.
 - means parameter not analyzed.



Table 3
Groundwater Quality
Kililace Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-46(S)																
			21-Jul-00	9-Oct-00	27-Jul-01	28-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	28-Apr-07	28-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	203	30 - 500	634	832	727	716	597	585	549	579	617	702	733	705	618	590	498	545	555
Aluminum	0.06	0.1	0.230	0.130	0.011	0.008	0.016	0.013	< 0.01	0.010	0.009	0.012	0.026	0.032	0.0432	0.0469	0.0491		
Ammonia, Total (as N)	NIL	NIL	24.5	48.0	28.2	30.3	29.3	27.3	35.4	37.4	28.0	35.2	40.2	40.8	39.2	37.3	35.8	24.8	34.4
Barium	0.3	1.0	1.32	1.81	1.83	1.89	1.80	2.17	1.94	2.40	2.44	2.80	2.80	2.89	2.55	2.44	2.08	1.83	2.45
Boron	1.3	5.0	0.680	1.280	0.890	1.00	0.890	0.640	0.606	0.746	0.580	0.646	0.757	0.579	0.422	0.494	0.399	0.380	0.467
Cadmium	NIL	NIL	85	100	85	88	78	79.4	75.2	85.5	108	116	126	114	87	123	83.2	84.4	89.2
Chloride	131	250	94	84	83	76	72	80	72	87	98	110	149	140	100	140	84	72	170
Chemical Oxygen Demand	NIL	NIL	100	100	108	158	83	73	71	89	89	84	87	112	81	79	73	64	57
Chromium	0.01	0.05	< 0.01	0.017	0.014	0.008	0.008	0.008	0.008	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.0033	0.0038	0.0037
Cobalt	NIL	NIL	< 0.01	0.001	0.004	0.005	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.004	0.014	0.014	0.0153	0.0110	0.0065
Conductivity (µS/cm) ³	NIL	NIL	1400	1540	700	770	1204	1391	1057	1254	1316	1349	1468	1454	1180	1349	1022	887	1187
Copper	0.5	1	0.001	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	0.001	0.001	0.004	0.003	0.001	0.001	0.001	0.0013	0.0010	0.0012	
Dissolved Organic Carbon	3.3	5	39.0	62.2	34.1	35.4	23.3	21.3	14.8	20.6	20.8	19.6	23.7	18.4	16.8	11.5	21.7	11.1	11.8
Hardness (as CaCO ₃)	100	80 - 100	373	423	377	397	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	62.0	59.6	62.5	100.0	68.4	60.7	51.4	75.9	77.9	92.4	166.0	118.0	87.4	134.0	73.4	67.9	89.7
Magnesium	NIL	NIL	38.0	42.0	40.0	40.0	35.7	39.3	36.6	40.6	32.7	43.4	46.0	33.9	30.8	41.7	27.9	27.0	32.5
Manganese	0.05	0.05	4.80	5.14	5.19	4.53	2.39	2.13	1.51	2.27	2.21	2.16	2.65	2.83	2.29	2.04	2.42	1.15	1.50
Nitrate (as N)	3	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05
Nitrite (as N)	0.3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (units) ³	6.5 - 8.5	6.5 - 8.5	6.9	6.8	6.7	6.82	6.65	6.71	6.67	6.84	6.76	6.66	6.76	6.52	6.67	6.76	6.71	6.93	
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	2.22	0.83	1.54	1.37	1.77	0.07	0.05	0.04	0.05	0.10	0.11	0.08	0.02	0.03	0.03	0.03	0.04
Potassium	NIL	NIL	73.0	90.0	84.0	79.0	74.5	83.2	85.6	74.2	85.1	74.9	84.4	62.2	61.5	69.1	58.8	67.4	71.1
Silicon	NIL	NIL	10.8	12.0	10.9	14.2	8.57	11.2	12.4	11.0	11.7	12.6	14.7	12.1	12.8	15.2	12.8	13.9	14.9
Sodium	102	200	85.0	85.0	77.0	77.4	71.9	72.6	60.3	91.6	82.8	89.8	89.8	116.0	75.5	80.1	89.2	49.3	89.2
Strontium	NIL	NIL	0.652	0.755	0.636	0.616	0.509	0.542	0.522	0.670	0.721	0.714	0.789	0.689	0.647	0.712	0.518	0.478	0.617
Sulphate	289	500	3.0	2.0	1.9	2.0	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.2	< 0.2
Total Dissolved Solids	292	500	906	892	844	804	711	898	834	737	766	760	894	837	754	809	808	517	717
Total Kjeldahl Nitrogen	NIL	NIL	24.5	53.8	38.2	37.8	31.9	28.4	36.6	42.0	28.8	37.1	39.5	38.2	40.7	38.0	33.8	30.6	38.9
Zinc	3	5	< 0.01	< 0.01	< 0.01	< 0.01	0.006	0.006	0.011	0.012	0.019	0.020	0.011	0.014	0.008	0.006	0.006	0.005	0.004

Notes:
1. Reasonable Use Criteria (RUC) criteria.
2. Ontario Drinking Water Standards (ODWS).
3. Results obtained from field analysis.

Labels BH00-4ND) and BH00-46(S) have been switched.
Results expressed in mg/L unless otherwise noted.
Bold and Italic values exceed the ODWS.
Bold and Italic values exceed RUC limits.
NIL indicates no limit specified.
- means parameter not analyzed.



Table 3
Groundwater Quality
Kililoos Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-1A(D)																
			21-Jul-00	9-Oct-00	27-Jul-01	25-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	28-Apr-07	25-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	263	30 - 500	30	16	41	20	30	21	18	21	32	31	33	21	31	32	27	38	30
Ammonium	0.06	0.1	2.950	0.340	0.700	0.680	0.054	0.075	0.074	0.048	0.040	0.056	0.068	0.099	0.131	0.104	0.240	0.160	0.164
Ammonia, Total (as N)	NIL	NIL	0.5	0.4	0.5	0.6	0.6	0.4	0.4	0.6	0.8	0.8	0.8	0.6	0.8	0.9	1.0	1.0	0.9
Barium	0.3	1.0	0.10	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.09	0.08	0.08	0.08	0.08	0.104	0.101	0.088
Boron	1.3	5.0	0.080	0.070	<0.01	0.080	0.020	0.020	0.040	0.040	0.019	0.024	0.016	0.022	0.016	0.017	0.0247	0.0172	0.0219
Calcium	NIL	NIL	8.00	5.00	6.00	6.02	6.14	6.18	6.22	6.14	6.19	8.22	6.93	6.66	7.55	7.89	8.82	8.04	8.06
Chloride	131	250	7.0	7.0	7.0	7.1	5.8	5.3	6.1	7.7	9.0	7.7	9.0	6.6	7.8	9.3	6.4	9.0	8.2
Chromium	0.01	0.05	<0.01	<0.01	0.004	0.003	0.005	0.003	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.0027	0.0028	0.0026
Chemical Oxygen Demand	NIL	NIL	33	22	8	16	12	<8	<8	<8	9	12	<8	8	15	<8	14	13	11
Cobalt	NIL	NIL	<0.01	0.002	<0.0002	<0.0003	<0.0003	0.00005	0.00002	0.0001	0.0001	0.0001	0.00007	0.0001	0.013	0.011	0.0142	0.0074	0.0054
Conductivity (µS/cm) ³	NIL	NIL	240	320	1400	1510	128	137	112	161	140	129	121	100	117	140	131	120	124
Copper	0.5	1	0.004	<0.001	<0.001	<0.001	<0.005	<0.005	0.002	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.0009	0.0010	0.0008
Dissolved Organic Carbon	3.3	5	6.6	3.7	3.2	2.9	2	1.7	<1	<1	1.2	1.1	<1	1.8	<1	<1	<1.0	<1.0	1.1
Hardness (as CaCO ₃)	100	80 - 100	37.9	21.0	32.9	32.0	16.4	17.4	18.4	17.3	22.3	22.8	19.0	17.3	20.2	21.4	21.0	20.0	19.8
Iron	9.9	0.3	16.9	15.0	17.0	16.4	17.4	14.7	18.4	17.3	22.3	22.8	19.0	17.3	20.2	21.4	21.0	20.0	19.8
Magnesium	NIL	NIL	4.0	2.0	4.0	3.0	2.89	2.87	3.05	2.84	3.95	4.10	3.24	3.09	3.42	3.63	3.74	3.35	3.38
Manganese	0.05	0.05	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.19	0.08	0.07	0.12	0.11	0.125	0.089	0.086
Nitrate (as N)	3	10	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	0.9	1	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.4	7.55	6.6	6.5	6.46	6.55	6.58	6.82	6.71	6.85	6.86	7.01	6.99	6.74	6.61	6.55	6.83
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	80.00	13.80	2.48	6.21	4.27	<0.02	0.03	0.05	0.05	0.04	0.03	0.05	0.03	0.03	0.02	0.02	0.02
Potassium	NIL	NIL	<1	1.0	1.0	<1	1.09	1.27	1.36	1.22	1.71	1.90	1.80	1.83	1.78	1.85	2.15	2.31	2.11
Silicon	NIL	NIL	10.70	8.51	7.18	8.43	8.22	9.34	9.26	8.58	10.10	9.32	9.69	9.49	9.36	9.39	10.5	9.9	10.0
Sodium	102	200	8.0	6.0	5.0	3.0	6.08	7.61	8.25	7.56	8.75	7.89	7.34	7.00	6.15	6.28	6.28	6.58	6.06
Sulfur	NIL	NIL	0.034	0.027	0.033	0.031	0.032	0.034	0.035	0.048	0.048	0.049	0.049	0.049	0.046	0.047	0.046	0.0472	0.0472
Sulfate	259	500	15.0	15.0	16.0	15	14	15	14	15	14	13	15	14	14	12	12	13	14
Total Dissolved Solids	292	500	204	60	80	80	111	63	83	83	74	31	71	<30	74	94	51	80	123
Total Kjeldahl Nitrogen	NIL	NIL	1.8	0.6	0.7	0.7	0.6	0.9	0.7	<0.5	0.7	0.9	0.7	0.8	0.8	1.0	1.0	1.1	1.1
Zinc	3	5	<0.01	<0.01	<0.01	<0.01	0.010	0.006	0.018	0.013	0.014	0.010	0.008	0.013	0.005	0.004	0.005	0.004	0.003

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.
 Labels BH00-4A(D) and BH00-4B(S) have been switched.
 Results expressed in mg/L, unless otherwise noted.
 Bold and Shaded values exceed the ODWS.
 Bold and Italic values exceed RUC limits.
 NIL indicates no limit specified.
 - means parameter not analyzed.

Table 3
Groundwater Quality
Killico Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH00-5																
			21-Jul-00	9-Oct-00	27-Jul-01	28-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	28-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	9-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	283	30 - 500	575	575	572	577	574	634	620	600	644	635	654	681	658	633	653	730	734
Ammonium	0.06	0.1	0.210	0.210	<0.05	0.110	0.115	0.098	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099	0.099
Ammonia, Total (as N)	NIL	NIL	0.5	0.6	0.6	1.0	1.5	2.8	5.9	4.7	10.4	16.7	12.4	20.9	22.9	26.7	26.3	26.1	28.2
Barium	0.3	1.0	0.59	0.54	0.29	0.49	0.56	0.76	1.03	0.86	1.40	1.76	1.67	1.83	2.33	1.97	2.67	3.04	3.31
Boron	1.3	5.0	0.340	0.320	0.360	0.400	0.500	0.680	0.750	0.673	0.671	0.631	0.624	0.612	0.501	0.515	0.479	0.480	0.544
Calcium	NIL	NIL	105	110	87	96	128	131	139	125	130	124	128	115	109	108	109	112	124
Chloride	131	250	127	126	112	121	72	66	57	61	54	51	52	48	45	47	52	67	89
Chromium	0.01	0.05	<0.01	<0.01	0.019	0.009	0.015	0.009	0.009	0.004	0.002	0.003	0.003	0.007	0.003	0.002	0.0027	0.0033	0.0031
Chemical Oxygen Demand	NIL	NIL	120	137	119	128	104	85	73	78	69	65	70	69	60	60	67	79	74
Cobalt	NIL	NIL	<0.01	0.007	0.010	0.011	0.007	0.007	0.009	0.009	0.010	0.009	0.008	0.008	0.016	0.012	0.0286	0.0209	0.0266
Copper	0.5	1	0.003	<0.001	<0.001	<0.005	<0.005	0.002	0.001	0.002	0.004	0.002	0.002	0.002	0.003	0.003	0.0037	0.0041	0.0030
Disolved Organic Carbon	3.3	5	40.6	37.4	33.0	35.6	4.3	20.6	18.7	17.0	18.7	15.2	14.6	13.6	15.1	14.2	12.6	13.7	15.4
Hardness (as CaCO ₃)	100	80 - 100	503	516	423	410	410	410	410	410	410	410	410	410	410	410	410	410	410
Iron	9.9	0.3	74.6	76.3	4.4	52.2	77.0	77.1	82.8	73.0	69.2	72.3	60.3	68.3	73.3	74.9	77.1	84.3	99.3
Magnesium	NIL	NIL	50.0	50.0	50.0	56.0	65.2	60.5	61.1	56.0	54.4	51.6	51.9	42.5	40.3	38.4	40.8	38.5	42.5
Manganese	0.05	0.05	4.01	3.49	3.45	3.23	3.2	2.85	3.19	3.13	3.59	3.88	3.51	3.84	3.68	3.12	2.54	4.09	4.10
Nitrate (as N)	3	10	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	0.3	1	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
pH (units) ³	6.5 - 8.5	6.7	6.6	6.3	6.4	6.3	6.4	6.59	6.75	6.87	7.23	6.86	6.79	6.87	6.81	6.71	6.74	6.78	7.05
Phenols	NIL	NIL	-	-	-	-	-	-	0.004	0.012	0.001	0.005	0.005	0.005	0.006	0.003	0.002	<0.002	0.004
Phosphorus, Total	NIL	NIL	5.97	0.46	0.93	3.80	3.41	0.05	0.04	0.05	0.02	0.07	0.09	0.05	0.02	0.03	0.02	0.02	0.03
Potassium	NIL	NIL	5.0	5.0	5.0	5.0	7.5	10.2	19.2	16.6	42.3	43.4	40.6	56.7	57.5	52.9	74.7	70.9	71.0
Silicon	NIL	NIL	13.5	12.3	10.8	15.1	12.9	12.6	13.1	12.1	13.6	13.0	14.9	12.4	11.9	12.6	14.9	13.0	13.3
Sodium	102	200	93.0	91.0	93.0	92.0	80.1	81.3	77.8	68.8	94.2	80.8	80.7	56.5	60.3	60.5	51.2	49.3	67.2
Strontium	NIL	NIL	0.688	0.488	0.500	0.607	0.576	0.670	0.791	0.750	0.910	0.812	0.814	0.783	0.762	0.733	0.775	0.797	0.873
Sulphate	259	500	3.0	2.0	2.0	1.0	1.0	<0.5	0.6	1.6	1.2	2.5	0.8	0.9	<0.5	0.6	<0.2	<0.2	<0.2
Total Dissolved Solids	292	500	912	840	832	812	884	811	729	757	746	780	706	690	709	738	874	743	889
Total Kjeldahl Nitrogen	NIL	NIL	2.9	2.2	2.0	2.8	2.0	2.3	7.1	4.5	10.7	15.6	13.3	20.0	22.6	24.7	25.2	29.0	28.0
Zinc	3	5	<0.01	<0.01	<0.01	<0.01	0.005	0.007	0.011	0.019	0.010	0.010	0.010	0.015	0.007	0.005	0.007	0.006	0.006

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.

Labels BH00-5AD and BH00-5B(S) have been switched.
 Results expressed in mg/L unless otherwise noted.
 Bold and Shaded values exceed the ODWS.
 Bold and Italic values exceed RUC limits.
 NIL indicates no limit specified.
 - means parameter not analyzed.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH04-16															
			20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-08	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	9-Oct-08	14-May-09	24-Aug-09	09-Oct-09			
Alkalinity (as CaCO ₃)	283	30 - 500	312	344	359	346	357	370	409	405	397	394	360	407	367			
Aluminium	0.08	0.1	0.082	0.005	0.004	0.005	< 0.01	0.005	0.005	0.014	0.046	0.024	0.0380	0.0673	0.0340			
Ammonia, Total (as N)	NIL	NIL	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.4	0.3	0.2	0.1			
Barium	0.3	1.0	0.49	0.66	0.63	0.60	0.59	0.64	0.69	0.62	0.49	0.58	0.559	0.534	0.522			
Boron	1.3	5.0	0.290	0.410	0.432	0.422	0.307	0.332	0.332	0.317	0.289	0.285	0.285	0.308	0.321			
Calcium	NIL	NIL	49.3	51.7	55.6	55.1	59.2	59.0	59.3	61.7	49.6	59.8	57.7	51.3	53.2			
Chloride	131	250	87	87	78	77	75	70	69	67	62	62	56	52	51			
Chemium	0.01	0.05	0.007	0.006	0.005	0.002	0.002	0.001	0.001	0.004	0.002	0.001	0.0013	0.0018	0.0016			
Chemical Oxygen Demand	NIL	NIL	70	60	61	71	62	55	61	56	69	47	55	52	41			
Cobalt	NIL	NIL	0.003	0.003	0.002	0.003	0.004	0.004	0.004	0.004	0.016	0.005	0.0188	0.0139	0.0122			
Copper	0.5	1	< 0.005	< 0.005	0.002	0.001	0.004	0.002	0.001	0.002	0.002	0.002	0.0015	0.0014	0.0009			
Disolved Organic Carbon	3.3	5	7.4	9.2	13.0	9.7	12.0	10.4	11.4	12.3	11.3	10.2	10.1	10.0	10.1			
Hardness (as CaCO ₃)	100	80 - 100	-	-	-	-	-	-	-	-	-	-	-	-	-			
Iron	9.9	0.3	63.8	84.1	74.3	69.1	100.0	33.9	53.3	52.7	53.3	88.0	79.8	63.0	64.1			
Magnesium	NIL	NIL	27.7	30.0	35.0	33.3	39.2	37.2	39.5	38.7	39.7	37.8	36.7	30.5	30.9			
Manganese	0.05	0.05	0.59	0.06	0.34	1.05	0.96	1.03	1.10	1.00	0.82	0.53	0.89	0.855	0.549			
Nitrate (as N)	3	10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
Nitrite (as N)	0.3	1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
pH (units) ³	6.5 - 8.5	6.5 - 8.5	6.33	6.4	7.02	6.55	6.99	6.86	6.58	6.84	6.70	6.52	6.52	6.87	7.07			
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-			
Phosphorus, Total	NIL	NIL	5.68	0.05	< 0.01	0.02	0.04	0.08	0.08	0.03	0.02	0.02	0.02	0.02	0.02			
Potassium	NIL	NIL	4.63	5.29	5.28	4.99	5.78	5.87	5.25	5.98	5.12	4.53	5.27	5.13	5.10			
Silicon	NIL	NIL	10.4	10.9	9.6	9.9	11.1	11.1	11.8	10.2	8.0	11.0	10.7	10.1	10.4			
Sodium	102	200	106.0	104.0	119.0	105.0	103.0	96.2	95.7	86.5	105.0	85.6	76.0	81.4	85.5			
Sulfurium	NIL	NIL	0.259	0.287	0.294	0.284	0.237	0.310	0.302	0.324	0.284	0.259	0.315	0.289	0.250			
Sulphate	289	500	44.0	23.0	18.0	16.0	12.0	9.6	9.5	6.6	5.2	5.4	4.7	4.5	4.5			
Total Dissolved Solids	292	500	560	537	540	534	514	509	553	497	558	546	460	480	531			
Total Kjeldahl Nitrogen	NIL	NIL	0.6	0.9	0.6	0.6	< 0.5	0.8	0.6	0.5	0.6	0.7	0.6	0.6	0.6			
Zinc	3	5	0.034	0.009	0.013	0.009	0.024	0.020	0.010	0.015	0.029	0.004	0.005	0.006	0.006			

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.

Labels BH00-4AD and BH00-4B(S) have been switched.
 Results expressed in mg/L unless otherwise noted.
 Bold and Shaded values exceed the ODWS.
 Bold and Italic values exceed RUC limits.
 NIL indicates no limit specified.
 - means parameter not analyzed.



Table 3
Groundwater Quality
Kilaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	BH04-ID												
			20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	28-Apr-07	28-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	283	30 - 500	537	573	566	554	457	435	452	489	444	417	404	410	383
Aluminum	0.06	0.1	0.011	0.006	0.007	0.005	< 0.01	0.006	0.005	0.006	0.006	0.059	0.068	0.087	0.0581
Ammonia, Total (as N)	NIL	NIL	0.5	0.4	0.3	0.4	0.3	0.2	0.2	0.4	0.3	0.5	0.4	0.4	0.4
Barium	0.3	1.0	0.64	0.67	0.64	0.58	0.50	0.49	0.42	0.47	0.42	0.459	0.438	0.438	0.438
Boron	1.3	5.0	0.330	0.390	0.454	0.444	0.348	0.366	0.345	0.345	0.293	0.319	0.296	0.272	0.312
Calcium	NIL	NIL	96.3	100.0	114.0	103.0	88.8	80.5	80.3	76.9	74.3	70.3	69.9	62.7	65.6
Chloride	131	250	87	84	69	68	59	51	53	47	46	45	37	41	39
Chromium	0.01	0.05	0.012	0.007	0.006	0.002	0.002	0.001	0.002	0.004	0.002	0.001	0.0014	0.0018	0.0016
Chemical Oxygen Demand	NIL	NIL	34	66	62	60	49	48	47	45	49	39	45	53	29
Cobalt	NIL	NIL	0.004	0.004	0.004	0.004	0.005	0.004	0.003	0.003	0.017	0.012	0.0204	0.0114	0.0124
Conductivity (µS/cm) ³	NIL	NIL	1021	1298	978	952	799	690	671	685	650	649	597	549	604
Copper	0.5	1	< 0.005	< 0.005	0.001	0.001	0.003	0.002	0.001	0.001	0.002	0.002	0.0018	0.0018	0.0011
Dissolved Organic Carbon	3.3	5	55.9	23.3	15.4	29.0	14.3	14.6	12.4	12.2	11.6	9.9	9.5	9.2	9.6
Hardness (as CaCO ₃)	100	80 - 100	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	0.9	0.3	58.7	50.1	55.3	51.3	46.5	40.0	41.4	35.6	34.9	32.3	34.0	31.0	32.8
Magnesium	NIL	NIL	64.7	63.9	73.7	66.0	55.7	50.0	46.0	45.1	41.5	36.0	41.2	33.9	35.4
Manganese	0.05	0.05	1.22	1.21	1.34	1.33	1.10	1.32	1.18	1.10	1.25	1.09	1.17	1.00	1.16
Nitrate (as N)	3	10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrite (as N)	0.3	1	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	6.23	6.53	6.87	6.68	6.83	6.70	6.64	6.68	6.75	6.63	6.53	6.77	7.11
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	0.04	0.08	0.03	0.04	0.05	0.05	0.06	0.04	0.02	0.03	0.02	0.03	0.02
Potassium	NIL	NIL	5.94	6.49	6.38	6.53	7.32	7.30	6.46	7.69	6.25	5.71	6.27	8.24	6.20
Silicon	NIL	NIL	7.57	8.33	6.39	8.13	9.14	8.31	11.20	8.56	8.34	8.17	9.36	8.71	8.91
Sodium	102	200	64.3	62.5	89.6	78.4	73.6	68.4	62.7	64.3	66.6	63.7	72.8	40.3	55.8
Strontium	NIL	NIL	0.436	0.462	0.479	0.473	0.455	0.398	0.376	0.398	0.395	0.386	0.381	0.362	0.379
Sulphate	259	500	5.4	1.0	0.8	1.0	0.7	1.1	1.0	2.1	2.0	3.4	4.5	2.5	2.6
Total Dissolved Solids	292	500	786	743	891	714	683	623	643	614	565	537	449	454	500
Total Kjeldahl Nitrogen	NIL	NIL	0.5	1.0	0.9	0.7	0.6	0.6	< 0.5	0.7	0.7	1.0	0.7	0.8	1.0
Zinc	3	5	0.006	0.007	0.008	0.008	0.015	0.020	0.010	0.015	0.007	0.008	0.006	0.007	0.005

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.
 Labels BH06-44(D) and BH06-46(S) have been switched.
 Results expressed in mg/L, unless otherwise noted.
 Bold and Italic values exceed the ODWS.
 * indicates no limit specified.
 - means parameter not analyzed.

Table 3
Groundwater Quality
Kilaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	MW05-1S										MW05-1D											
			15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	263	30 - 500	162	142	129	115	130	107	125	124	112	137	119	93	85	82	88	85	84	95	89	84	100	83
Aluminum	0.06	0.1	0.37	0.12	0.10	0.41	0.08	0.08	0.05	0.05	0.05	0.14	0.17	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.28	0.36	0.73	0.43
Ammonia, Total (as N)	NL	NL	2.0	3.3	4.8	1.8	3.4	3.3	1.5	1.5	2.6	4.6	4.8	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	< 0.1
Bran	0.3	1.0	0.15	0.14	0.14	0.13	0.13	0.11	0.15	0.13	0.12	0.12	0.10	0.23	0.20	0.19	0.19	0.16	0.20	0.21	0.19	0.24	0.20	0.16
Boron	1.3	5.0	0.05	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.09	0.09	0.09	0.04	0.04	0.09	0.03	0.02	0.02	0.03	0.03
Calcium	NL	NL	44.7	37.5	39.5	35.8	36.3	35.6	36.0	36.1	37.3	35.9	35.9	70.2	87.2	74.0	68.8	83.7	85.0	0.03	0.02	0.02	0.02	0.03
Chloride	131	250	37	36	40	40	39	43	41	41	48	48	47	140	130	170	140	130	190	160	160	220	160	
Chromium	0.01	0.05	0.004	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.004	0.005	0.001	< 0.0005	0.002	0.001	0.001	0.004	0.002
Chemical Oxygen Demand	NL	NL	63	62	63	36	56	49	29	20	45	70	60	< 8	< 8	< 8	< 8	11	10	8	< 8	13	< 8	
Cobalt	NL	NL	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.011	0.009	0.018	0.010	0.008	0.002	0.001	0.002	0.001	0.0008	0.001	0.014	0.011	0.018	0.009	0.012
Conductivity (µS/cm)	NL	NL	395	315	279	253	279	258	242	263	264	281	284	359	591	521	452	413	520	568	520	577	460	466
Copper	0.5	1	0.0016	0.0005	0.0009	0.0014	0.0006	0.0008	< 0.0005	0.006	0.006	0.0015	0.001	0.003	0.001	0.001	0.002	0.0008	0.001	0.003	0.002	0.003	0.003	0.002
Dissolved Organic Carbon	3.3	5	22.1	25.0	28.4	28.2	20.3	18.2	9.7	10.5	18.3	25.9	28.5	2.8	< 1	2.0	1.5	< 1	1.5	2.0	1.2	1.1	< 1.0	1.2
Hardness (as CaCO ₃)	100	80 - 100	2.97	3.24	2.03	1.34	1.83	1.85	1.20	1.31	1.30	1.60	1.74	0.48	0.43	0.16	0.12	0.11	0.11	0.35	0.41	0.57	0.98	0.61
Iron	9.9	0.3	20.0	16.8	18.8	17.2	16.8	14.9	17.1	17.8	17.5	15.7	15.6	22.2	19.2	24.8	20.6	18.3	23.3	22.9	24.2	28.1	21.4	20.4
Magnesium	NL	NL	0.40	0.31	0.26	0.37	0.22	0.25	0.35	0.45	0.33	0.20	0.25	0.16	0.14	0.07	0.08	0.12	0.07	0.12	0.10	0.13	0.08	0.09
Manganese	0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Nitrate (as N)	3	10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Nitrite (as N)	0.3	1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
pH (units)	6.5 - 8.5	6.5 - 8.5	6.8	6.7	7.4	7.8	6.9	6.4	6.6	6.7	6.3	6.2	6.8	6.6	6.5	7.2	6.7	7.0	7.9	7.7	7.7	8.1	7.7	8.0
Phenols	NL	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NL	NL	0.03	0.02	0.72	0.14	0.48	0.50	0.07	0.08	0.39	0.50	0.57	0.03	0.02	< 0.01	0.03	< 0.01	0.03	0.04	0.05	0.04	0.07	0.04
Potassium	NL	NL	4.44	3.29	3.95	3.39	3.43	3.77	3.12	3.15	3.49	3.37	3.29	7.94	5.92	6.54	6.06	5.51	6.54	5.94	5.81	6.74	6.08	5.44
Silicon	NL	NL	13.8	12.2	13.9	11.1	14.7	12.2	11.1	11.4	13.3	13.3	13.9	6.49	6.29	7.33	6.77	7.15	6.96	7.29	7.58	8.13	8.02	8.16
Sodium	102	200	34.6	20.8	15.8	7.5	14.3	13.3	5.6	5.9	10.2	10.3	9.9	22.6	16.4	22.1	19.3	16.6	21.4	19.9	20.4	27.9	23.4	21.1
Sr	NL	NL	0.98	0.280	0.309	0.253	0.284	0.248	0.232	0.238	0.259	0.290	0.288	1.64	1.48	1.77	1.47	1.42	1.65	1.65	1.76	1.84	1.49	1.40
Sulphate	259	500	24	6.9	4.8	< 0.5	2.7	2.4	< 0.5	< 0.5	0.3	0.5	0.4	35	33	30	33	34	29	29	30	27	32	32
Total Dissolved Solids	292	500	346	287	274	271	271	220	289	257	249	289	311	489	383	474	369	406	477	533	571	553	471	443
Total Kjeldahl Nitrogen	NL	NL	2.5	3.2	4.8	2.4	3.6	3.7	< 0.5	1.7	3.4	5.2	5.4	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Zinc	3	5	0.017	0.011	0.009	0.030	0.010	0.014	0.005	0.003	0.005	0.005	0.005	0.028	0.023	0.005	0.020	0.009	0.011	0.008	0.004	0.008	0.005	0.005

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.

Labels BH00-4(D) and BH00-4(BS) have been switched.
 Results expressed in mg/L unless otherwise noted.
 Bold and Shaded values exceed the ODWS.
 Bold and Italic values exceed RUC limits.
 NL indicates no limit specified.
 - means parameter not analyzed.



Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	MW06-25										MW06-2D												
			15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	
Alkalinity (as CaCO ₃)	263	0.5	0.62	0.025	<0.01	0.007	0.008	0.008	0.017	0.015	0.033	0.100	0.160	0.12	0.23	0.14	0.21	0.27	0.26	0.34	0.16	2.33	0.90	0.09	
Aluminum	0.06	0.1	0.02	0.2	<0.1	<0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.5	0.6	0.4	0.5	0.5	0.5	0.9	0.8	0.7	0.6	
Ammonia, Total (as N)	NIL	NIL	0.2	0.2	<0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.5	0.6	0.4	0.5	0.5	0.5	0.9	0.8	0.7	0.6	
Barium	0.3	1.0	0.05	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	
Boron	1.3	5.0	0.049	0.036	0.027	0.026	0.024	0.027	0.022	0.021	0.021	0.028	0.0254	0.063	0.050	0.011	0.009	0.008	0.009	0.008	0.008	0.008	0.008	0.0074	0.0109
Calcium	NIL	NIL	9.07	8.16	8.24	7.73	7.62	8.25	7.35	7.53	7.89	7.90	7.72	82.4	27.3	23.4	21.7	21.5	21.3	21.0	21.2	20.7	19.1	24.7	
Chloride	131	269	2.9	3.0	2.7	3.0	3.0	3.0	3.0	4.1	4.2	3.8	4.2	6.3	4.3	3.9	2.9	3.2	3.0	2.3	3.8	3.3	3.7	3.6	
Chromium	0.01	0.05	0.001	0.001	0.002	0.001	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005	0.0010	0.002	0.002	0.001	0.001	0.001	0.001	0.003	0.003	0.003	0.0026	0.0007	
Chemical Oxygen Demand	NIL	NIL	<8	11	<8	<8	<8	11	<8	11	<8	8	11	<8	26	<8	55	50	45	27	53	29	36	42	
Calcium	NIL	NIL	0.0009	0.0006	0.0005	0.0005	0.0005	0.0005	0.011	0.010	0.0193	0.0026	0.0057	0.0019	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.003	0.028	0.0300	0.0243	
Conductivity (µS/cm) ³	NIL	NIL	92	109	83	80	76	89	85	84	79	92	89	290	284	135	132	130	134	132	128	127	141	116	
Copper	0.5	1	0.002	0.001	0.001	0.004	0.001	0.002	0.0006	0.0006	0.0008	0.0022	0.0023	0.005	0.003	0.003	0.007	0.004	0.005	0.014	0.011	0.0195	0.0065	0.0059	
Dissolved Organic Carbon	3.3	5	1.7	<1	2.1	<1	1.4	1.5	2.6	1.5	1.4	1.2	1.4	3.3	3.9	3.0	4.5	4.6	3.9	4.5	4.1	4.5	3.5	3.9	
Hardness (as CaCO ₃)	100	80-100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Iron	9.9	0.3	2.89	7.97	7.95	4.48	6.96	7.61	7.32	6.68	8.03	8.76	7.92	13.9	16.4	19.7	18.9	19.2	21.5	21.5	21.7	20.5	19.0	0.1	
Magnesium	NIL	NIL	4.72	4.57	4.57	4.48	4.64	4.60	4.02	4.20	4.46	4.07	4.24	13.80	7.60	7.32	6.68	6.81	6.82	7.17	7.27	7.46	6.96	6.64	
Manganese	0.05	0.05	0.079	0.030	0.070	0.063	0.064	0.064	0.065	0.077	0.062	0.068	0.068	0.482	0.300	0.284	0.314	0.316	0.277	0.398	0.347	0.356	0.300	0.246	
Nitrate (as N)	3	10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	
Nitrite (as N)	0.3	1	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	
pH (units) ³	6.5-8.5	6.5-8.5	6.86	6.81	7.81	6.69	6.67	6.63	6.71	6.57	6.52	7.09	7.06	6.41	6.58	7.89	7.79	6.68	6.72	6.54	6.92	6.83	5.91	6.63	
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus, Total	NIL	NIL	<0.01	0.04	<0.01	0.02	<0.01	0.03	<0.01	0.01	<0.01	0.02	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.16	0.15	0.21	0.11	0.01	
Potassium	NIL	NIL	2.65	1.97	1.81	2.16	2.18	2.20	1.81	2.15	1.76	1.84	1.87	5.72	3.99	2.18	2.40	2.46	2.35	2.00	2.08	2.12	1.71	1.75	
Silicon	NIL	NIL	5.80	6.24	6.60	5.94	6.57	6.20	6.14	6.38	6.73	6.71	6.98	8.75	10.7	12.5	11.7	12.6	11.7	13.7	15.0	14.6	12.7	11.0	
Sodium	102	200	5.80	6.42	5.15	4.94	5.12	5.35	3.44	3.72	3.79	4.24	4.14	19.30	13.40	6.44	6.72	7.39	5.66	3.95	4.26	4.12	4.39	4.21	
Sulfur	NIL	NIL	0.094	0.072	0.049	0.046	0.045	0.047	0.044	0.045	0.046	0.047	0.046	0.383	0.148	0.088	0.097	0.089	0.081	0.084	0.085	0.085	0.0771	0.0869	
Sulfate	259	500	13	12	11	11	11	11	12	11	11	11	11	66	34	20	20	19	18	19	18	18	18	174	
Total Dissolved Solids	292	500	134	80	34	<30	74	46	83	71	49	54	66	289	363	369	214	137	205	480	309	197	191	174	
Total Kjeldahl Nitrogen	NIL	NIL	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	0.7	0.8	0.5	1.3	0.6	0.9	0.8	0.8	0.7	0.8	
Zinc	3	5	0.015	0.014	0.009	0.010	0.014	0.005	0.007	0.004	0.004	0.003	0.004	0.027	0.033	0.015	0.030	0.024	0.019	0.014	0.014	0.016	0.012	0.005	

Notes:
1. Resonance Use Criteria (RUC) criteria.
2. Ontario Drinking Water Standards (ODWS).
3. Results obtained from field analysis.

Labels B100-44(D) and B100-48(S) have been switched.
Results expressed in mg/L unless otherwise noted.
Bold and Striked values exceed the ODWS.
Bold and Italic values exceed RUC limits.
NIL indicates no limit specified.
- means parameter not analyzed.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	MW07-35										MW07-3D									
			26-Apr-07	28-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	26-Apr-07	28-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09		
Alkalinity (as CaCO ₃)	263	30 - 500	80	85	85	78	82	95	76	94	105	105	73	76	80	80	79	82	77	83	89	89
Aluminum	0.06	0.1	<0.01	0.003	0.006	0.003	0.034	0.068	0.0741	0.3080	0.524	0.524	0.02	0.01	0.05	0.06	0.24	0.24	0.09	0.228	0.205	0.381
Ammonia, Total (as N)	NIL	NIL	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
Barium	0.3	1.0	0.10	0.12	0.10	0.14	0.14	0.11	0.185	0.170	0.141	0.141	0.07	0.06	0.06	0.07	0.05	0.07	0.05	0.058	0.0724	0.0744
Boron	1.3	5.0	0.008	0.008	0.008	0.007	0.007	0.008	0.0059	0.0058	0.0103	0.031	0.017	0.023	0.019	0.015	0.014	0.0128	0.014	0.0128	0.0126	0.0151
Cadmium	NIL	NIL	26.2	29.3	25.6	33.7	28.4	29.3	34.3	33.5	38.7	24.8	24.8	24.1	21.5	23.2	24.0	23.8	28.8	28.8	29.3	29.6
Calcium	131	250	189	189	189	209	209	140	209	240	199	199	21	29	25	24	25	24	26	26	30	26
Chloride	0.01	0.05	0.005	0.004	0.001	<0.0005	0.002	0.001	0.0008	0.0016	0.0036	0.001	<0.0003	0.0007	<0.0003	0.0007	<0.0005	0.002	<0.0005	0.0007	0.0010	0.0013
Chemical Oxygen Demand	NIL	NIL	11	<8	10	9	11	<8	13	10	<8	9	<8	9	14	<8	8	8	<8	9	8	<8
Cobalt	NIL	NIL	0.005	0.003	0.002	0.001	0.011	0.003	0.0111	0.0104	0.0046	0.0005	0.0005	0.0006	0.0005	0.0004	0.012	0.003	0.0191	0.0191	0.0206	0.0195
Copper	0.5	1	0.006	0.005	0.002	0.004	0.003	0.003	0.0034	0.0041	0.0028	0.0028	0.002	0.003	0.001	0.001	0.002	0.001	0.0013	0.0013	0.0012	0.0014
Dissolved Organic Carbon	3.3	5	3.3	2.1	2.8	2.5	3.0	2.3	2.8	2.4	3.2	2.0	2.0	1.1	1.4	1.3	<1	1.3	<1	1.3	<1.0	2.0
Hardness (as CaCO ₃)	100	80 - 100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	0.12	0.02	0.03	<0.01	0.06	0.13	0.09	0.35	0.10	0.07	0.04	0.09	0.05	0.05	0.83	0.15	0.28	0.28	0.28	0.53
Magnesium	NIL	NIL	15.1	15.1	15.3	15.8	13.6	13.9	17.2	16.3	17.3	10.8	10.7	8.7	8.4	9.5	9.5	11.1	11.1	11.1	11.1	11.3
Manganese	0.05	0.05	0.288	0.228	0.172	0.108	0.098	0.096	0.0416	0.0516	0.0313	0.045	0.041	0.047	0.041	0.074	0.043	0.0751	0.043	0.0751	0.0765	0.0699
Nitrate (as N)	3	10	1.13	2.25	1.83	1.68	1.51	1.59	1.01	1.03	1.09	<0.06	<0.06	<0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	0.3	1	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.91	7.79	7.21	7.68	6.88	6.65	7.13	7.05	8.4	8.10	8.04	7.72	6.75	6.71	8.03	8.24	8.37	8.24	8.37	7.23
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01	0.03	0.03	0.04	0.03	0.05	0.03	0.02	0.02	0.02	0.04
Potassium	NIL	NIL	5.93	6.14	5.65	6.42	5.11	4.71	5.41	5.20	5.20	8.79	4.80	5.85	5.74	5.51	5.09	5.46	5.09	5.46	5.40	5.30
Silicon	NIL	NIL	9.30	9.97	11.10	8.71	8.43	10.80	9.09	10.60	10.90	6.50	6.56	6.84	6.82	7.10	6.71	7.56	7.10	7.56	7.03	7.39
Sodium	102	200	175	122	106	125	165	104	139	133	136	23.9	14.6	20.1	14.5	12.0	9.8	10.8	10.8	10.8	10.8	9.1
Strontium	NIL	NIL	0.200	0.208	0.186	0.253	0.218	0.169	0.282	0.282	0.266	0.227	0.195	0.186	0.189	0.189	0.186	0.237	0.186	0.237	0.240	0.242
Sulphate	259	500	25	24	22	29	23	23	27	21	22	35	27	22	19	19	19	19	19	19	20	18
Total Dissolved Solids	292	500	490	377	406	497	506	403	497	520	486	180	157	191	180	188	177	194	177	194	177	211
Total Kjeldahl Nitrogen	NIL	NIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
Zinc	3	5	0.016	0.010	0.010	0.015	0.008	0.008	0.007	0.010	0.005	0.011	0.020	0.008	0.005	0.005	0.004	0.005	0.004	0.005	0.003	0.004

Notes:
1. Reasonable Use Criteria (RUC) criteria.
2. Ontario Drinking Water Standards (ODWS).
3. Results obtained from field analysis.

Labels BH00-4AD) and BH00-4B(S) have been switched.
Results expressed in mg/L unless otherwise noted.
Bold and Italic values exceed the ODWS.
Bold and Italic values exceed RUC limits.
NIL indicates no limit specified.
° means parameter not analysed.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	MW07-4				MW07-5				MW07-6												
			26-Apr-07	17-Oct-07	21-May-08	27-Aug-08	26-Apr-07	17-Oct-07	21-May-08	27-Aug-08	26-Apr-07	17-Oct-07	21-May-08	27-Aug-08									
Alkalinity (as CaCO ₃)	263	30-500	10	26	24	20	38	30	36	21	17	142	296	186	212	212	49	48	48	48	43	61	65
Aluminium	0.06	0.1	<0.01	0.003	0.002	0.017	0.002	0.002	0.005	0.004	0.028	0.003	0.001	0.0018	0.0046	0.0049	0.001	0.002	0.003	0.001	0.0016	0.0015	0.0022
Ammonia, Total (as N)	NIL	NIL	0.1	0.3	0.2	<0.1	0.1	<0.1	0.4	0.4	<0.1	0.4	0.5	0.6	0.8	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Barium	0.3	1.0	0.02	0.03	0.04	0.03	0.05	0.05	0.0471	0.0497	0.0657	0.24	0.26	0.328	0.369	0.341	0.10	0.07	0.07	0.04	0.09	0.0317	0.0688
Boron	1.3	5.0	0.022	0.023	0.019	0.021	0.019	0.015	0.0141	0.0120	0.0184	0.013	0.012	0.0106	0.0139	0.0189	0.046	0.037	0.037	0.04	0.020	0.0317	0.0207
Calcium	NIL	NIL	3.80	3.39	3.81	9.37	3.07	3.96	5.46	5.37	5.35	15.3	16.0	37.0	41.0	42.4	18.2	7.8	7.0	9.4	5.5	4.77	8.20
Chloride	131	250	2.6	3.7	3.1	3.7	6.4	4.4	7.5	6.6	6.7	61	60	46	51	49	2.3	5.0	3.9	3.9	5.6	4.3	2.5
Chromium	0.01	0.05	0.0005	0.0005	0.0005	0.0005	<0.0005	<0.0005	<0.0005	0.0009	<0.0005	0.0008	0.0005	0.0048	0.0009	0.0007	0.001	<0.0003	<0.0003	<0.0005	<0.0005	<0.0005	<0.0005
Chemical Oxygen Demand	NIL	NIL	<8	<8	<8	<8	<8	<8	11	<8	<8	48	50	66	60	76	19	16	13	12	<8	11	71
Cobalt	NIL	NIL	0.0006	0.0009	0.0012	0.0009	0.0009	0.0009	0.0009	0.00340	0.00588	0.009	0.005	0.00897	0.00841	0.00301	0.0002	0.0001	0.0001	0.0001	0.0016	0.0100	0.00923
Conductivity (µS/cm) ³	NIL	NIL	51	67	60	42	38	59	74	65	79	202	497	421	557	495	109	102	106	71	65	89	97
Copper	0.5	1	0.002	0.005	0.001	0.003	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	0.001	0.001	0.0015	0.0013	0.0011	0.002	0.005	0.002	0.0019	<0.0005	0.0008	0.001
Dissolved Organic Carbon	3.3	5	<1	<1	<1	<1	<1	<1	5.3	3.4	3.3	13.2	22.4	10.8	12.5	11.1	5.5	5.2	2.7	1.0	2.1	1.2	<1.0
Hardness (as CaCO ₃)	100	80-100	-	-	-	-	-	-	-	-	-	312	358	50.1	56.3	39.3	0.47	0.23	0.12	0.55	10.0	0.38	0.11
Iron	9.9	0.3	0.05	0.27	0.02	0.12	0.13	0.16	0.03	0.21	0.08	15.8	17.4	19.2	16.9	19.2	5.10	2.05	1.60	1.86	3.58	1.41	2.08
Magnesium	NIL	NIL	2.24	2.05	2.08	2.46	1.91	2.42	3.59	3.28	3.40	6.87	7.79	6.86	6.86	6.86	0.80	0.73	0.216	0.85	0.219	0.74	0.181
Manganese	0.05	0.05	0.04	0.007	0.008	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
Nitrate (as N)	3	10	0.15	0.09	<0.05	0.15	<0.05	0.15	0.13	0.15	0.16	<0.05	<0.05	0.53	0.08	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	0.3	1	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
pH (units) ³	8.5-8.5	8.5-8.5	6.87	7.16	7.18	6.90	7.03	7.15	6.50	6.64	6.53	6.94	6.86	6.92	6.79	7.06	6.76	6.88	6.72	7.01	6.88	7.11	7.10
Phenols	NIL	NIL	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Phosphorus, Total	NIL	NIL	<0.01	0.02	<0.01	0.03	<0.01	0.02	<0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.01
Potassium	NIL	NIL	1.82	1.82	2.01	1.73	1.14	1.45	1.40	1.75	1.51	1.68	2.16	2.37	2.54	2.45	1.26	1.10	1.28	1.09	1.06	0.65	0.80
Silicon	NIL	NIL	5.64	4.23	4.30	5.89	5.86	5.80	6.77	6.72	6.93	9.69	9.08	9.12	10.70	8.40	9.09	9.11	8.28	6.27	2.18	2.85	2.17
Sodium	102	200	3.69	3.25	3.36	3.54	1.69	2.04	2.39	2.55	2.44	8.15	7.49	7.31	8.22	8.57	8.23	9.21	9.59	5.52	3.49	3.04	2.33
Strontium	NIL	NIL	0.019	0.017	0.020	0.023	0.015	0.019	0.0253	0.0266	0.0251	0.076	0.076	0.081	0.138	0.184	0.202	0.186	0.194	0.048	0.042	0.051	0.054
Sulphate	259	500	6.2	9.3	6.9	7.5	12.0	8.8	16	16	16	18.0	21.0	14.0	9.0	5.5	4.5	1.8	1.0	1.2	6.2	5.4	2.3
Total Dissolved Solids	282	500	<30	74	31	<30	89	66	71	54	80	111	291	226	337	409	371	317	309	406	74	83	71
Total Kjeldahl Nitrogen	NIL	NIL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.9	1.0	1.0	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	3	5	3.04	12.70	8.53	4.22	13.30	11.40	6.50	6.88	7.79	31.50	30.10	88.50	48.80	69.20	0.96	0.80	14.20	16.30	48.50	22.20	23.3

Notes:
 1. Results are in mg/L (RUC) units.
 2. Organic Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.
 Labels BHP0-4(A) and BHP0-4(B) have been switched.
 Results expressed in mg/L, unless otherwise noted.
 Bold and Shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 NIL indicates no limit specified.
 - means parameter not analysed.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	R1																	
			21-Jul-00	9-Oct-00	27-Jul-01	29-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Jun-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09		
Alkalinity (as CaCO ₃)	263	30 - 500	54	< 0.05	44	< 0.05	45	0.007	41	39	0.009	47	0.009	45	0.009	56	0.015	57	0.0243	55
Aluminium	0.06	NIL	< 0.05	< 0.05	< 0.02	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.017	< 0.1	< 0.1	< 0.1	< 0.1
Ammonia, Total (as N)	NIL	NIL	0.02	< 0.02	0.12	0.20	0.12	0.12	0.12	0.25	0.12	0.12	0.13	0.13	0.10	0.09	0.09	0.09	0.084	0.090
Barium	0.3	1.0	0.14	0.14	0.12	0.20	0.12	0.12	0.12	0.25	0.12	0.12	0.13	0.13	0.10	0.09	0.09	0.09	0.0225	0.0251
Boron	1.3	5.0	0.020	0.020	0.020	0.050	0.030	0.030	0.030	0.022	0.019	0.026	0.026	0.026	0.034	0.020	0.021	0.0203	0.0225	0.0251
Calcium	NIL	NIL	19.0	18.0	16.0	30.0	17.0	14.6	17.5	34.8	15.8	17.5	19.8	19.8	38.4	13.7	13.9	13.9	13.8	13.6
Chloride	131	250	5.0	6.0	5.0	14.0	4.9	3.6	4.9	11.0	3.8	4.9	5.7	5.7	7.6	2.3	3.0	2.2	2.2	1.7
Chromium	0.01	0.05	< 0.01	< 0.01	< 0.001	< 0.001	0.003	< 0.003	8	< 8	0.001	0.0005	0.0005	0.0005	0.001	0.0008	0.0005	0.0009	0.0009	0.0010
Chemical Oxygen Demand	NIL	NIL	5	< 5	5	5	8	8	8	< 8	< 8	< 8	10	10	8	11	< 8	10	10	9
Cobalt	NIL	NIL	< 0.01	0.0003	0.0003	0.0004	< 0.0003	< 0.0003	165	162	162	< 0.0003	0.0003	0.0003	0.0002	0.0003	0.0002	0.000259	0.000269	114
Conductivity (µS/cm) ³	NIL	NIL	200	280	170	150	165	165	165	162	162	165	167	167	170	153	144	134	98	114
Copper	0.5	1	0.11	0.09	0.05	0.07	0.11	0.10	0.11	0.06	0.06	0.21	0.13	0.13	0.11	0.09	0.20	0.0311	0.0234	0.0556
Dissolved Organic Carbon	3.3	5	3.1	2.9	2.9	2.3	3.0	3.3	3.0	3.3	3.6	3.6	1.5	1.5	3.1	2.4	2.4	2.8	1.7	2.8
Hardness (as CaCO ₃)	100	80 - 100	85.0	82.0	73.0	124.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	0.06	0.03	0.08	0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.02	< 0.01	< 0.01	0.28	0.03	0.02	0.02	0.03
Magnesium	NIL	NIL	9.0	8.0	8.0	12.0	9.19	7.64	9.19	18.30	7.91	8.75	9.79	8.75	7.91	7.65	6.16	6.26	5.73	6.02
Manganese	0.05	0.05	0.01	0.01	0.01	0.02	0.01	0.006	0.006	0.006	0.006	0.008	0.009	0.009	0.015	0.008	0.008	0.0103	0.0066	0.0066
Nitrates (as N)	3	10	7.65	8.85	3.06	13.2	6.35	3.94	4.46	7.68	21.70	4.46	7.68	7.68	2.01	0.98	2.03	5.91	1.78	1.10
Nitrite (as N)	0.3	1	-	-	-	-	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.8	7.72	6.5	6.7	6.58	7.3	6.58	7.3	6.90	7.31	7.31	7.31	7.61	7.20	7.16	6.71	7.52	6.60
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	4.2	< 0.01	< 0.01	< 0.01	0.05	< 0.02	0.05	< 0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01
Potassium	NIL	NIL	3.0	4.0	3.0	4.0	3.3	3.25	3.61	3.61	3.61	3.61	3.97	3.97	3.69	3.20	3.18	3.54	3.13	3.22
Silicon	NIL	NIL	4.16	4.24	3.47	4.41	3.91	4.33	4.41	4.61	4.61	4.41	4.18	4.18	4.61	4.67	4.83	4.84	4.72	5.10
Sodium	102	200	6.0	2.0	2.0	2.0	4.3	3.6	3.6	5.2	3.1	3.6	3.7	3.7	7.1	2.9	2.6	4.26	3.12	2.65
Strontium	NIL	NIL	0.097	0.063	0.079	0.125	0.050	0.080	0.080	0.085	0.102	0.093	0.102	0.102	0.110	0.071	0.073	0.102	0.072	0.070
Sulphate	259	500	19	18	20	25	24	17	18	30	15	18	20	20	17	10	10	16	8	7
Total Dissolved Solids	292	500	196	92	144	192	200	114	140	160	126	140	160	160	134	109	100	94	97	109
Total Kjeldahl Nitrogen	NIL	NIL	0.4	0.4	0.5	0.4	0.8	0.7	0.9	0.9	< 0.5	0.9	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5
Zinc	3	5	0.01	< 0.01	< 0.01	0.01	0.052	0.036	0.052	0.036	0.030	0.030	0.030	0.030	0.027	0.040	0.069	0.020	0.019	0.028

Notes:
1. Reasonable Use Criteria (RUC) criteria.
2. Ontario Drinking Water Standards (ODWS).
3. Results obtained from field analysis.

Labels BH00-4A(D) and BH00-4B(S) have been switched.
Results expressed in mg/L unless otherwise noted.
Bold and Shaded values exceed the ODWS.
Bold and italic values exceed RUC limits.
NIL indicates no limit specified.
'-': means parameter not analyzed.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	R2															
			21-Jul-00	9-Oct-00	27-Jul-01	29-Oct-01	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09
Alkalinity (as CaCO ₃)	263	30 - 500	70	65	65	65	62	63	63	57	62	65	66	64	65	57	69	66
Aluminum	0.06	NIL	< 0.05	< 0.05	< 0.05	< 0.05	< 0.004	0.012	0.002	< 0.01	0.002	< 0.01	0.002	0.004	0.003	0.0027	0.0025	0.0027
Ammonia, Total (as N)	NIL	NIL	0.1	0.05	0.05	0.04	0.1	< 0.1	0.2	< 0.1	0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Barium	0.3	1.0	0.06	0.05	0.05	0.06	0.05	0.05	0.07	0.06	0.07	0.07	0.07	0.07	0.06	0.0760	0.0605	0.0655
Boron	1.3	5.0	0.060	0.070	0.110	0.130	0.110	0.129	0.069	0.043	0.065	0.077	0.092	0.042	0.052	0.0425	0.1050	0.0721
Calcium	NIL	NIL	20.0	18.0	17.0	22.0	18.7	19.3	20.3	21.3	19.6	19.7	19.5	20.4	19.2	21.4	19.6	20.6
Chloride	131	250	2.0	2.0	2.0	2.1	2.1	1.6	0.5	3.2	2.1	2.1	2.2	2.9	2.8	3.2	2.6	2.0
Chromium	0.01	0.05	< 0.01	< 0.01	< 0.001	0.002	< 0.001	0.029	< 0.0003	0.0003	< 0.0003	< 0.0003	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chemical Oxygen Demand	NIL	NIL	< 4	6	8	< 5	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8
Cobalt	NIL	NIL	< 0.01	< 0.0002	< 0.0002	< 0.0003	< 0.0003	0.0001	0.0004	0.0005	0.0002	0.0001	0.0002	0.0005	0.0005	0.00067	0.00033	0.00051
Conductivity (µS/cm) ³	NIL	NIL	170	190	225	235	127.4	168	151	147	144	140	132	124	142	144	144	144
Copper	0.5	1	< 0.001	0.001	0.003	0.105	0.007	0.008	0.038	0.004	0.002	0.004	0.005	0.003	0.006	0.0801	0.0875	0.0035
Dissolved Organic Carbon	3.3	5	1.0	0.4	0.9	< 0.5	1.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	< 1.0	< 1.0
Hardness (as CaCO ₃)	100	80 - 100	71.0	66.0	63.0	76.0	-	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	0.06	0.05	0.15	0.03	0.03	0.14	0.06	< 0.01	0.03	0.03	0.05	0.05	0.03	0.03	0.04	0.03
Magnesium	NIL	NIL	5.00	5.00	5.00	5.00	4.79	4.51	5.08	5.82	4.94	4.95	4.86	5.21	4.92	5.52	4.65	5.15
Manganese	0.05	0.05	0.010	0.010	0.010	0.010	0.015	0.0165	0.016	0.014	0.015	0.015	0.015	0.016	0.015	0.0151	0.0124	0.0138
Nitrate (as N)	3	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrite (as N)	0.3	1	-	-	-	-	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.40	7.20	7.40	7.20	7.07	7.10	7.25	6.88	6.83	6.91	7.05	7.08	7.74	7.76	8.18	7.82
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	< 0.01	< 0.01	< 0.01	< 0.01	< 0.03	0.02	0.02	< 0.01	0.01	< 0.01	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Potassium	NIL	NIL	1.0	1.0	1.0	1.0	1.45	1.34	1.39	1.71	1.49	1.52	1.48	1.56	1.43	1.68	1.44	1.53
Silicon	NIL	NIL	4.46	4.39	3.67	4.23	4.26	4.54	4.55	5.46	4.72	5.09	4.88	5.03	5.10	5.85	4.78	5.38
Sodium	102	200	13.0	9.0	9.0	11.0	8.42	8.2	8.2	6.3	9.2	9.1	8.9	6.4	6.4	6.17	11.60	7.93
Sroutium	NIL	NIL	0.817	0.712	0.772	0.753	0.741	0.832	0.817	0.910	0.837	0.844	0.845	0.862	0.861	0.904	0.875	0.877
Sulphate	259	500	26	22	25	31	22	24	22	22	22	22	21	20	21	21	23	24
Total Dissolved Solids	292	500	144	66	108	140	149	123	111	60	126	86	94	117	103	77	100	117
Total Kjeldahl Nitrogen	NIL	NIL	0.1	0.05	0.07	0.07	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	3	5	< 0.01	< 0.01	< 0.01	< 0.01	0.055	0.002	0.010	0.005	< 0.01	0.004	0.002	0.002	0.007	0.002	0.003	0.010

Notes:
1. Reasonable Use Criteria (RUC) criteria.
2. Ontario Drinking Water Standards (ODWS).
3. Results obtained from field analysis.

Labels BH00-4AD) and BH00-4B(S) have been switched.
Results expressed in mg/L, unless otherwise noted.
Bold and Shaded values exceed the ODWS.
Bold and Italic values exceed RUC limits.
NIL indicates no limit specified.
- means parameter not analyzed.

Table 3
Groundwater Quality
Killaloe Waste Disposal Site

Parameter	RUC ¹	ODWS ²	R3													
			21-Jul-00	9-Oct-00	27-Jul-01	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (as CaCO ₃)	263	30 - 500	49	47	37	69	62	64	67	71	73	81	92	74	96	101
Aluminum	0.06	0.1	<0.05	<0.05	<0.05	0.016	0.063	<0.01	0.004	0.071	0.068	1.190	0.445	0.658	0.0417	0.0247
Ammonia, Total (as N)	NIL	NIL	0.2	0.04	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.5	<0.1	<0.1	<0.1
Barium	0.3	1.0	0.21	0.13	0.12	0.02	0.03	0.03	0.10	0.03	0.03	0.06	0.05	0.0421	0.0400	0.0366
Boron	1.3	5.0	0.020	0.020	0.020	0.029	0.016	0.022	0.019	0.023	0.020	0.023	0.024	0.0245	0.0258	0.0280
Calcium	NIL	NIL	37.0	21.0	16.0	29.6	28.1	27.1	24.2	23.8	20.8	28.6	27.5	28.4	30.3	32.1
Chloride	131	250	59.0	36.0	27.0	17.0	14.0	21.0	12.0	9.3	2.6	2.4	2.9	1.7	1.5	1.4
Chromium	0.01	0.05	<0.01	<0.01	0.001	<0.0003	0.0006	0.0014	<0.0003	0.0006	0.0005	0.0034	<0.0005	<0.0005	0.0006	0.0006
Chemical Oxygen Demand	NIL	NIL	<4	8	<5	<8	<8	<8	8	<8	15	18	8	14	15	<8
Cobalt	NIL	NIL	<0.0002	<0.0002	<0.0002	0.0001	0.0001	0.0001	0.002	0.0001	0.0001	0.0013	0.0005	0.000184	0.000159	0.000129
Copper	0.5	1	0.099	0.042	0.040	0.002	0.002	0.002	0.001	0.003	0.004	0.010	0.006	0.0040	0.0042	0.0034
Dissolved Organic Carbon	3.3	5	2	1.4	1.5	2.4	1.3	3.2	2.8	3.3	4.9	4.3	3.5	4.1	3.9	4.0
Hardness (as CaCO ₃)	100	80 - 100	167	98	77	-	-	-	-	-	-	-	-	-	-	-
Iron	9.9	0.3	0.33	0.03	0.09	<0.01	0.02	<0.01	0.03	0.04	0.08	1.83	0.41	0.07	0.03	<0.01
Magnesium	NIL	NIL	17.00	11.00	9.00	1.97	1.55	2.04	1.34	1.07	1.27	1.83	1.61	1.60	1.22	1.06
Manganese	0.05	0.05	0.07	<0.01	0.010	0.0004	0.004	0.003	0.003	0.010	0.003	0.003	0.064	0.00989	0.00582	0.00105
Nitrate (as N)	3	10	7.94	7.44	7.44	3.60	3.06	2.44	2.33	1.92	0.97	1.92	0.49	1.72	1.82	1.59
Nitrite (as N)	0.3	1	-	-	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.54	<0.06	<0.06	<0.06
pH (units) ³	6.5 - 8.5	6.5 - 8.5	7.5	7.6	6.9	6.80	7.28	6.99	6.91	6.99	7.15	7.11	7.51	7.96	8.18	8.66
Phenols	NIL	NIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phosphorus, Total	NIL	NIL	0.02	0.01	0.01	0.04	0.06	0.02	0.05	0.04	0.04	0.73	0.23	0.05	0.06	0.08
Potassium	NIL	NIL	3.0	2.0	2.0	8.2	7.8	11.8	10.5	10.2	12.2	11.1	10.7	9.15	9.01	9.02
Silicon	NIL	NIL	4.34	4.70	3.89	3.53	3.23	3.94	3.89	4.10	4.14	6.09	4.85	5.05	4.70	4.74
Sodium	102	200	21.0	15.0	14.0	9.3	9.5	14.5	12.0	10.7	7.2	7.0	5.7	6.27	6.07	5.83
Strontium	NIL	NIL	0.189	0.099	0.085	0.205	0.205	0.226	0.216	0.216	0.175	0.229	0.231	0.181	0.196	0.216
Sulphate	259	500	24.0	21.0	19.0	7.3	7.6	9.6	9.4	9.3	7.8	9.8	9.0	7.9	7.7	7.3
Total Dissolved Solids	292	500	424	168	184	157	131	117	194	111	106	143	143	103	146	137
Total Kjeldahl Nitrogen	NIL	NIL	0.3	0.2	0.1	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.77	<0.5	<0.5	0.6
Zinc	3	5	1.03	0.04	0.03	0.0003	0.004	<0.0003	<0.01	0.002	0.001	0.010	0.011	0.001	0.001	<0.001

Notes:
 1. Reasonable Use Criteria (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from field analysis.

Labels BH00-4A(D) and BH00-4B(S) have been switched.
 Results expressed in mg/L unless otherwise noted.
 Bold and Shaded values exceed the ODWS.
 Bold and Italic values exceed RUC limits.
 NIL indicates no limit specified.
 '-' means parameter not analyzed.

Table 4
Groundwater Quality Compared To Provincial
Water Quality Objectives (PWQO)
Killico Waste Disposal Site

Parameter	BH00-5										BH04-5																
	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	20-Jul-04	8-Aug-05	15-Aug-06	11-Oct-06	26-Apr-07	29-Aug-07	17-Oct-07	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	
Alkalinity (as CaCO ₃)	671	654	620	600	644	635	654	659	663	730	734	734	734	312	344	359	346	351	370	409	405	414	397	394	360	407	397
<25% decrease	0.015	0.008	0.009	0.010	0.010	0.008	0.031	0.023	0.042	0.085	0.057	0.082	0.085	0.032	0.005	0.004	0.005	<0.01	0.005	0.005	0.014	0.049	0.024	0.030	0.067	0.0340	
Ammonia Total (N)	NL	2.6	5.9	4.7	10.4	15.7	12.4	20.9	22.9	25.3	28.1	28.2	30.1	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.4	0.4	0.3	0.2	0.1
Boron	0.56	0.76	1.03	0.86	1.40	1.76	1.67	1.80	2.31	1.57	2.67	3.04	3.31	0.40	0.65	0.63	0.60	0.59	0.64	0.60	0.52	0.49	0.58	0.59	0.534	0.523	
Bromine	0.520	0.640	0.770	0.670	0.671	0.657	0.624	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615	0.615
Calcium	128	131	139	125	130	124	126	115	108	109	112	124	49.3	51.7	55.6	55.1	59.2	59.0	59.0	59.3	61.7	49.6	59.6	57.7	51.3	53.2	
Chloride	72	66	57	61	54	51	52	48	47	52	67	89	87	87	87	77	77	79	77	69	67	62	62	62	59	51	
Chromium	0.015	0.009	0.008	0.004	0.002	0.003	0.003	0.007	0.002	0.002	0.003	0.003	0.003	0.007	0.006	0.006	0.002	0.002	0.001	0.001	0.004	0.002	0.001	0.001	0.001	0.001	
Chemical Oxygen Demand	NL	104	85	73	78	69	65	70	69	60	79	74	74	60	61	71	62	55	55	61	56	69	47	55	52	41	
Cobalt	0.0073	0.0076	0.0085	0.0086	0.0096	0.0093	0.0093	0.0164	0.0118	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268	0.0268
Copper	<0.005	<0.005	0.002	0.001	0.002	0.004	0.002	0.002	0.003	0.003	0.003	0.004	0.004	0.003	0.005	0.005	0.007	0.008	0.008	0.008	0.008	0.002	0.002	0.002	0.001	0.001	
Conductivity (µS/cm)²	1193	1362	970	1040	1101	963	1031	981	1015	1044	1081	1248	967	74	92	764	850	725	801	793	731	787	774	683	663	708	
Dissolved Organic Carbon	NL	1.3	20.6	16.7	17.0	15.2	14.6	13.6	15.1	14.2	12.6	13.7	15.4	7.4	9.2	11.0	9.7	10.4	11.4	12.3	11.5	10.2	10.1	10.1	10.0	10.1	
Iron	77.0	77.1	82.0	75.0	82.2	72.5	80.3	68.6	74.8	77.4	84.8	89.9	83.8	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1	84.1
Magnesium	65.2	60.5	61.1	56.0	64.4	51.0	51.9	42.5	40.3	38.4	40.8	36.5	42.5	27.7	30.0	35.0	33.3	38.2	37.2	36.5	36.7	33.7	37.6	36.7	30.5	30.9	
Manganese	NL	3.12	2.85	3.10	3.18	3.50	3.86	3.57	3.84	3.86	3.12	4.54	4.09	4.10	0.98	1.00	0.94	1.05	0.96	1.03	1.10	1.00	0.82	0.93	0.99	0.848	
Nitrate (as N)	NL	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Nitrite (as N)	NL	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
pH (Units)²	8.34	6.59	6.75	6.67	7.23	6.66	6.79	6.67	6.81	6.71	6.74	6.78	7.05	6.33	6.4	7.02	6.55	6.59	6.60	6.58	6.64	6.70	6.52	6.52	6.67	7.07	
Phenols	0.001	0.004	0.012	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	
Phosphorus, Total	3.41	0.68	0.64	0.95	0.92	0.97	0.98	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Potassium	7.5	10.2	19.2	15.6	42.3	43.4	40.6	59.7	57.5	52.9	74.7	70.9	71.0	6.83	6.83	6.83	6.83	6.83	6.83	6.83	6.83	6.83	6.83	6.83	6.83	6.83	
Silicon	NL	12.6	13.1	12.1	13.6	13.0	14.8	14.8	12.4	11.9	12.5	14.9	13.0	13.3	10.40	10.50	9.55	9.84	11.10	11.10	11.80	10.20	8.01	11.00	10.7	10.1	
Sodium	90.1	81.3	77.5	68.8	94.2	60.8	60.7	59.5	60.3	60.5	51.2	43.3	67.2	106.1	104	119	105	103	96.2	95.7	86.5	105.0	85.6	85.6	76.0	81.4	
Sulfur	0.59	0.67	0.76	0.75	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	
Sulfate	1	<0.5	0.6	1.6	1.2	2.5	0.8	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Total Dissolved Solids	888	811	729	757	746	760	796	680	709	726	674	749	889	580	557	540	594	574	514	509	563	497	569	460	460	531	
Total Kjeldahl Nitrogen	NL	2	2.3	7.1	4.5	10.7	15.6	13.3	20.0	22.6	24.7	25.2	28.0	0.8	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Zinc	0.005	0.007	0.011	0.013	0.010	0.010	0.010	0.015	0.007	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	

Notes:
1. Provincial Water Quality Objectives (PWQO).
2. Results from field analysis.

Bold and Striked values exceed PWQO.
NL indicates no limit specified.
"-", means parameter not analyzed.
Results expressed in mg/L, unless otherwise noted.

Table 4
Groundwater Quality Compared To Provincial
Water Quality Objectives (PWQO)
Kilbuck Waste Disposal Site

Parameter	PWQO ¹	BH04-1D										MW07-4											
		20-Jun04	8-Aug05	15-Aug05	11-Oct06	25-Apr07	17-Oct07	21-May08	27-Aug08	8-Oct08	14-May09	24-Aug09	08-Oct09	26-Apr07	28-Aug07	17-Oct07	21-May08	27-Aug08	8-Oct08	14-May09	21-Aug09	08-Oct09	
Alkalinity (as CaCO ₃)	<25% decrease	587	575	566	558	457	495	452	459	444	427	464	410	383	16	28	28	20	38	30	19	21	17
Aluminum	0.075	0.011	0.006	0.007	0.004	0.005	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	<0.01	0.003	0.002	0.017	0.002	0.002	0.005	0.004	0.0028
Ammonia, Total (N)	NL	0.5	0.4	0.3	0.4	0.3	0.2	0.2	0.4	0.3	0.5	0.4	0.4	0.4	0.1	0.3	0.2	<0.1	0.1	<0.1	<0.1	0.3	<0.1
Barium	NL	0.64	0.67	0.64	0.58	0.50	0.49	0.42	0.47	0.42	0.459	0.436	0.438	0.438	0.02	0.03	0.04	0.03	0.05	0.05	0.0471	0.0467	0.0567
Boron	0.2	0.330	0.390	0.454	0.444	0.344	0.466	0.345	0.345	0.233	0.319	0.258	0.272	0.312	0.022	0.023	0.019	0.021	0.019	0.015	0.0141	0.0120	0.0184
Calcium	NL	953	100.0	114.0	103.0	88.8	80.5	80.3	76.9	74.3	70.3	69.9	62.7	65.6	3.80	3.39	3.91	3.1	3.7	4.4	5.46	5.37	5.35
Chloride	NL	87	84	89	86	59	51	55	47	46	45	37	41	39	2.6	3.7	3.1	3.7	6.4	4.4	7.5	6.6	6.7
Chromium	0.1	0.012	0.007	0.008	0.0024	0.002	0.001	0.002	0.004	0.002	0.001	0.0014	0.0018	0.0016	0.0005	0.0005	0.0003	0.0005	<0.0005	<0.0005	<0.0005	0.0009	<0.0005
Chemical Oxygen Demand	NL	34	66	62	60	49	48	47	45	49	39	45	59	29	<8	<8	<8	<8	<8	<8	11	8	<8
Cobalt	0.0009	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0006	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0009
Conductivity (µS/cm) ²	NL	1021	1288	878	952	789	690	671	655	650	649	597	604	604	51	67	60	42	36	59	74	83	79
Copper	0.005	<0.005	0.0013	0.0008	0.0029	0.0018	0.0010	0.0012	0.0012	0.0015	0.0015	0.0018	0.0011	0.0011	0.0017	0.0014	0.0014	0.003	<0.0005	0.0005	0.0005	0.0006	<0.0005
Dissolved Organic Carbon	NL	15.9	23.3	16.4	29	14.8	14.6	12.4	12.2	11.6	9.9	9.5	9.2	9.6	<1	<1	<1	<1	<1	<1	<1.0	1	<1.0
Iron	0.3	55.7	50.1	55.7	51.3	48.5	48.0	41.4	35.6	34.3	32.5	34.0	32.8	32.8	0.09	0.27	0.02	0.12	0.13	0.16	0.03	0.33	0.08
Magnesium	NL	64.7	63.9	73.7	65.0	59.7	50.0	49.0	45.1	41.5	39.0	41.2	33.9	36.4	2.24	2.03	2.08	2.46	1.91	2.42	3.59	3.28	3.40
Manganese	NL	1.22	1.21	1.34	1.39	1.10	1.12	1.18	1.10	1.25	1.09	1.17	1.00	1.10	0.004	0.007	0.008	0.004	0.057	0.046	0.0454	0.0280	0.0451
Nitrate (as N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	0.09	<0.05	0.15	<0.05	0.15	0.13	0.15	0.16
Nitrite (as N)	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
pH (units) ²	6.5 - 8.5	8.28	6.53	6.87	6.68	6.83	6.70	6.64	6.68	6.76	6.63	6.53	6.77	7.11	6.97	7.16	7.18	6.9	7.03	7.16	6.50	6.64	6.53
Phenols	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Phosphorus, Total	0.02	0.04	0.08	0.03	0.04	0.03	0.06	0.06	0.04	0.02	0.03	0.02	0.03	0.02	<0.01	0.02	<0.01	0.03	<0.01	0.02	<0.01	<0.01	0.01
Potassium	NL	5.84	6.49	6.38	6.53	7.32	7.30	6.46	7.69	6.25	6.71	8.27	8.24	8.20	1.62	1.82	2.01	1.73	1.14	1.45	1.40	1.75	1.51
Silicon	NL	7.57	8.23	8.39	8.13	9.14	8.31	11.2	8.6	8.3	8.2	9.36	8.71	8.51	5.64	4.23	4.80	5.89	5.86	5.80	6.77	6.72	6.59
Sodium	NL	84.3	82.5	80.8	79.4	73.6	69.4	62.7	64.3	66.6	63.7	72.8	40.3	55.8	3.69	3.25	3.36	3.54	1.69	2.04	2.39	2.55	2.44
Sulfur	NL	0.44	0.46	0.46	0.47	0.46	0.40	0.376	0.398	0.395	0.396	0.381	0.392	0.379	0.02	0.02	0.02	0.02	0.01	0.02	0.0253	0.0265	0.0251
Sulfate	NL	5.4	1	0.8	1	0.7	1.1	1.0	2.1	2.0	3.4	4.5	2.5	2.6	6.2	9.3	6.9	7.5	12.0	8.8	16.0	16.0	16.0
Total Dissolved Solids	NL	786	743	691	714	653	523	543	514	526	537	449	454	500	<30	74	31	<30	89	66	71	64	80
Total Kjeldahl Nitrogen	NL	0.5	1	0.9	0.7	0.6	0.3	<0.5	0.7	0.7	1	0.7	0.8	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	0.02	0.006	0.007	0.008	0.008	0.015	0.020	0.010	0.015	0.007	0.008	0.006	0.007	0.005	0.04	0.270	0.83	4.22	13.39	11.60	6.96	8.68	7.78

Notes:
1. Provincial Water Quality Objectives (PWQO).
2. Results from field analysis.
Bold and Shaded values exceed PWQO.
NL indicates no limit specified.
"-", means parameter not analyzed.
Results expressed in mg/L unless otherwise noted.



Table 5
Surface Water Quality
Killaroe Waste Disposal Site

Parameter	PWQO ¹	SWI												SW2											
		13-May-04	19-Oct-04	10-May-04	9-May-05	9-May-06	20-Apr-07	11-Sep-07	21-May-08	14-May-09	24-Aug-09	08-Oct-09	13-May-04	19-Oct-04	10-May-04	24-Oct-05	9-May-06	12-Oct-06	26-Apr-07	11-Sep-07	21-May-08	14-May-09	24-Aug-09		
Alkalinity (CaCO ₃)	< 25% decrease	0.28	0.19	0.14	0.19	0.19	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Aluminum	0.075	0.1	0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ammonia, Total (as N)	N/L	0.024	0.019	0.019	0.017	0.017	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Ammonia, Un-ionized (as N) ²	N/L	< 0.05	< 0.01	< 0.04	0.007	0.007	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Boron	0.2	6.14	6.17	5.89	5.41	10.10	6.77	5.03	5.03	4.27	5.55	10.70	6.97	7.28	10.00	5.27	14.10	5.25	6.57	4.55	13.70	7.42	6.40	6.40	13.70
Calcium	N/L	114	115	104	70	82	96	126	66	66	79	150	87	147	100	87	147	96	127	59	100	71	102	338	
Chloride	N/L	3.7	4	3.8	2.5	0.9	3.2	3.5	3.5	2.5	1.3	2.4	2.9	4.6	2.3	5.4	3.2	4.2	2.7	2.7	2.8	4.6	2.0	2.0	1.5
Chromium	0.1	< 0.001	< 0.001	< 0.001	0.0005	< 0.001	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006
Cobalt	0.0009	0.0008	< 0.0003	< 0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Copper	0.005	0.0009	< 0.0009	0.0016	0.0006	0.0010	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
Dissolved Organic Carbon	N/L	41.2	38.2	24.6	24.6	30.5	44.7	20.2	20.2	41.7	23.6	26.8	56.0	25.1	20.8	42.7	27.0	44.5	42.7	45.9	20.6	43.6	27.6	36.8	75.5
Dissolved Oxygen ³	5	272	311	203	670	478	478	5.42	5.42	3.87	4.31	2.16	1.76	3.52	2.7	2.54	2.02	2.72	4.92	5.38	3.93	3.47	2.15	2.15	8.30
Iron	0.3	0.75	0.42	0.35	0.48	1.43	0.75	0.57	0.76	0.48	0.80	1.88	3.08	0.55	0.75	2.98	0.45	4.41	0.62	1.04	0.81	1.28	1.82	2.15	8.30
Magnesium	N/L	2.59	2.73	2.78	2.25	3.41	2.83	2.29	4.55	1.88	2.40	4.17	3.08	2.9	3.88	2.33	5.61	2.13	2.61	2.01	6.23	2.31	2.68	5.11	
Manganese	N/L	0.0665	0.056	0.021	0.027	0.088	0.032	0.043	0.028	0.019	0.0494	0.2780	0.165	0.139	0.214	0.046	0.063	0.024	0.035	0.032	0.089	0.141	0.234	0.381	
Nitrate (as N)	N/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.1	
Nitrite (as N)	N/L	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	
pH (units) ³	6.5 - 8.5	8.40	8.20	8.00	8.10	6.48	6.79	6.81	6.24	6.58	7.71	6.92	5.40	6.00	6.00	6.50	5.80	6.30	6.72	6.78	6.22	6.66	6.66	6.70	6.10
Phenols	0.001	< 0.001	< 0.001	0.003	< 0.001	0.0002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001	0.002	< 0.001	< 0.001	0.002	0.001	< 0.001	0.001	< 0.001	0.001	0.001	0.001	< 0.001	< 0.001
Phosphorus, Total	0.02	0.03	< 0.02	0.02	0.02	0.03	0.03	0.02	0.04	0.04	0.03	0.04	0.07	< 0.01	0.06	0.03	< 0.02	0.03	0.04	0.06	0.06	0.06	0.06	0.06	0.06
Potassium	N/L	1.1	0.12	0.3	0.07	0.17	0.47	0.84	0.77	0.42	0.65	0.47	0.54	0.54	1.27	1.26	0.27	1.52	0.11	0.33	0.86	1.72	0.59	0.72	0.50
Silicon	N/L	1.49	6.6	1.85	3.34	9.86	5.94	2.93	8.91	4.11	2.41	7.07	6.86	4.87	7.4	1.73	9.47	2.07	6.10	2.65	12.20	4.08	2.64	7.16	
Sodium	N/L	2.22	2.05	3.08	2.26	2.29	2.81	2.42	2.20	2.08	2.48	2.66	2.69	2	2.92	2.78	3.82	2.26	2.37	2.23	2.44	2.33	2.54	2.13	
Strontium	N/L	0.039	0.036	0.034	0.034	0.063	0.040	0.029	0.068	0.025	0.0333	0.0661	0.0400	0.051	0.061	0.031	0.044	0.033	0.041	0.027	0.092	0.036	0.0369	0.0692	
Sulphate	N/L	1.4	3.3	5.0	5.9	3.2	1.5	3.6	12.0	2.5	1.1	< 0.2	1.1	< 0.5	3.6	3.2	29	3.9	0.9	3.1	19.0	0.9	0.4	< 0.2	
Total Dissolved Solids	N/L	100	143	89	103	194	163	60	174	91	114	209	134	171	169	86	154	103	143	66	186	114	134	237	
Total Kjeldahl Nitrogen	N/L	0.9	0.9	0.6	0.7	0.8	0.6	0.8	0.9	< 0.5	0.6	1.3	1.1	2.0	0.9	0.6	1.0	0.9	0.7	0.6	1.0	0.6	0.8	1.4	
Zinc	0.02	0.008	< 0.01	0.006	0.006	< 0.01	0.01	0.01	0.01	0.005	0.005	0.015	0.005	0.015	0.015	0.008	0.008	0.007	0.006	0.009	0.013	0.011	0.009	0.018	

Notes:
 1. Provincial Water Quality Objectives (PWQO).
 2. Calculated using Total Ammonia and field analysis.
 3. Results obtained from field analysis.
 Bold text and shading indicate values exceeding PWQO.
 N/L indicates No Limit.
 All results are expressed in mg/L, unless otherwise stated.



Table 5
Surface Water Quality
Killaroe Waste Disposal Site

Parameter	SW3			SW4			SW5			SW6			SW7			SW8		
	11-Sep-07	21-May-08	14-May-09	10-May-05	12-Oct-06	26-Apr-07	11-Sep-07	21-May-08	19-May-04	10-May-05	9-May-06	12-Oct-06	26-Apr-07	11-Sep-07	21-May-08	14-May-09	24-Aug-09	
Alkalinity (CaCO ₃)	2	< 2	3	60	106	3	11	23	134	127	165	254	292	102	312	301	468	
< 25% decrease	0.75																	
Aluminum	0.18	0.19	0.358	0.14	0.09	0.10	0.22	0.10	0.04	0.20	0.91	0.01	0.02	0.37	0.015	0.0109	0.0204	
Ammonia, Total (as N)	< 0.001	< 0.001	0.00030	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.5	0.37	< 0.04	< 0.1	< 0.1	< 0.1	0.1	< 0.1	
Ammonia, Un-ionized (as N) ²	0.026	0.011	0.0267	0.061	0.049	0.117	0.080	0.062	0.046	0.087	< 0.001	< 0.001	< 0.001	< 0.001	0.00036	0.00068	0.00068	
Boron	0.012	0.003	0.0046	< 0.04	0.018	0.004	0.026	0.006	< 0.05	0.01	0.11	0.12	0.04	0.20	0.14	0.151	0.113	
Calcium	6.81	3.62	4.55	17.2	20.1	8.70	21.1	7.45	22.7	32.6	60	43.6	80.4	48.8	65.7	51.5	76.7	
Chemical Oxygen Demand	5.2	3.6	7.3	64	134	82	76	18	57	75	165	89	59	72	37	50	131	
Chloride	4.6	4.9	6.3	67	18	36	42	23	33	90	61	49	38	91	51	43	57	
Chromium	< 0.0005	< 0.0005	0.0011	0.001	0.0008	0.0005	0.0006	< 0.0005	< 0.001	0.003	0.0013	0.0003	< 0.0003	0.0008	< 0.0005	< 0.0005	0.0006	
Chromium	0.0007	0.0005	0.00130	0.0007	0.0010	0.0027	0.0004	0.0003	0.0004	0.0018	0.0053	0.002	0.001	0.001	0.0007	0.000874	0.002150	
Cobalt	86	36	53	305	233	110	219	98	304	344	528	604	459	463	557	532	790	
Conductivity (µS/cm) ³	0.001	0.0006	0.0018	0.0025	0.0041	0.0017	0.0017	0.0014	< 0.0008	0.0016	0.0181	0.005	0.0005	0.004	0.001	0.0011	0.0042	
Copper	17.9	16.5	27.4	20.3	38.8	9.4	25.1	9.4	23.9	28.7	12.2	18.5	17.9	22.5	14.9	16.0	35.4	
Dissolved Organic Carbon	4.92	5.0	5.57	2.03	3.10	5.21	3.85	4.50	7.5	2.89	1.43	6.05	3.77	5.09	3.71	4.00	3.16	
Dissolved Oxygen ³	0.60	0.63	3.81	3.89	1.69	12.40	9.90	10.7	0.43	5.95	38.4	12.30	0.29	14.72	14.40	2.48	2.84	
Iron	3.42	1.78	1.96	6.56	7.93	5.75	7.59	3.47	18	25.4	39.6	27.2	37.0	30.5	47.2	35.7	46.3	
Magnesium	0.033	0.006	0.0429	0.068	0.208	0.106	0.101	0.010	0.066	0.422	0.659	0.355	0.051	0.471	0.097	0.192	0.282	
Manganese	0.11	< 0.05	0.06	0.49	< 0.05	< 0.05	0.82	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05	
Nitrate (as N)	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	
Nitrite (as N)	6.28	7.61	6.69	7.00	6.56	6.84	6.30	6.72	7.10	6.71	7.20	6.80	6.63	6.72	6.38	7.20	7.31	
pH (units) ³	< 0.001	< 0.001	0.001	< 0.001	< 0.001	0.004	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Phenols	0.08	0.02	0.63	0.08	0.14	0.10	0.13	0.03	< 0.02	0.06	1.18	0.40	0.04	0.06	0.05	0.03	0.10	
Phosphorus, Total	2.24	0.44	0.77	3.02	10.9	2.21	2.74	0.90	2.22	1.68	3.09	4.33	2.97	4.82	6.66	4.18	3.63	
Potassium	7.94	6.43	4.22	5.72	8.32	7.52	8.26	5.84	6.3	8.2	15.4	8.9	10.7	10.6	8.7	8.21	13.00	
Silicon	2.51	1.75	1.90	26.2	22.3	10.2	25.8	12.8	22.1	40.6	25.0	32.4	23.7	66.4	38.5	32.4	41.8	
Sodium	0.050	0.026	0.0365	0.076	0.068	0.057	0.154	0.049	0.162	0.175	0.348	0.280	0.272	0.344	0.290	0.366	0.324	
Strontium	22.0	6.6	1.5	1.2	1.8	12.0	42.0	9.8	9.9	6.1	6.7	17	4.6	3.2	49.0	16.0	12	
Sulphate	106	77	103	211	140	243	111	228	374	364	363	409	414	389	414	389	623	
Total Dissolved Solids	0.5	< 0.5	1.0	1.0	1.0	1.2	0.8	< 0.5	0.8	0.7	1.2	0.9	0.6	0.8	< 0.5	0.8	1.0	
Total Kjeldahl Nitrogen	0.004	0.002	0.007	0.008	0.014	0.002	0.006	0.004	0.004	< 0.01	0.133	0.033	< 0.0003	0.022	0.009	0.004	0.005	
Zinc																		

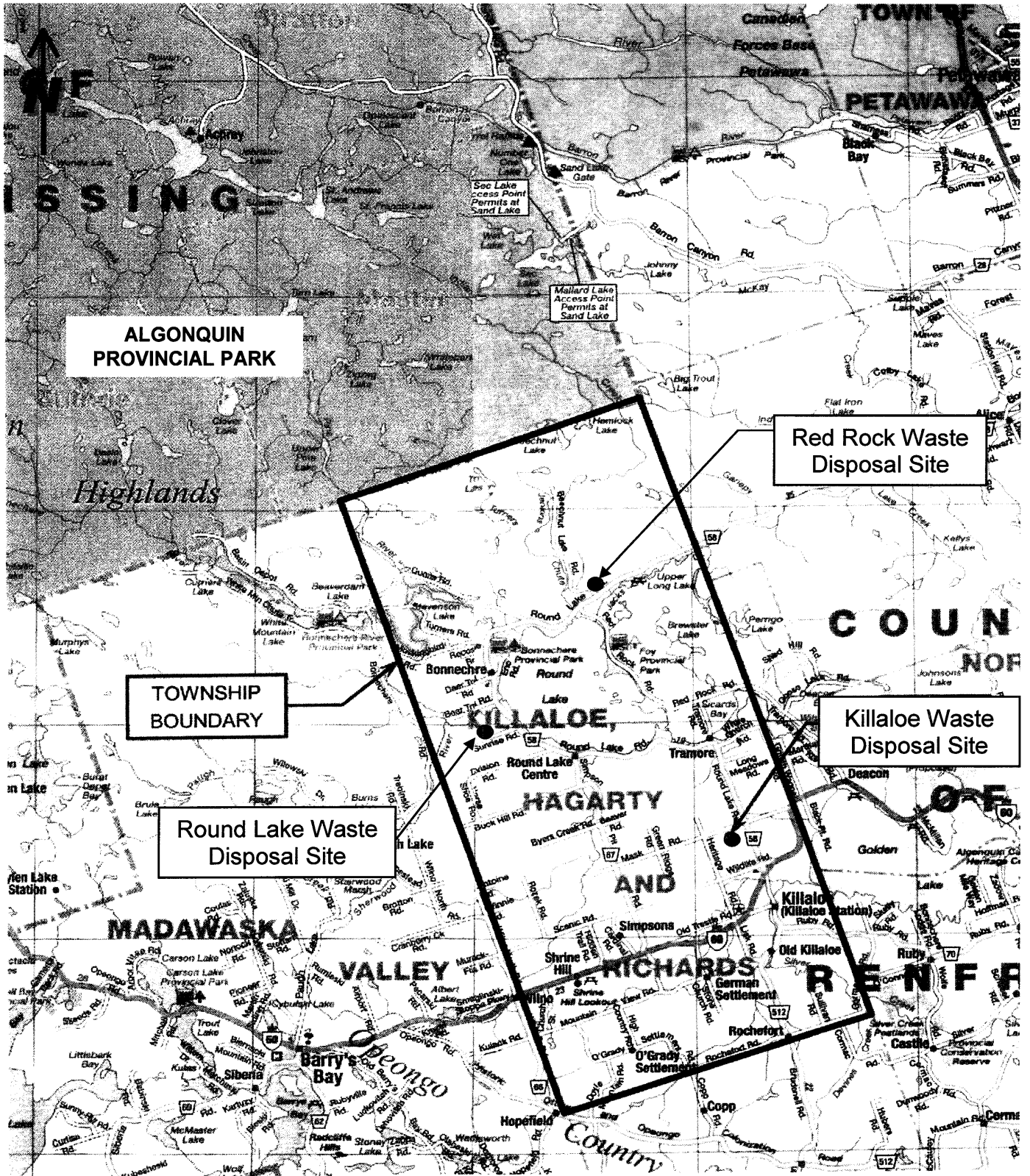
Notes:
 1. Priority Water Quality Objectives (PWQO).
 2. Calculated using Total Ammonia and field analysis.
 3. Results obtained from field analysis.
 Bold text and shading indicate values exceeding PWQO.
 NIL indicates No Limit.
 All results are expressed in mg/L, unless otherwise stated.

Table 5
Surface Water Quality
Killaloe Waste Disposal Site

Parameter	PWQO ¹				SW6				SW6				SW6				SW6				
	21-May-08	27-Aug-08	8-Oct-08	14-May-09	24-Aug-08	08-Oct-09	21-May-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	21-May-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09	21-May-08	8-Oct-08	14-May-09	24-Aug-09	08-Oct-09
Alkalinity (CaCO ₃)	0.046	0.840	0.048	0.0284	0.0214	0.030	0.051	0.053	0.0494	0.0638	0.0320	0.070	0.321	0.073	0.148	0.057	0.070	0.321	0.073	0.148	0.057
Aluminum	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	
Ammonia, Total (as N)	< 0.001	< 0.001	< 0.001	0.00042	0.00035	0.00031	< 0.001	< 0.001	0.00007	0.00036	0.00093	< 0.001	< 0.001	< 0.001	0.00008	0.00010	0.00008	< 0.001	0.00008	0.00010	
Ammonia, Un-ionized (as N) ²	0.028	0.140	0.034	0.0316	0.0707	0.0453	0.022	0.029	0.0254	0.0508	0.0249	0.025	0.060	0.027	0.0238	0.0505	0.025	0.060	0.027	0.0238	
Barium	0.006	0.015	0.006	0.0069	0.0069	0.0036	0.007	0.003	0.0076	0.0031	0.0024	0.007	0.008	0.001	0.0069	0.0041	0.007	0.008	0.001	0.0069	
Boron	13.0	32.2	15.7	14.3	25.4	17.8	5.90	7.53	6.49	11.60	7.22	8.96	11.10	8.39	5.80	11.10	8.39	5.80	11.10	10.70	
Calcium	41	69	44	44	65	41	31	52	38	90	34	70	104	87	58	110	110	87	58	110	
Chemical Oxygen Demand	0.0006	0.0014	0.0008	0.0008	0.0005	0.0006	< 0.0005	< 0.0005	< 0.0005	0.0006	< 0.0005	< 0.0005	0.0009	0.0005	0.0005	0.0007	0.0005	< 0.0005	0.0005	0.0007	
Chloride	0.0002	0.0037	0.0003	0.000289	0.000558	0.000377	0.0001	0.0001	0.000141	0.000886	0.00082	0.0002	0.0002	0.000184	0.000577	0.000530	0.0002	0.000184	0.000577	0.000530	
Cobalt	77	58	108	10	170	108	59	59	51	90	64	122	87	70	64	110	81	70	64	110	
Copper	< 0.0005	0.002	0.001	< 0.0005	0.0006	< 0.0005	< 0.0005	< 0.0005	0.0007	0.0007	< 0.0005	0.0009	0.0007	< 0.0005	0.0009	0.0007	< 0.0005	< 0.0005	0.0009	0.0007	
Dissolved Organic Carbon	16.9	21.6	16.7	16.1	24.8	12.7	14.6	23.4	14.4	31.1	13.3	25.7	35.2	26.6	25.4	33.7	30.3	26.6	25.4	33.7	
Dissolved Oxygen	6.40	4.93	6.09	6.78	3.14	5.25	3.40	2.71	2.12	3.64	2.83	4.02	4.95	6.20	5.12	2.44	3.94	6.20	5.12	2.44	
Iron	1.86	9.43	3.43	2.85	5.21	4.86	0.17	0.29	0.20	1.16	0.18	0.74	1.88	1.40	0.78	0.37	1.88	1.40	0.78	0.37	
Magnesium	5.60	13.3	7.3	5.97	9.39	7.35	3.12	3.81	3.34	5.31	3.81	4.05	4.78	3.86	2.70	5.17	5.54	3.86	2.70	5.17	
Manganese	0.03	1.23	0.11	0.0348	0.5400	0.2070	0.005	0.017	0.00789	0.11200	0.00650	0.021	0.176	0.050	0.0270	0.1590	0.1380	0.050	0.0270	0.1590	
Nitrate (as N)	< 0.05	0.29	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	0.06	< 0.05	< 0.05	0.07	0.06	< 0.05	
Nitrite (as N)	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	
pH (units) ³	6.81	6.78	7.1	7.17	6.84	7.17	6.73	5.74	6.47	7.04	7.39	6.60	6.55	6.47	6.80	6.40	6.25	6.47	6.80	6.40	
Phenols	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Phosphorus, Total	0.03	0.04	0.01	0.02	0.04	0.02	0.02	< 0.01	0.02	0.02	< 0.01	0.04	< 0.01	0.01	0.03	0.02	< 0.01	0.01	0.03	0.02	
Potassium	0.99	0.73	1.85	1.01	1.36	1.57	1.32	0.13	1.70	0.69	1.61	1.19	0.24	0.20	0.31	0.67	1.10	0.24	0.20	0.31	
Silicon	2.53	10.3	5.9	2.67	8.92	6.39	3.01	7.81	2.70	8.12	8.00	0.31	8.82	5.82	0.64	5.95	7.95	5.82	0.64	5.95	
Sodium	2.34	3.49	2.73	2.33	2.84	2.75	3.75	3.81	3.39	3.50	3.51	15.40	7.59	4.75	6.81	4.70	6.74	4.75	6.81	4.70	
Strontium	0.088	0.169	0.114	0.107	0.130	0.105	0.035	0.043	0.0396	0.0731	0.0430	0.084	0.091	0.060	0.0431	0.0849	0.0761	0.060	0.0431	0.0849	
Sulphate	0.5	< 0.5	< 0.5	< 0.2	0.3	0.4	3.7	1.6	2.5	< 0.2	1.00	2.4	0.5	< 0.5	0.9	< 0.2	0.2	< 0.5	0.9	< 0.2	
Total Dissolved Solids	74	240	117	123	197	126	97	94	74	146	100	151	194	117	83	169	186	117	83	169	
Total Kjeldahl Nitrogen	0.5	1.0	0.6	0.6	0.8	0.7	< 0.5	13.2	< 0.5	0.8	0.7	0.7	0.7	0.8	0.6	0.8	2.5	0.7	0.8	0.6	
Zinc	0.003	0.021	0.008	0.001	0.002	0.003	0.003	0.008	0.004	0.008	0.002	0.004	0.012	0.007	0.002	0.003	0.004	0.007	0.002	0.003	

Notes:
 1. Promicla Water Quality Objectives (PWQO).
 2. Calculated using Total Ammonia and field analysis.
 3. Results obtained from field analysis.
 Bold text and shading indicate values exceeding PWQO.
 NIL indicates No Limit.
 All results are expressed in mg/L, unless otherwise stated.

FIGURES



Greenview Environmental Management Limited
 89 Cleak Avenue, P.O. Box 100
 Bancroft, Ontario K0L 1C0
 tel: (613) 332-0057
 fax: (613) 332-1767
 email: solutions@greenview-environmental.ca

CREATED BY:
 PMC
 CHECKED BY:
 THP
 DATE:
 MARCH 2010
 SCALE:
 NTS

CLIENT:
 TOWNSHIP OF KILLALOE, HAGARTY AND RICHARDS
 SITE/TITLE:
 REGIONAL LOCATION PLAN

PROJECT NO.:
 107.09.002
 FIGURE:
 1

LEGEND

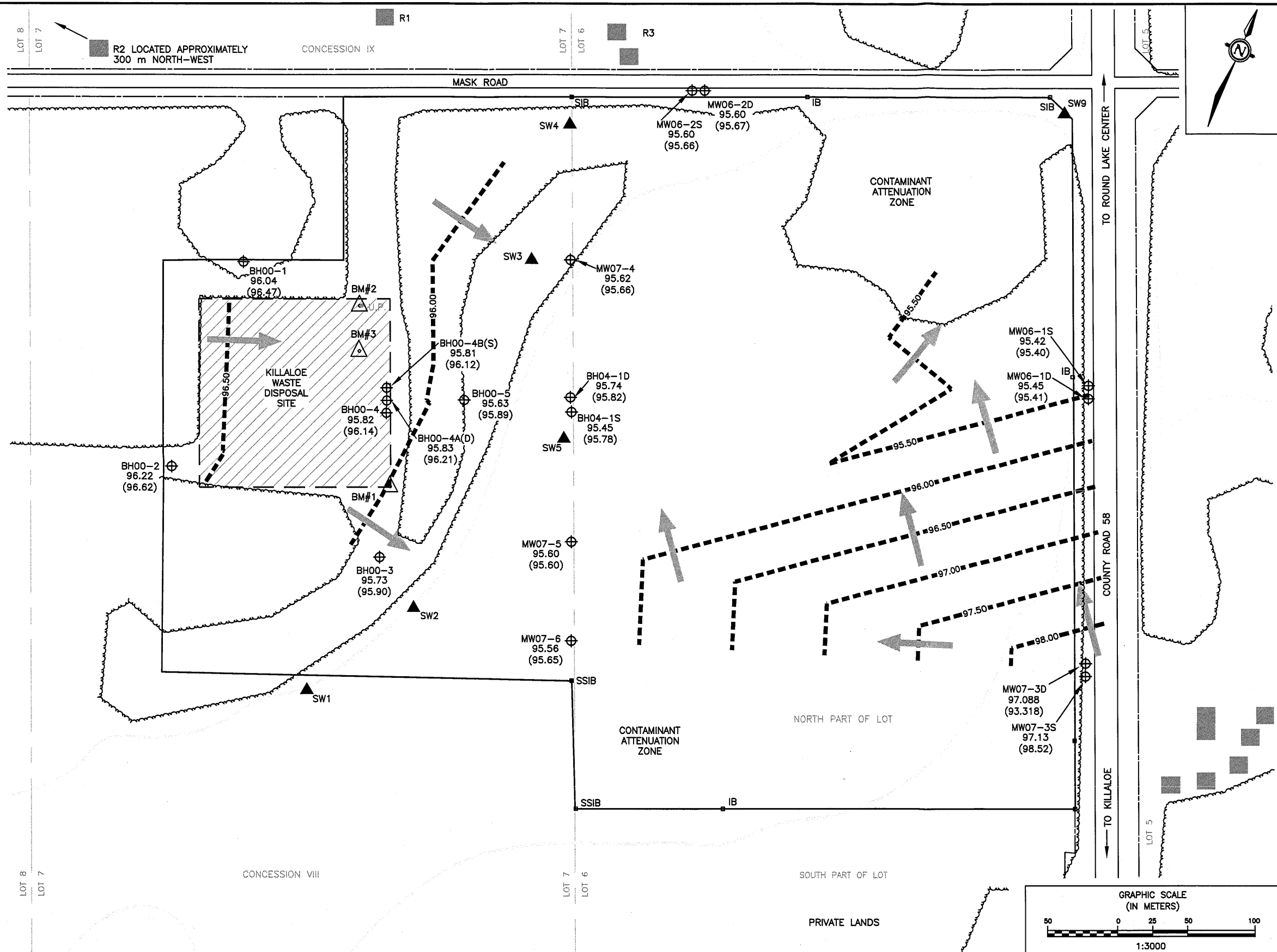
- PROPERTY BOUNDARY/
CONTAMINANT ATTENUATION ZONE
- - - APPROVED WASTE DISPOSAL AREA
- 100.00- TOPOGRAPHIC CONTOUR LINE
- - - RIGHT OF WAY
- - - LOT LINE
- IB ■ SSIB PROPERTY BARS
- ~ APPROXIMATE TREE LINE
- U.P. OVERHEAD UTILITY POLE
- BH00-2 ⊕ GROUNDWATER MONITORING WELL
- SW4 ▲ SURFACE WATER SAMPLING LOCATION
- 96.00 ■ EQUIPOTENTIAL CONTOUR
(MAY 14, 2009)
- 96.22
(96.62) GROUNDWATER ELEVATIONS
OCTOBER 8, 2009 (MAY 14, 2009)
- GROUNDWATER FLOW DIRECTION
- △ BM#1 BENCHMARK

NOTES

1. BENCHMARKS
 BM#1
 TOP OF IRON BAR AT SOUTHEAST CORNER OF SITE.
 ASSUMED ELEVATION = 100.00 m

 BM#2
 WEST SIDE OF HYDRO POLE AT NORTHEAST CORNER
 OF SITE.
 ASSUMED ELEVATION = 100.953 m

 BM#3
 TOP CORNER OF MOST SOUTH-WESTERLY EXTENT OF
 RETAINING WALL.
 ASSUMED ELEVATION = 102.474 m
2. ROAD RIGHT-OF-WAY LOCATIONS ARE SHOWN
 APPROXIMATE.
3. UPDATED PROPERTY INFORMATION BASED ON
 CROWN LAND REFERENCE PLAN, JANUARY 2008,
 BY WALLY SIMPSON, O.L.S.



No.	DATE	BY	REVISIONS

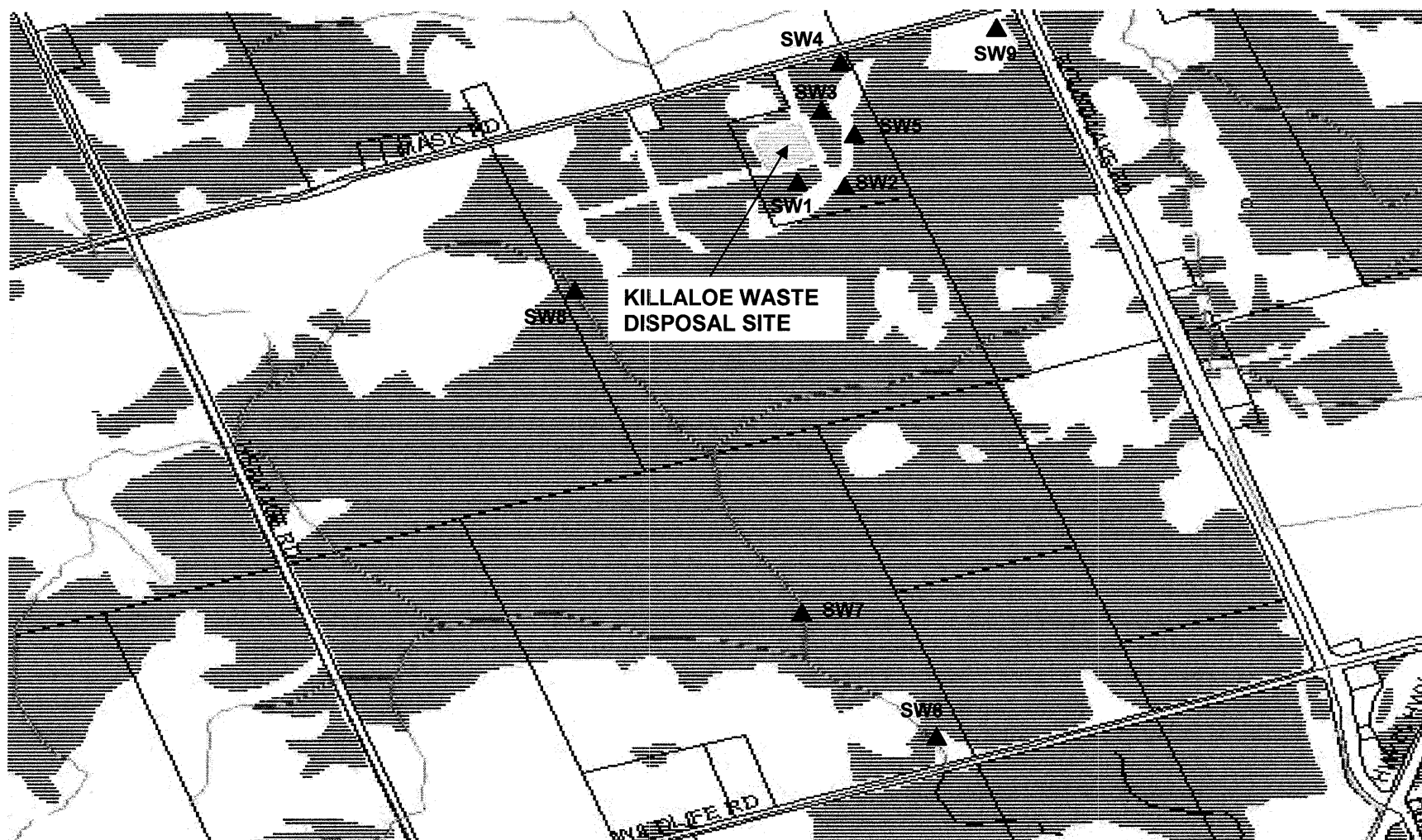
Greenview
 ENVIRONMENTAL MANAGEMENT
 Greenview Environmental Management Limited
 69 Cleak Avenue, PO Box 100
 Bancroft, Ontario K0L 1C0
 tel: (613) 332-0057
 fax: (613) 332-1767
 email: solutions@greenview-environmental.ca

DRAWN BY: HLB	CHECKED BY: THP
DESIGNED BY:	APPROVED BY: THP
SCALE: 1:3000	DATE: MARCH 2010

CLIENT:
 TOWNSHIP OF
 KILLALOE, HAGARTY
 AND RICHARDS

PROJECT:
 KILLALOE WASTE DISPOSAL SITE
 FIGURE:
 ENVIRONMENTAL MONITORING
 LOCATION PLAN

PROJECT No:
 107.09.002
 FIGURE:
2



Source: County of Renfrew Geosmart Mapping

▲ Approximate Surface Water Sampling Location



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89 Cleak Avenue, P.O. Box 100
Bancroft, Ontario K0L 1C0
tel: (613) 332-0057
fax: (613) 332-1767
email: solutions@greenview-environmental.ca

CREATED BY:
PMC
CHECKED BY:
THP
DATE:
MARCH 2010
SCALE:
NTS

SITE:
KILLALOE WASTE DISPOSAL SITE
TITLE:
SURFACE WATER MONITORING LOCATION PLAN

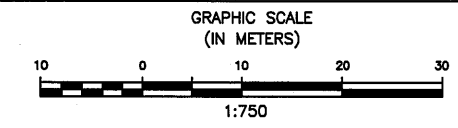
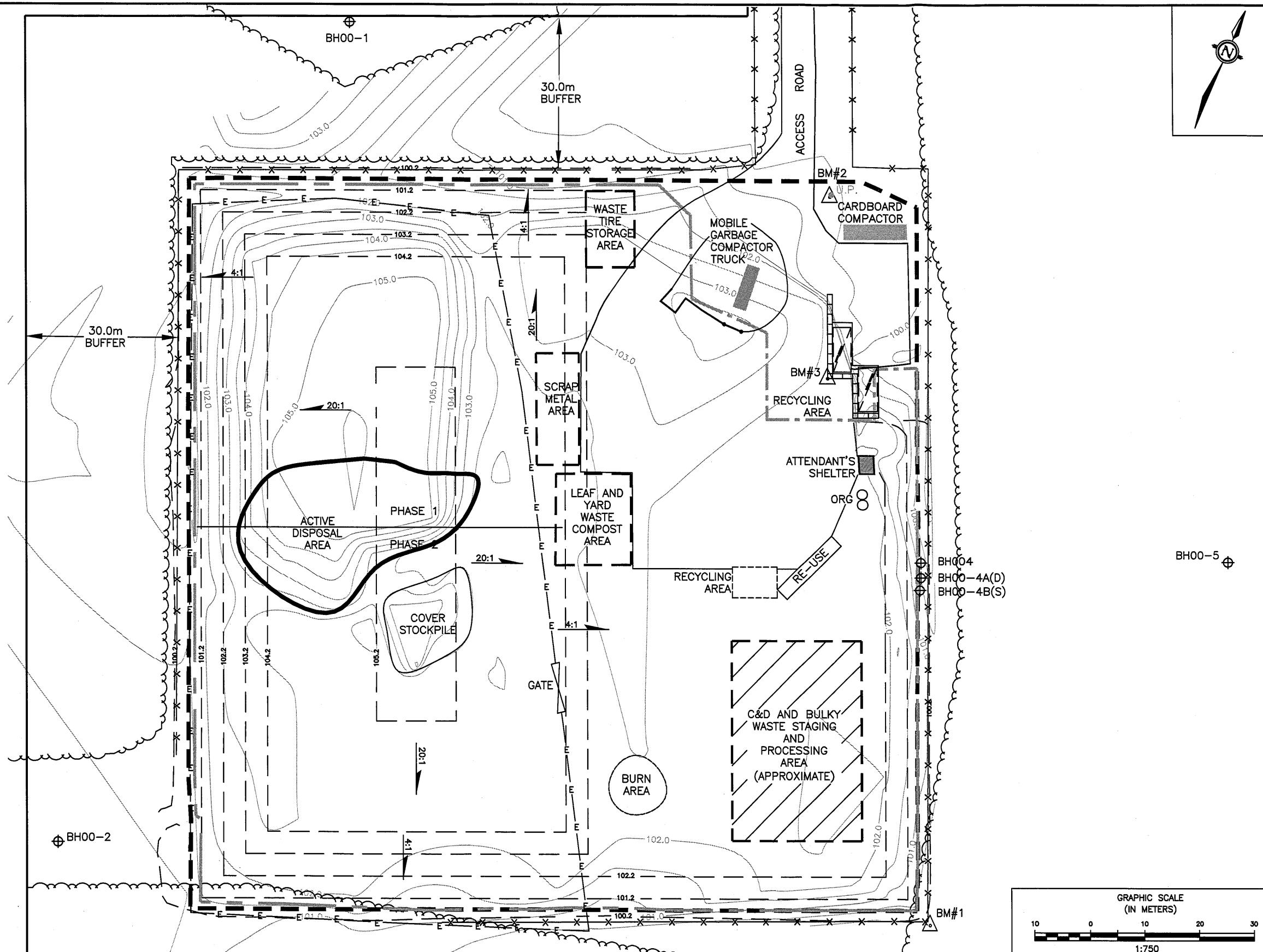
PROJECT NO.:
107.09.002
FIGURE:
3

LEGEND

- PROPERTY BOUNDARY
- APPROVED WASTE DISPOSAL AREA
- EXISTING LIMIT OF WASTE
- APPROXIMATE ACTIVE DISPOSAL AREA (NOVEMBER 2009)
- TOPOGRAPHIC CONTOUR LINE
- FINAL CONTOURS AT CLOSURE (TO TOP OF WASTE)
- ON-SITE ROAD
- APPROXIMATE TREE LINE
- FENCE
- ELECTRIC BEAR FENCE
- OVERHEAD UTILITY POLE
- PROPOSED GRADE
- GROUNDWATER MONITORING WELL
- SURFACE WATER SAMPLING LOCATION
- RECYCLING - ORGANIC WASTE
- BENCHMARK

NOTES

1. BENCHMARKS
 - BM#1
TOP OF IRON BAR AT SOUTHEAST CORNER OF SITE.
ASSUMED ELEVATION = 100.00 m
 - BM#2
WEST SIDE OF HYDRO POLE AT NORTHEAST CORNER
OF SITE.
ASSUMED ELEVATION = 100.953 m
 - BM#3
TOP CORNER OF MOST SOUTH-WESTERLY EXTENT OF
RETAINING WALL.
ASSUMED ELEVATION = 102.474 m
2. TOPOGRAPHIC SURVEYS COMPLETED BY TRANSENCO
LIMITED IN MAY 2007, AND BY GREENVIEW IN
JUNE AND OCTOBER 2008, AND IN JUNE AND
NOVEMBER 2009.



No.	DATE	BY	REVISIONS

Greenview
ENVIRONMENTAL MANAGEMENT
Greenview Environmental Management Limited
69 Cleak Avenue, PO Box 100
Bancroft, Ontario K0L 1C0
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DRAWN BY: HLB
CHECKED BY: THP
DESIGNED BY: APPROVED BY: THP
SCALE: 1:750
DATE: MARCH 2010

CLIENT: TOWNSHIP OF KILLALOE, HAGARTY AND RICHARDS

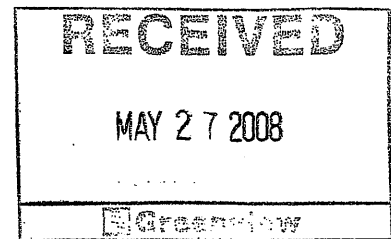
PROJECT: KILLALOE WASTE DISPOSAL SITE
FIGURE: EXISTING SITE CONDITIONS PLAN

PROJECT No: 107.09.002
FIGURE: 4

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APPENDIX A

Provisional Certificate of Approval A412306 and Certificate of Requirement

**AMENDMENT TO PROVISIONAL CERTIFICATE OF
APPROVAL****WASTE DISPOSAL SITE**

NUMBER A412306

Notice No. 3

Issue Date: May 13, 2008

The Corporation of the Township of Killaloe, Hagarty and Richards
1 John Street, Post Office Box, No. 39
Killaloe, Ontario
K0J 2A0

Site Location: Killaloe Waste Disposal Site
1049 Mask Rd., Part Lot 7, Concession 8,
Geographic Township of Hagarty, County of Renfrew

You are hereby notified that I have amended Provisional Certificate of Approval No. A412306 issued on September 1, 2000 and amended on July 27, 2006 and December 5, 2007 for the use and operation of an 1.88 hectare landfill site within an 11.51 hectare total site area, as follows:

I. The following Conditions are hereby added to the Certificate:**M. Organic Waste Depot Program**

51. The organic waste depot program at the Site shall consist of the on-Site collection and transfer of organic waste that is stored in a maximum of two (2) specialized MOLOK containers with a total storage capacity of 1.6 cubic metres in accordance with the specifications of item number 16 of Schedule "A".

52. (a) The Owner shall ensure that containers used to store organic waste are leakproof, lockable and bear resistant; and

(b) The Owner shall monitor the containers in which organic waste are stored for:

(i) decomposition to ensure that the organic waste has not decomposed to the point where it is unacceptable for the intended receiving facility; and

(ii) odours; and

(c) The Owner shall empty the containers used to store organic waste and transfer the organic waste from the Site forthwith when:

- (i) the maximum capacity approved in Condition 51 has been reached; or
- (ii) the organic waste has decomposed to the point where it is unacceptable to the receiving facility; or
- (iii) the organic waste is creating odours that are creating a negative impact on Site users or off-Site.

N. Storage of Recyclable Waste

53. The total amount of waste present and stored on Site shall not exceed the following limits:

- (a) corrugated cardboard shall not exceed 40 cubic metres;
- (b) marketable scrap metal, including aluminium and steel cans, shall not exceed 100 cubic metres;
- (c) Blue Box Recyclables shall not exceed 70 cubic metres;
- (d) organic waste shall not exceed 1.6 cubic metres;
- (e) the volume of tire units shall not exceed 100 cubic metres.

II. The following definition is added to the Definition section of the Certificate:

- (j) "organic waste" means source separated residential non-hazardous organic waste consisting of a combination of one or more of the following components: food waste, soiled paper products, leaf and yard waste, sanitary products and pet wastes.
- (k) "tire units" means the definition provided in Section 6 (1) (a), (b) and (c) of Regulation 347 of the Act or as amended from time to time.

III. Definition (b) of the Certificate which defines "Applicant", "Owner" and "Operator" is hereby revoked and replaced with the following:

- (b) "Applicant", "Owner" and "Operator" means the Corporation of the Township of Killaloe, Hagarty and Richards including its officers, employees, agents or contractors.

IV. The following items are hereby added to Schedule "A":

- 15. Application to amend a Certificate of Approval for a Waste Disposal Site, dated March 27, 2008 and signed by Lorna Hudder, CAO/Clerk - Treasurer, The Corporation of the Township of Killaloe, Hagarty and Richards.
- 16. Document dated April 16, 2008, prepared by Tyler H. Peters, P.Eng, Project Manager, Greenview

Environmental Management Ltd., providing supporting information.

The reasons for this amendment to the Certificate of Approval are as follows:

1. Condition numbers 51 and 52 approves the on-Site collection, storage and transfer of organic waste at the Site using the two (2) specialized MOLOK containers and requires that the on-Site organic waste activities be protective of the natural environment and human health.
2. Condition 53 gives clarity to how much recyclable waste is allowed to be stored at the Site. The current reference in the Certificate to the Site been used for the management of recyclable material is contained in the September 1998 Design and Operations Report (DOR) which is #2 of Schedule "A". The 1998 DOR did not specify quantities of recyclables that could be stored at the Site.
3. The definitions are added to clarify the meaning of the words "organic waste" and "tire units".
4. Item III is added to provide the correct reference that matches the name on the Certificate.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A412306 dated September 1, 2000

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

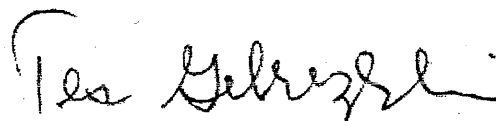
* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the

Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 13th day of May, 2008

THIS NOTICE WAS MAILED
ON <u>May 21, 2008</u>
<u>N.P</u>
(Signed)



Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

JC/

c: District Manager, MOE Ottawa
Tyler Peter, P.Eng., Greenview Environmental Management Limited ✓



Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A412306
Notice No. 2
Issue Date: December 5, 2007

The Corporation of the Township of Killaloe, Hagarty and Richards
Post Office Box, No. 39
Killaloe, Ontario
K0J 2A0

Site Location: Killaloe Waste Disposal Site
Lot 7, Concession 8
Geographic Township of Hagarty
Killaloe, Hagarty and Richards Township, County of Renfrew

You are hereby notified that I have amended Provisional Certificate of Approval No. A412306 issued on September 1, 2000, and amended on July 27, 2006 for the use and operation of an 1.88 hectare landfill site within an 11.51 hectare total site area, as follows:

I. Condition 31 (a) is hereby revoked and replace by:

31.(a) By July 27, 2009, the Owner shall purchase or obtain a written easement agreement with the property owner(s) of the land(s) required for the Contaminant Attenuation Zone, which will provide the property rights necessary to establish the Contaminant Attenuation Zone; or implement remedial measures as in Items 7 to 12 inclusive in the Schedule "A" of this Certificate, to bring the site into compliance with Reasonable Use Policy Objectives at the property boundary.

II. The following Conditions are hereby added to the Certificate:

Additional Alternative Cover Material:

45. The alternative cover material shall be non-hazardous in accordance to *Reg. 347* and will be expected to perform at least as well as soil in relation to the following functions:

- (a) Control of blowing litter, odours, dust, landfill gas, gulls, vectors, vermin and fires;
- (b) Provision for an aesthetic condition of the landfill during the active life of the Site;
- (c) Provision for vehicle access to the active tipping face; and
- (d) Compatibility with the design of the *Site* for groundwater protection, leachate management and landfill gas management.

46. Shredded Construction & Demolition and Bulky waste as per Item 14 of Schedule "A" is an additional alternative daily cover material approved under this Certificate.
47. Maximum amount of material stored in the Construction & Demolition and bulky household items area is 500 m³;
48. The Owner shall undertake the necessary precautionary measures for fire prevention when stockpiling material to be used as alternative cover (example - limit potential for spontaneous combustion, etc.).
49. The Owner shall ensure that the material used as alternative daily cover, does not cause an adverse environmental effect. If any adverse effect is caused, the Owner shall immediately stop the use of such material and resume the use of other approved daily cover or clean soil.
50. Sufficient soil daily cover material or other approved daily cover material will be available for use, either when site conditions do not permit use of the alternative material, or if performance of the material is unsatisfactory.

III. The following items are hereby added to Schedule "A":

13. Application to amend a Certificate of Approval for a Waste Disposal Site, dated June 21, 2007 and signed by Ms. Lorna Hudder, CAO/Clerk-Treasurer, the Corporation of the Corporation of the Townsh of Killaloe, Hagarty and Richards.
14. Document dated June 27, 2007, prepared by Mr. Tyler Peters, Project Manager, Greenview Environmental Management Ltd., providing supporting information.

The reasons for this amendment to the Certificate of Approval are as follows:

1. Condition 31 (a) approves the extension of the deadline for establishing the Contaminant Attenuation Zone.
2. Conditions 45, 46 and 47 approves the temporary storage of construction and demolition waste and bulky items until enough quantity is accumulated for reducing the size.
3. The reasons for Conditions 48, 49 and 50 are to specify the performance requirements of alternative cover material so that the use of alternative cover material does not cause and adverse effect.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A412306 dated September 1, 2000, as amended.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection

Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., Suite 1700
P.O. Box 2382
Toronto, Ontario
M4P 1E4

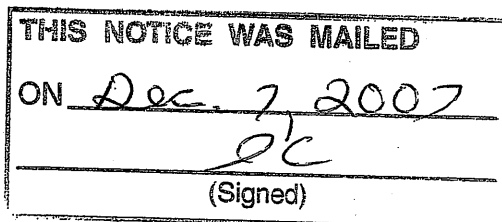
AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 5th day of December, 2007



Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

AT/

c: District Manager, MOE Ottawa
Tyler H. Peter, P.Eng., Greenview Environmental Management Limited ✓



Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A412306
Notice No. 1
Issue Date: July 27, 2006

The Corporation of the Township of Killaloe, Hagarty and Richards
PO Box 39
Killaloe, Ontario
K0J 2A0

Site Location: Killaloe Waste Disposal Site
Lot 7, Concession 8, Hagarty Twp.
Killaloe, Hagarty and Richards Township, County of Renfrew

You are hereby notified that I have amended Provisional Certificate of Approval No. A412306 issued on September 1, 2000 for the use and operation of an 1.88 hectare landfill site within an 11.51 hectare total site area, as follows:

Condition Numbers 19, 20, 21, 22 and 23 including Schedule "B" are revoked and the following conditions are added:

D. SITE OPERATIONS

19. Unused approved volumetric capacity shall be deposited on top of the landfill according to the documents listed in Schedule "A".

E. COMPOSTING

20. Composting operations at the Site shall be carried out in a manner as not to interfere with normal waste disposal operations as approved in this Certificate.
21. Should the ensuing compost be destined for use by the general public, composting operations at the Site shall be carried out in accordance with the Ministry's Interim Guidelines for the Production and Use of Aerobic Compost in Ontario, dated November 1991, and revised from time to time.
22. Should the ensuing compost be destined for use as alternative cover material at the Site, composting operations at the Site must be carried out in a manner that does not cause groundwater or surface water contamination, offensive odours or encourage the presence of vermin or any other adverse effect.

F. MONITORING AND REPORTING

23. The Site shall be operated in such a way as to ensure compliance with the following:
- (a) Reasonable Use Guideline B-7 for the protection of the groundwater at the Site;
 - (b) Provincial Water Quality Objectives included in the July 1994 publication entitled *Water Management Policies, Guidelines, Provincial Water Quality Objectives*, as amended from time to time or limits set by the Regional Director, for the protection of the surface water at and off the Site.
24. (a) The Owner shall monitor surface water and groundwater as approved in Items 7-12 (inclusive) construct and maintain to the satisfaction of the Ministry, a groundwater monitoring network which fully delineates the horizontal and vertical extent of leachate migration resulting from the landfilling activities at the Site.
- (b) Groundwater samples from all wells in the above-described monitoring network will be obtained and analyzed at least once during maximum water level conditions and at least once during the minimum water level conditions. Groundwater elevations in all monitoring wells shall be measured during each monitoring event prior to obtaining water quality samples.
25. A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic training and experience will execute or directly supervise the execution of the groundwater monitoring and reporting program.
26. A written report on the development, operation and monitoring of the Site, shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the District Manager no later than March 31st of the year following the period being reported upon.
27. The Annual Report shall include the following:
- (a) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the Site during the reporting period and a calculation of the total volume of Site capacity used during the reporting period;
 - (b) site plan(s) showing the existing contours of the Site, areas of landfilling operations during the reporting period, areas of intended operation during the next reporting period, areas of excavation during the reporting period, the progress of final cover, vegetative cover, and any intermediate cover application, previously existing site facilities, facilities installed during the reporting period and site preparations and facilities planned for installation during the next reporting period;
 - (c) a calculation of the remaining approved capacity of the Site and an estimate of the remaining Site life;
 - (d) summary of cover stock piling activities including use, timing, locations and erosion protection;
 - (e) waste types and quantities recyclable wastes received and transferred off the Site;
 - (f) destinations of recyclable wastes transferred off the Site;
 - (g) summary of litter pick-up and any dust suppression activities undertaken at the Site;
 - (h) summary of maintenance and repairs performed on the equipment used at the Site;

- (i) summary of inspections undertaken at the Site;
- (j) summary of complaints received and actions taken to resolve them;
- (k) summary of emergency situations and actions taken to address them;
- (l) any environmental and operational problems and any mitigative actions taken;
- (m) any recommendations to minimize environmental impacts from the operation of the landfill and waste diversion areas to improve such operations in this regard;
- (n) the results and an interpretive analysis of the results of all leachate, groundwater and surface water monitoring, including an assessment of the need to amend the monitoring programs;
- (o) an assessment of the operation of the Site, the need to amend the design or operation of the Site, and the adequacy of and need to implement the contingency plans;
- (p) a report on the status of all monitoring wells and a statement as to compliance with O.Reg. 903; and
- (q) any other information required by the District Manager.

G. GROUNDWATER WELLS / MONITORS

- 28. The Owner shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage.
- 29. Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.
- 30. Any groundwater monitoring wells included in the on-going monitoring program that are damaged shall be assessed, repaired, replaced or decommissioned by the Owner, as required.
 - (a) The Owner shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than ~~one regular sampling event is missed.~~
 - (b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the District Manager for abandonment, shall be decommissioned by the Owner, as required, in accordance with O.Reg. 903, that will prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

H. CONTAMINANT ATTENUATION ZONE

- 31. (a) Within twelve (12) months from the date of this Certificate, the Owner shall purchase or obtain a written easement agreement with the property owner(s) of the land(s) required for the Contaminant Attenuation Zone, which will provide the property rights necessary to establish the Contaminant Attenuation Zone; or implement remedial measures as in Items 7 to 12 inclusive in the Schedule "A" of this Certificate, to bring the site into compliance with Reasonable Use Policy Objectives at the property boundary.
- (b) The Owner must continue to own the property rights to the Contaminant Attenuation Zone for all of the contaminating life span of the Site.

- (c) The ownership of the property rights must include the right to:
- (i) discharge contaminants from the operations at the Site into the Contaminant Attenuation Zone;
 - (ii) enter into the Contaminant Attenuation Zone and onto the surface above the Contaminant Attenuation Zone for purposes of testing, monitoring, intercepting contaminants and carrying out remedial work;
 - (iii) install, operate and maintain works, for the purposes mentioned in clause (ii), in or the Contaminant Attenuation Zone, including on the surface above the Contaminant Attenuation Zone; and
 - (iv) prevent the owner(s) of the land(s) in which the Contaminant Attenuation Zone is located from paving, erecting a structure or making any use of land(s) above or in the vicinity of the contaminant attenuation zone that would interfere with the functioning of the Contaminant Attenuation Zone or with the exercise of any of the rights mentioned in this subsection.
- (d) The Owner shall notify the Director in writing within thirty (30) days after any change in his, her or its ownership of the property rights in the Contaminant Attenuation Zone.

32. The Owner shall ensure that the written easement agreement, specified in Condition 31(a) includes an agreement of the property owner(s) of the land(s) required for the Contaminant Attenuation Zone, to register a Certificate of Requirement on title to the land(s) to be used as the Contaminant Attenuation Zone.

I. ALTERNATIVE DAILY COVER MATERIAL

33. Clean soil, non-hazardous contaminated soils, temporary or movable low permeability flexible membranes, asphalt shingles, leaf and yard waste mixed with sand and composted leaf and yard waste are the alternative daily cover material approved under this Certificate;
34. The Company shall ensure that the non-hazardous contaminated soils, temporary or movable low permeability flexible membranes, asphalt shingles, leaf and yard waste mixed with sand and composted leaf and yard waste used as alternative daily cover, does not cause an adverse environmental effect. If any adverse effect is caused, the Company shall immediately stop the use of such material and resume the use of other approved daily cover or clean soil.

J. RECORDS KEEPING

Daily Operations Records

35. The Owner shall establish a daily operating report of the landfilling and waste diversion operations, in

the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

- (a) type and estimated amount of waste received at the Site for landfilling;
- (b) area of the Site in which landfilling operations are taking place;
- (c) type, source and amount of daily or intermediate cover used;
- (d) waste types and quantities recyclable wastes received at the Site;
- (e) source of their generation;
- (f) waste types and quantities of recyclable wastes transferred off the Site;
- (g) destination of recyclable wastes transferred off the Site;
- (h) records of litter pick-up activities and any dust suppression activities undertaken at the Site;
- (i) maintenance and repairs performed on the equipment used at the Site;
- (j) summary emergency situations and actions taken to address them;
- (k) any environmental and operational problems and any mitigative actions taken;
- (l) any recommendations to minimize environmental impacts from the operation of the waste diversion areas to improve such operations in this regard; and
- (m) any other information required by the District Manager.

Inspections Records

36. The Owner shall establish and maintain a written record of the weekly Site inspections. This record shall be in the form of a log or a dedicated electronic file and it shall include, as a minimum, the following information:

- (a) date and time of inspection;
- (b) name, title and signature of trained personnel conducting the inspection;
- (c) a listing of all the areas inspected and any deficiencies observed; and
- (d) recommendations for remedial action and the completion date of such action.

Waste Refusal Records

37. A record shall be kept in the daily log book of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known.

- 38.
- (a) The Owner shall retain all documentation listed in Schedule "A" for as long as this Certificate is valid.
 - (b) The Owner shall retain at the Site, all records required by this Certificate for a minimum of two (2) years from the date of their creation.
 - (c) The Owner shall retain the employee training records for as long as the employee is working at the Site.
 - (d) The Owner shall make all of the above documents and records available for inspection upon request by the staff of the Ministry.

K. EMERGENCY SITUATIONS

39. (a) Any spills, fires or other emergency situations shall be forthwith reported directly to the Ministry's Spills Action Centre (1-800-268-6060) and shall be cleaned up immediately.
- (b) In addition, the Owner shall submit, to the District Manager a written report within three (3) business days of the emergency situation, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the Site.
40. All wastes resulting from an emergency situation shall be managed and disposed of in accordance with O.Reg. 347.
41. All equipment and materials required to handle the emergency situations shall be:
- (a) kept on hand at all times that waste landfilling and/or handling is undertaken at the Site; and
- (b) be adequately maintained and kept in good repair.
42. The Owner shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).

L. CLOSURE PLAN

43. At least two (2) years prior to the anticipated date of closure of this Site, the Owner shall submit to the Director for approval, with copies to the District Manager, a detailed site closure plan pertaining to the termination of landfilling operations at this Site, post-closure inspection, maintenance and monitoring and end use. The plan shall include the following:
- (a) a plan showing Site appearance after closure;
- (b) a description of the proposed end use of the Site;
- (c) a descriptions of the procedures for closure of the Site, including:
- (i) advance notification of the public of the landfill closure;
- (ii) posting of a sign at the Site entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
- (iii) completion, inspection and maintenance of the final cover and landscaping;
- (iv) site security;
- (v) removal of unnecessary landfill-related structures, buildings and facilities; and
- (vi) final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
- (vii) a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above;
- (d) descriptions of the procedures for post-closure care of the Site, including:
- (i) operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;
- (ii) record keeping and reporting; and

- (iii) complaint contact and response procedures;
- (e) an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and
- (f) an updated estimate of the contaminating life span of the Site, based on the results of the monitoring programs to date.

44. The Site shall be closed in accordance with the closure plan as approved by the Director.

The following are added to the Schedule "A"

- 7. Document entitled "Site Operations and Development Plan, Killaloe Waste Disposal Site", dated December 2004 and prepared by SGS Lakefield Research Limited.
- 8. Application to amend a Certificate of Approval for a Waste Disposal Site, dated December 22, 2004 and signed by Ms. Lorna Hudder, CAO/Clerk- Treasurer, the Corporation of the Township of Killaloe, Hagarty and Richards.
- 9. Letter from Ms. Lorna Hudder, CAO/Clerk- Treasurer, the Corporation of the Township of Killaloe, Hagarty and Richards, to Ranjani Munasinghe, MOE, dated July 22, 2005 as a response to the MOE comments dated June 7, 2005.
- 10. Letter dated January 27, 2006 from Christine M. Wolf, SGS Lakefield Research Limited to Ms. Lorna Huder, CAO/Clerk - Treasurer, the Corporation of the Township of Killaloe, Hagarty and Richards, Re: Groundwater Modelling Results.
- 11. Letter from Ms. Lorna Huddler, CAO/Clerk- Treasurer, the Corporation of the Township of Killaloe, Hagarty and Richards, to Ranjani Munasinghe, MOE, dated March 29, 2006 as a response to the MOE comments for hydrogeological and surface water reviews by Mark Phillips, MOE and Kyle Stephenson, MOE.
- 12. Technical Review Comments from Kyle Stephenson, MOE, sent on June 7, 2006 to Ranjani Munasinghe.

The reason(s) for this amendment to the Certificate of Approval is (are) as follows:

- 7. This notice is issued to allow the Owner to use the approved capacity, approve the composting operation, to allow the use of alternative daily cover and to update the Certificate.
- 8. Condition 19 is included to allow the Owner to use the unused approved capacity.
- 9. Conditions 20, 21 and 22 are included to ensure that the Owner undertake the composting activities in accordance with Ministry's requirements and in a manner that would not result in a hazard or nuisance to the natural environment.

10. Condition 23 is included to provide the groundwater and surface water limits to prevent water pollution at the Site.
11. Conditions 24 and 25 are included to require the Municipality to demonstrate that the Site is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
12. Conditions 26, 27, 35, 36, 37 and 38 inclusive are included to ensure that accurate records are maintained to ensure compliance with the conditions in this Certificate, the EPA and its regulations.
13. Conditions 28, 29 and 30 are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.
14. Conditions 31 and 32 are included to require the Owner to obtain property rights to land(s) that is required for a Contaminant Attenuation Zone that is necessary for attenuation of contamination resulting from the operation of the Site or to use an alternative method to bring the site into compliance with Reasonable Use Policy Objectives.
15. The reason for the Conditions 33 and 34 to allow the Owner to use alternative daily cover at the Site and in a manner that would not result in a hazard or nuisance to the natural environment.
16. Condition 39 is included to ensure that emergency situations are reported to the Ministry to ensure public health and safety and environmental protection.
17. Condition 40, 41 and 42 are included to ensure that emergency situations are handled in a manner to minimize the likelihood of an adverse effect and to ensure public health and safety and environmental protection.
18. Condition 43 and 44 are included to ensure that final closure of the Site is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A412306 dated September 1, 2000, as amended.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
 Environmental Review Tribunal
 2300 Yonge St., Suite 1700
 P.O. Box 2382
 Toronto, Ontario
 M4P 1E4

AND


The Director
 Section 39, *Environmental Protection Act*
 Ministry of the Environment
 2 St. Clair Avenue West, Floor 12A
 Toronto, Ontario
 M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 27th day of July, 2006

THIS NOTICE WAS MAILED	
ON	July 28 2006
	JL
	(Signed)



Tesfaye Gebrezghi, P.Eng.
 Director
 Section 39, *Environmental Protection Act*

RM/

c: District Manager, MOE Ottawa
 Tyler Peters, SGS Lakefield Research Limited ✓



Ontario

Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE MANAGEMENT SYSTEM

NO. A-412306

Page 1 of 11

Under the Environmental Protection Act and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

The Corporation of the Township of Killaloe, Hagarty & Richards
1 John Street, P.O. Box 39
Killaloe, Ontario
K0J 2A0

for the Waste Management System serving of a 1.88 hectare landfill within an 11.51 hectare total Site area;

and subject to the following conditions:

The application and supporting information as listed in Schedule "A", which is attached to this Provisional Certificate of Approval and forms part of this Certificate;

Located: Part Lot 7, Concession 8 (Hagarty Township)
Township of Killaloe, Hagarty & Richards
County of Renfrew

which includes the use of the site only for the disposal of the following categories of waste (Note: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) Municipal Waste

and subject to the following conditions:

A. DEFINITIONS

For the purpose of this Provisional Certificate of Approval:

- (a) "Act" and "EPA" mean the Environmental Protection Act, R.S.O. 1990, C. E-19 as amended;
- (b) "Applicant", "Owner" and "Operator" mean the Township of Hagarty and Richards, including its officers, employees, agents or contractors;
- (c) "Certificate" means this entire Provisional Certificate of Approval including its schedules, if any, issued in accordance with Section 27, Part V of the Environmental Protection Act;



- (d) "Director" means a Director, Environmental Assessment and Approvals Branch of the Ministry of the Environment;
- (e) "District Manager" means the District Manager of the Ottawa District Office, Eastern Region of the Ministry;
- (f) "Ministry" means the Ontario Ministry of the Environment (MOE);
- (g) "Municipal Waste" is as defined in Ontario Regulation 347, R.R.O. 1990;
- (h) "O.Reg. 232" means Ontario Regulation 232/98 (Landfilling Sites), R.R.O. 1990;
- (i) "RUPO" means the Ministry of the Environment Reasonable Use Policy Objectives (Guideline B-7);
- (j) "Site" means the landfill site as described in this Certificate; and
- (k) "Waste fill area" means the area on the surface of the site beneath which or above which waste is disposed by landfilling.

B. GENERAL

1. The Provisional Certificate of Approval No. A 412306, dated April 2, 1980 is hereby revoked and replaced by this Certificate.
2. Except as otherwise provided by these Conditions, the Site shall be operated and maintained, in accordance with the Applications for a Certificate of Approval for a Waste Disposal Site, dated September 21, 1998, and its supporting documents as listed in Schedule "A".
3. The requirements specified in this Certificate are the requirements under the Environmental Protection Act, R.S.O. 1990. The issuance of this Certificate in no way abrogates the Applicant's legal obligations to take all reasonable steps to avoid violating other applicable provisions of this legislation and other legislation and regulations.
4. The requirements of the Certificate are severable. If any requirement of this Provisional Certificate of Approval, or the application of any requirement of the Provisional Certificate of Approval to any circumstance, is held invalid, the application of such requirement to other circumstances and the remainder of the Provisional Certificate of Approval shall not be affected in any way.



Ontario

Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE MANAGEMENT SYSTEM

NO. A 412306

Page 3 of 11

5. The Applicant shall ensure compliance with all the terms and conditions of this Certificate. Any non-compliance constitutes a violation of the Environmental Protection Act, R.S.O. 1990 and its grounds for enforcement.
6. (a) The Applicant shall, forthwith upon request of the Director, District Manager, or Provincial Officer (as defined in the Act), furnish any information requested by such persons with respect to compliance with this Certificate, including but not limited to, any records required to be kept under this Certificate; and
- (b) In the event, the Applicant provides the Ministry with information, records, documentation or notification in accordance with this Certificate (for the purposes of this condition referred to as "Information"),
- i. the receipt of Information by the Ministry;
 - ii. the acceptance by the Ministry of the Information's completeness or accuracy; or
 - iii. the failure of the Ministry to prosecute the Applicant, or to require the Applicant to take any action, under this Certificate or any statute or regulation in relation to the Information;

shall not be construed as an approval, excuse or justification by the Ministry of any act or omission of the Applicant relating to the Information, amounting to non-compliance with this Certificate or any statute or regulation.

7. The Applicant shall allow Ministry personnel, or a Ministry authorized representative(s), upon presentation of credentials, to:

- (a) carry out any and all inspections authorized by Section 156, 157 or 158 of the Environmental Protection Act, R.S.O. 1990, Section 15, 16 or 17 of the Ontario Water Resources Act, R.S.O. 1990, or Section 19 or 20 of the Pesticides Act, R.S.O. 1990, as amended from time to time, of any place to which this Certificate relates; and

without restricting the generality of the foregoing, to:



- (b) i. enter upon the premises where the records required by the conditions of this Certificate are kept;
 - ii. have access to and copy, at reasonable times, any records required by the conditions of this Certificate;
 - iii. inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations required by the conditions of this Certificate; and
 - iv. sample and monitor at reasonable times for the purposes of assuring compliance with the conditions of this Certificate.
8. (a) Where there is a conflict between a provision of any document referred to in Schedule "A" and the conditions of this Certificate, the conditions in this Certificate shall take precedence; and
- (b) Where there is a conflict between documents listed in Schedule "A", the document bearing the most recent date shall prevail.
9. The Applicant shall ensure that all communications/correspondence made pursuant to this Certificate includes reference to the Certificate approval number A 412306.
10. The Applicant shall notify the Director in writing of any of the following changes within thirty (30) days of the change occurring:
 - (a) change of Applicant or Operator of the Site or both;
 - (b) change of address or address of the new Applicant;
 - (c) change of partners where the Applicant or Operator is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, 1991 shall be included in the notification to the Director;
 - (d) any change of name of the corporation where the Applicant or Operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (form 1 of 2 of O. Reg. 182, Chapter C-39, R.R.O. 1990 as amended from time to time), filed under the Corporations Information Act shall be included in the notification to the Director; and



Ontario

Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE MANAGEMENT SYSTEM
NO. A 412306
Page 5 of 11

- (e) change in directors or officers of the corporation where the Applicant or Operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" as referred to in 10(d), supra.
11. In the event of any change in ownership of the Site, the Applicant shall notify, in writing, the succeeding owner of the existence of this Certificate, and a copy of such notice shall be forwarded to the Director.
12. Any information relating to this Certificate and contained in Ministry files may be made available to the public in accordance with the provisions of the Freedom of Information and Protection of Privacy Act, R.S.O. 1990, C. F-31.
13. All records and monitoring data required by the conditions of this Certificate shall be kept on the Owners's premises for a minimum period of two (2) years from the date of their creation.
14. The obligations imposed by the terms and conditions of this Certificate are obligations of due diligence.

C. PROHIBITION AND REGISTRATION ON TITLE

15. (a) Pursuant to Section 197 of the EPA, neither the Applicant nor any person having an interest in the Site shall deal with the Site in any way without first giving a copy of the Provisional Certificate of Approval to each person acquiring an interest in the Site as a result of the dealing;
- (b) By December 31, 2000, the Applicant shall submit to the Director for the Director's signature two (2) copies of a completed Certificate of Prohibition containing a register able description of the Site, in accordance with Form 1 of O. Reg. 14/92; and
- (c) Within ten (10) calendar days of receiving the Certificate of Prohibition, the Applicant shall register the Certificate of Prohibition in the appropriate Land Registry Office on title and immediately following registration, submit to the Director the duplicate registered copy.



D. SITE OPERATIONS

16. This Site shall only receive Municipal Waste that is generated from within the Township of Hagarty & Richards and the Village of Killaloe.
17. The final volumetric capacity of this Site, excluding final cover, is 84,962 cubic metres.
18. Waste shall be managed and landfilled at the Site in accordance with the items listed in Schedule "A".
19. The Owner shall have installed an additional five (5) groundwater monitoring wells, as specified in Item (6) of Schedule "A", no later than November 30, 2000.

E. MONITORING AND REPORTING

20. The Owner shall conduct surface and ground water sampling at the frequencies and for the parameters specified in Schedule "B", as modified by the District Manager. By March 31, 2001 and on an annual basis thereafter, the Owner shall submit to the District Manager, an Annual Report that contains the following, for the previous calendar year:
 - (a) the analytical results of the sampling program;
 - (b) an analysis of the results of the monitoring programs conducted at the Site to date;
 - (c) recommendations for the monitoring or operation of the Site for the following calendar year;
 - (d) for the first two Annual Reports, and at a frequency specified by the District Manager thereafter, a site plan, including cross sectional drawings, showing the current extent of waste disposal;
 - (e) an estimate of the total amount of waste landfilled and an estimate of the Site's remaining capacity;
 - (f) a statement as to compliance with the terms and conditions of this Certificate;
 - (g) a summary of complaints regarding the operation of the Site and the Owner's response to those complaints; and
 - (h) an assessment of the need to develop and implement contingency plans for leachate control.



Ontario

Ministry Ministère
of the de
Environment l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE MANAGEMENT SYSTEM

NO. A-412306

Page 7 of 11

F. Site Closure

21. One (1) year prior to the Site reaching the capacity specified in Condition (17), the Owner shall submit to the Director, for approval, a plan for the closure, monitoring and long term maintenance of the Site.

G. EMERGENCIES

22. In case of an emergency or a spill at this Site, the Applicant shall forthwith call the Ministry of the Environment Spills Action Centre (1-800-268-6060) or the District Office.

H. RECORD KEEPING

23. The Company shall maintain records of the results of all inspections and monitoring and a summary of all activities associated with the Site (e.g. spills, maintenance work) in a record book located at the Site.



Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE MANAGEMENT SYSTEM

NO. A 412306
Page 8 of 10

SCHEDULE "A"

This Schedule "A" forms part of Provisional Certificate of Approval No. A 412306:

1. Application to amend a Certificate of Approval for a Waste Disposal Site, dated September 21, 1998 and signed by Janice Bush, Reeve, Township of Hagarty & Richards.
2. Document entitled "Design and Operations Report for the Killaloe Landfill Site, Provisional Certificate of Approval A412306", dated September 1998 and prepared by The Greer Galloway Group Inc.
3. Letter from I. Parrott, MOE to K. Mooder, The Greer Galloway Group Inc. dated November 12, 1999 re: Ministry Review Comments.
5. Letter from K. Mooder, The Greer Galloway Group Inc. to I. Parrott, MOE, dated January 10, 2000 re: Response to Ministry Review Comments dated November 12, 1999, including Addendum.
6. Letter from K. Mooder, The Greer Galloway Group Inc. to I. Parrott, MOE, dated May 2, 2000 re: Additional Information on Environmental Monitoring Program.



SCHEDULE "B"

Groundwater Monitoring

In the summer and fall of the year 2000, groundwater samples shall be taken from monitoring wells A, B, 00-1, 00-2, 00-3, 00-4A, 00-4B, 00-5A, 00-5B and private residence wells R1, R2 and R3, and analysed for the following parameters:

(1) Field Measured Parameters:

water level, temperature, conductivity, pH

(2) Laboratory Measured Parameters:

calcium, magnesium, sodium, potassium, aluminum, barium, boron, chromium, cobalt, copper, iron, manganese, total phosphorus, silicon, strontium, zinc, alkalinity, TDS, chloride, ammonia, nitrate and sulphate, TKN, COD, DOC.

Surface Water Monitoring

In the spring, summer and fall of the year 2000, samples shall be taken from Surface Water Stations SW-1 (upstream), SW-2 (adjacent) and SW-3 (downstream) and analysed for the following parameters:

(1) Field Measured Parameters:

flow rate, DO, pH, conductivity, temperature,

(2) Laboratory Measured Parameters:

ammonia, chloride, calcium, magnesium, potassium, sodium, aluminum, barium, boron, chromium, cobalt, copper, iron, manganese, total phosphorus, silicon, strontium, zinc, phenols, alkalinity, sulphate, nitrite, nitrate and sulphate, TKN, COD, DOC and TDS.



The reasons for the imposition of these conditions are as follows:

1. Conditions 1, 3, 4, 5, 6, 8, 9, 10, 11, 12 and 13 are to clarify the legal rights and obligations of this Certificate.
2. Condition 7 is to ensure that the appropriate Ministry staff have ready access to the waste Site to inspect the operations that are approved under this Certificate. The condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Environmental Protection Act, as amended.
3. Conditions 2, 20 and 23 are to ensure that the waste disposal Site is operated in accordance with the application for this Certificate and supporting information and not in any way or under any name which the Director has not been asked to consider.
4. Condition 14 is required to clarify that the terms and conditions of this Certificate impose a standard of due diligence and not absolute liability.
5. The reason for Condition 15, which requires registration of the Certificate, is that Section 46 of the Environmental Protection Act prohibits any use being made of the lands after they cease to be used for waste disposal purposes within a period of twenty-five years from the year in which such land ceased to be used, unless the approval of the Minister for the proposed use has been given. The purpose of this prohibition is to protect future occupants of the site and the environment from any hazards which might occur as a result of waste being disposed of on the site. This prohibition and potential hazard should be drawn to the attention of future owners and occupants by the Certificate being registered on title.
6. The reason for Conditions 16, 17, 18, 19, 21 and 22 is to ensure that the Site is operated and maintained in a manner that protects the health and safety of people and the environment.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990 c. E-19, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice require a hearing by the Board. Section 142 of the Environmental Protection Act, as amended provides that the Notice requiring a hearing shall state:

The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and



Ontario

Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
FOR A WASTE MANAGEMENT SYSTEM

NO. A 41230

Page 11 of 1

2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

- 3. The name of the appellant;
- 4. The address of the appellant;
- 5. The Certificate of Approval number;
- 6. The date of the Certificate of Approval;
- 7. The name of the Director;
- 8. The municipality within which the waste management system is located.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary,*
Environmental Appeal Board,
3300 Yonge St., 12th Floor,
P.O. Box 2382
Toronto, Ontario.
M4P 1E4

AND

The Director,
Section 39, Environmental Protection Act,
Ministry of the Environment,
2 St. Clair Ave. W., 12A Floor,
Toronto, Ontario.
M4V 1L5

*Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board by: Tel: (416) 314-4600, Fax: (416) 314-4506 or e-mail: www.ert.gov.on.ca


DATED AT TORONTO this 1st day of September, 2000.

THIS IS A TRUE COPY OF THE
ORIGINAL CERTIFICATE MAILED

ON Sept. 1st 2000

LD

(SIGNED)


A. Dominski, P. Eng.,
Director,
Section 39,
Environmental Protection Act

1/ld

District Manager, MOE Ottawa District Office

LRO # 49 Certificate

Received as RE103980 on 2009 05 14 at 09:20

The application(s) hereby applies to the Land Registrar.

yyyy mm dd Page 1 of 3

Properties

PIN 57520 - 0101 LT
 Description PT LT 6 CON 8 HAGARTY, PT 1, 49R18569; TWP OF KILLALOE, HAGARTY & RICHARDS
 Address KILLALOE

PIN 57520 - 0097 LT
 Description PART OF LOT 7, CONCESSION 8, HAGARTY BEING PART 1 ON 49R958 AND PART 1 ON 49R13573.
 Address KILLALOE

Party From(s)

Name DIRECTOR APPOINTED UNDER SECTION 5 OF THE ENVIRONMENTAL PROTECTION ACT
 Address for Service 2 St. Clair Avenue West
 Floor 12A
 Toronto, Ontario
 M4V 1L5

This document is not authorized under Power of Attorney by this party.
 This document is being authorized by a representative of the Crown.

Party To(s)

Capacity

Share

Name THE CORPORATION OF THE TOWNSHIP OF KILLALOE, HAGARTY AND RICHARDS
 Address for Service 1 John Street
 Killaloe, Ontario
 K0J 2A0

Statements

Schedule: See Schedules

Signed By

Darlene Okum 203 Nelson Street acting for Signed 2009 05 14
 Pembroke Party From(s)
 K8A 3N1

Tel 6137352313
 Fax 6137352013

Submitted By

ROY C. REICHE, BARRISTER & SOLICITOR 203 Nelson Street 2009 05 14
 Pembroke
 K8A 3N1

Tel 6137352313
 Fax 6137352013

Fees/Taxes/Payment

Statutory Registration Fee \$80.00
 Total Paid \$80.00

Certificate of Requirement
(s. 197 *Environmental Protection Act*, R.S.O. 1990, c. E19)

S. 197(2) Environmental Protection Act

This is to certify that pursuant to a Provisional Certificate of Approval No. A412306 Issued on September 1, 2000, and amended on July 27, 2006; December 5, 2007 and May 13, 2008 for the use and operation of an 1.88 hectare landfill site within an 11.51 hectare total site area, more particularly described in Schedule "A" attached hereto, the following persons, **THE CORPORATION OF THE TOWNSHIP OF KILLALOE, HAGARTY AND RICHARDS**

are prohibited from dealing with the property described in Schedule "A" without first giving a copy of the Provisional Certificate of Approval, together with the amendments referred to above, to each person acquiring an interest in the property as a result of the dealing.

Under subsection 197(3) of the Environmental Protection Act, the prohibition applies to each person who, subsequent to the registration of this certificate, acquires an interest in the property.

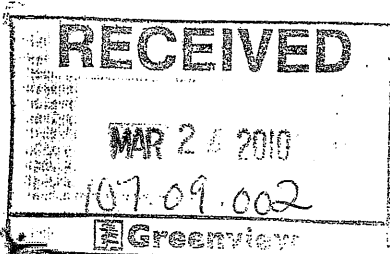
SCHEDULE "A"

Part of Lot 7, Concession 8, Hagarty, being Part 1, on 49R958 and Part 1 on 49R13673, Township of Killaloe, Hagarty and Richards, being all of PIN 57520-0097 (LT);

Part Lot 6, Concession 8, Hagarty, Part 1, 49R16569; Township of Killaloe, Hagarty and Richards, being all of PIN 57520-0101 (LT);

APPENDIX B

Correspondence



Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Killaloe, Hagarty and Richards Mailing Address: 1 John St, Post Office Box, 39, Killaloe, Ontario, Canada, K0J 2A0 Physical Address: 1 John St, Killaloe, Hagarty and Richards, Township, County of Renfrew, Ontario, Canada, K0J 2A0 Telephone: (613)757-2300, FAX: (613)757-3634, email: khr@on.albn.com Client #: 0748-4P3R65, Client Type: Municipal Government, NAICS: 92		
Inspection Site Address:	Killaloe Waste Disposal Site Address: 1045 Mask Rd Lot 7, Concession 8, Hagarty, Killaloe, Hagarty and Richards, Township, County of Renfrew District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 18, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 309791, UTM Northing: 5050778, UTM Location Description: Entrance gate to site		
Contact Name:	Lorna Hudder	Title:	CAO
Contact Telephone:	613-757-2300 ext	Contact Fax:	(613)757-3634
Last Inspection Date:	2008/06/24		
Inspection Start Date:	2010/03/17	Inspection Finish Date:	2010/03/17
Region:	Eastern		

1.0 INTRODUCTION

The purpose of the inspection was to assess the Site for compliance with Certificate of Approval No. A412306, O.Regulation 347 and the Environmental Protection Act.

No non-compliance issues were noted with respect to the site operations. Only a cursory review of groundwater and surface water aspects of the landfill was conducted. No leachate seeps or damaged wells were observed and no off-property reports of adverse water quality have been reported to the ministry. The ministry's technical review of the most recent annual reports are pending.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):

A412306

2.1 FINANCIAL ASSURANCE:

Municipality owned landfill sites are not required to hold financial assurance.

2.2 APPROVED AREA OF THE SITE:

Not required for municipally operated waste disposal sites.

2.3 APPROVED CAPACITY:

The approved landfill area is 1.88 hectares within a 11.51 hectare total site area. Proper markers were in place to define the lateral and vertical extent of the landfill.

2.4 ACCESS CONTROL:

Access is controlled by a lockable gate. The site was open for business at the time of the inspection.

2.5 COVER MATERIAL:

The township is struggling to keep the site litter free. Threats from bears were abated in the fall 2009 through the installation of a bear fence. Crows and turkey vultures are also litter issues. The operators trust that they will be able to deter birds once they start applying the heavier shredded construction and demolition (C&D) waste to the active fill area as cover. They currently have a large stockpile of shredded C&D waste at the site. The township will continue to monitor progress.

2.6 WASTE BURNING:

The burning of clean brush and lumber is authorized on site in accordance with Guideline C-7. The Township is encouraged to use chipped woodwaste as alternate daily cover (as approved) instead of burning.

2.7 GROUNDWATER/SURFACEWATER IMPACT:

The ministry will review the 2009 Annual report in 2010 for groundwater and surfacewater aspects.

There were no obvious signs of surface water impacts noted during the inspection. No leachate springs or leachate ponding was observed. Virtually no odours were noticed.

2.8 LEACHATE CONTROL SYSTEM:

The site is a natural attenuation site.

2.9 METHANE GAS CONTROL SYSTEM:

There is no methane gas control system at the site.

2.10 OTHER WASTES:

No evidence of wastes other than solid non-hazardous waste and recyclables were observed at the site.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

There are no outstanding non-compliance issues from the previous inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

None based on section 4.0. above.

6.0 OTHER INSPECTION FINDINGS

No other inspection findings.

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

23-09-09_0935.jpg; 23-09-09_0936.jpg; 23-09-09_0937.jpg; 23-09-09_0938.jpg; 23-09-09_0939.jpg; 23-09-09_0940.jpg; 23-09-09_0941.jpg; 23-09-09_0942.jpg; 23-09-09_0943.jpg; 23-09-09_0944.jpg; 23-09-09_0945.jpg; 23-09-09_0946.jpg; 23-09-09_0947.jpg; 23-09-09_0948.jpg; 23-09-09_0949.jpg; 23-09-09_0950.jpg; 23-09-09_0952.jpg

PREPARED BY:

Environmental Officer:

Name:

Lance Larkin

District Office:

Ottawa District Office

Date:

2010/03/22

Signature



REVIEWED BY:

District Supervisor:

Name:

Paul Kehoe

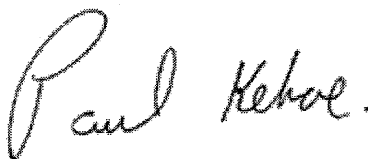
District Office:

Ottawa District Office

Date:

2010/03/22

Signature:



File Storage Number:

SI RE KI C08 610

Note:

"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

APPENDIX C

Borehole Logs

PROJECT: 991-2844

RECORD OF BOREHOLE: BH 00-1

SHEET 1 OF 1

LOCATION:

BORING DATE: 09/05/2000

DATUM: Local

SAMPLER: HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	20	40	60	80	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶		
0		GROUND SURFACE		98.65											
		Light brown fine SAND, trace to some silt		0.00											
1		Compact, fine to coarse SAND, trace fine gravel		97.89 0.76											
2					1	SB	DO	11							
3		Loose to very loose brown to grey, fine to medium SAND, occasional to trace silt, stratified		95.91 2.74											
4					2	SB	DO	8							
5					3	SB	DO	3							
6					4	SB	DO	2							
7															
8		Very loose grey fine SAND, some medium sizes		91.03 7.62											
		END OF BOREHOLE		90.42 8.23											
9															
10															
11															
12															
13															
14															
15															

BOREHOLE 991-2844.GPJ, G.LDR, CAN.GDT, 3/28/01

DEPTH SCALE

1:75



LOGGED: D.W.M.

CHECKED: *[Signature]*

PROJECT: 991-2844

RECORD OF BOREHOLE: BH 00-2

SHEET 1 OF 1

LOCATION:

BORING DATE: 08/05/2000

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+ ⊕			- ⊖	Wp
0		GROUND SURFACE		101.75													
		Light brown fine SAND, trace silt		0.00													
1		Compact brown fine to coarse SAND, trace silt		100.84													
				0.91	1	50 DO	21										
2																	
3		Compact brown fine to medium SAND, trace silt		98.70													
				3.05	2	50 DO	14										
4																	
5	Power Auger 200mm DIAM. (yellow stem)	Compact brown to grey fine SAND, trace silt, stratified		97.18													
				4.57	3	50 DO	22										
6		Loose brown to grey fine to medium SAND, trace silt, stratified iron staining		95.65													
				6.10	4	50 DO	9										
7																	
8		Very loose grey fine SAND, trace silt		94.13													
				7.62	5	50 DO	4										
9		END OF BOREHOLE		92.81													
				9.14													
10																	
11																	
12																	
13																	
14																	
15																	

Bentonite Seal

Native and Caved Backfill

Bentonite Seal

Sand Backfill

50mm PVC # 10 Slot Screen

W.L. Elev. in Screen at 96.43m
July 21, 2000

BOREHOLE 991-2844.GPJ GLDR CAN.GBT 3/28/01

DEPTH SCALE
1:75



LOGGED: D.W.M.
CHECKED: [Signature]

PROJECT: 991-2844

RECORD OF BOREHOLE: BH 00-3

SHEET 1 OF 1

LOCATION:

BORING DATE: 08/05/2000

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	20	40	60	80	10 ⁻⁵	10 ⁻⁴		
0		GROUND SURFACE		87.22											
0		Loose to compact brown to grey fine SAND, trace to some silt, occasional seams, stratified mica flakes		0.00											
1					1	50 DO	5								
2															
3					2	50 DO	18								
4															
5		Compact brown grey, fine to medium SAND, trace silt, occasional silty sand seams, stratified		82.65 4.57	3	50 DO	24								
6															
6		Loose brown to grey SILT, frequent silty sand seams		81.12 6.10	4	50 DO	6								
7															
8		Compact brown to grey, fine to medium SAND, some coarse sizes, trace to some silt		89.60 7.62	5	50 DO	18								
8															
8		END OF BOREHOLE		88.99 8.23											
9															
10															
11															
12															
13															
14															
15															

BOREHOLE 991-2844.GPJ GLDR-CAN.GDT 3/28/01

DEPTH SCALE
1:75



LOGGED: D.W.M.
CHECKED: *[Signature]*

W.L. Elev. in Screen at 95.77m
July 21, 2000

PROJECT: 991-2844

RECORD OF BOREHOLE: BH 00-4D & BH 00-4S

SHEET 1 OF 1

LOCATION:

BORING DATE: 09/05/2000

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat v. rem v.		U - O				Wp	
0		GROUND SURFACE		100.11													
1		Loose, brown, fine to medium SAND, some coarse sizes, stratified		0.00											Bentonite Seal		
2																	
3		Loose, brown, fine to coarse SAND, stratified		97.06 3.05											Native and Cave Backfill		
4															Bentonite Seal		
5		Very loose, brown, fine to medium SAND, some coarse sizes, iron odour		85.54 4.57											Sand Backfill		
6	Power Auger 200mm DIAM. (Hollow Stem)	Very loose, grey, fine to coarse SAND, some black - green staining, trace silt		84.01 6.10											50mm PVC # 10 Slot Screen S (Shallow)		
7																	
8															Native and Cave Backfill		
9															Bentonite Seal		
10															Sand Backfill		
11															50mm PVC # 10 Slot Screen D (Deep)		
12		END OF BOREHOLE		88.83 11.28													
13															W.L. Elev. in Shallow Screen at 95.95m July 21, 2000		
14															W.L. Elev. in Deep Screen at 95.93m July 21, 2000		
15																	

BOREHOLE 991-2844.GPJ GLDR CAN.GDT 4/11/01

DEPTH SCALE
1:75



LOGGED: D.W.M./
CHECKED: [Signature]

PROJECT: 991-2844

RECORD OF BOREHOLE: BH 00-4-2

SHEET 1 OF 1

LOCATION:

BORING DATE: 09/05/2000

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+ ⊕	0- U- ⊙			10 ⁻⁴
0		GROUND SURFACE		100.11													
0		Loose, brown, fine to medium SAND, some coarse sizes, stratified		0.00													
1																Bentonite Seal	
2																	
3				07.05												Native and Cave Backfill	
3		Loose, brown, fine to coarse SAND, stratified		3.05													
4																Bentonite Seal	
5				05.54													
5		Very loose, brown, fine to medium SAND, some coarse sizes, iron odour		4.57												Sand Backfill	
6				04.01													
6		Very loose, grey, fine to coarse SAND, some black - green staining, trace silt		6.10												50mm PVC # 10 Slot Screen S (Shallow)	
7																	
8																Native and Cave Backfill	
9																	
9																Bentonite Seal	
10																	
10																Sand Backfill	
11																	
11				08.03												50mm PVC # 10 Slot Screen D (Deep)	
11		END OF BOREHOLE		11.26													
12																	
13																W.L. Elev. In Shallow Screen at 95.95m July 21, 2000	
14																W.L. Elev. In Deep Screen at 95.93m July 21, 2000	
15																	

BOREHOLE 991-2844.GPJ GLDR.CAN.GDT 3/28/01

DEPTH SCALE
1:75



LOGGED: D.W.M.
CHECKED: M.V.

PROJECT: 991-2844

RECORD OF BOREHOLE: BH 00-5

SHEET 1 OF 1

LOCATION:

BORING DATE: 05/05/2000

DATUM: Local

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+	⊕			U-
0		GROUND SURFACE		86.44													
0		TOPSOIL Light brown to yellow silty, fine to medium SAND		0.10													
1				84.92													
1.52		Loose to very loose, brown, fine to medium SAND, trace silt		1.52	1	60 DO	6										
2																	
2.5					2	50 DO	2										
3																	
4																	
4.57		Very loose, brown to green, fine SAND, some silt, stratified		4.57	3	50 DO	2										
5																	
5.5					4	50 DO	2										
6																	
7																	
7.62		Very loose, grey, fine SAND, trace silt		7.62	5	50 DO	2										
8																	
8.23		END OF BOREHOLE		8.23													
9																	
10																	
11																	
12																	
13																	
14																	
15																	

Bentonite Seal

Native and Caved Backfill

Bentonite Seal

Sand Backfill

50mm PVC # 10 Slot Screen

Sand Backfill

W.L. Elev. In Screen at 95.85m July 21, 2000

BOREHOLE 991-2844.GPJ GLDR CAN.GDT 3/28/01

DEPTH SCALE
1 : 75



LOGGED: D.W.M.
CHECKED: [Signature]

PROJECT: 04-1120-735-1000

RECORD OF BOREHOLE: 04-1

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: Mar. 11, 2004

DATUM: Not Surveyed

SAMPLER: HAMMER, 6kg; DROP, 750mm

PENETRATION TEST: HAMMER, 6kg; DROP, 750mm

DEPTH SCALE METERS	SCHEMATIC	SOIL PROFILE		SAMPLE		DYNAMIC PENETRATION RESISTANCE, kN/cm^2				HYDRAULIC CONDUCTIVITY, L/sec				ADDITIONAL LAB TESTING	PRECAUTION OR STANDARD INSTALLATION
		DESCRIPTION	SPERM FOOT	ELEV. DEPTH (m)	NUMBER	TYPE	25	50	75	100	15'	10'	10'		
0		GROUND SURFACE													
0.5		Dark brown M&T		4.50											Bentonite Seal
1.0		Yellow brown SILTY fine SAND		4.30											
1.5		Loose to compact gray fine SAND, trace M		4.10											
2.0					SS										Silty Sand
3.0					SS										12mm Diam. PVC #10 S&T Screen
4.0					SS										Bentonite Seal
5.0					SS										Silty Sand
6.0		Compact gray SILTY fine SAND		3.90											Bentonite Seal
7.0					SS										
8.0		Gray fine to medium SAND		3.70											
9.0					SS										12mm Diam. PVC #10 S&T Screen
10.0		End of Borehole		3.50											

BOREHOLE 04-1120-735-1000-001 (SEE PLAN) 03/11/04

DEPTH SCALE
1:50



LOGGED: D.J.E.
CHECKED: G.S.V.



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Log of Monitoring Well: BH06-1S

Project No.: 107.06.002

Project: Killaloe WDS

Client: Township of Killaloe, Hagarty and Richards

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
						0 15 30 45 60		
0		Ground Surface						
0 to 10.5		Peat Dark brown, organic peat, moist, loosely compacted. Saturated at 0.91 m. Fragments of partially decomposed plant and wood debris.	1	AS	100			Stick-up = 0.74 m
1 to 3			2	SS	10			Concrete
3 to 4			3	SS	20			Bentonite Chips
4 to 5			4	SS	20			
5 to 10.5		Medium to Coarse Sand Grey, medium to coarse sand with trace sub-angular granitic gravel, wet, loosely compacted.	5	SS	60			Silica Sand
10.5 to 13.5			6	SS	95			Well Screen = 1.52 m x 0.05m
13.5 to 16		End of Borehole						

Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: August 1, 2006

Logged By: S. Reynolds

Checked By: T. Peters

Sheet: 1 of 1



Greenview

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Project No.: 107.06.002

Project: Killaloe WDS

Client: Township of Killaloe, Hagarty and Richards

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
0		Ground Surface						
0 to 1.52		Peat Dark brown, organic peat, moist, loosely compacted. Saturated at 0.91 m. Fragments of partially decomposed plant and wood debris.	1	AS	100			
1.52 to 2.0			2	SS	10			
2.0 to 2.5			3	SS	20			
2.5 to 3.0			4	SS	20			
3.0 to 4.5		Medium to Coarse Sand Grey, medium to coarse sand with trace sub-angular granitic gravel, wet, loosely compacted.	5	SS	60			
4.5 to 5.0			6	SS	95			
5.0 to 6.0			7	SS	80			
6.0 to 7.5		Fine to Medium Sand Grey, fine to medium sand with trace sub-angular granitic gravel, wet, loosely compacted.	8	SS	85			
7.5 to 8.0			9	SS	80			
8.0 to 9.0		Fine Sandy Silt Grey, fine sandy silt, wet, moderately compacted and sticky.	10	SS	80			
9.0 to 10.0			11	SS	80			
10.0 to 10.5			12	SS	65			
10.5 to 32		End of Borehole						

Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: July 31, 2006

Logged By: S. Reynolds

Checked By: T. Peters

Sheet: 1 of 1



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Log of Monitoring Well: BH06-2S

Project No.: 107.06.002

Project: Killaloe WDS

Client: Township of Killaloe, Hagarty and Richards

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
						0 15 30 45 60		
4 ft m		Ground Surface						
		Fill Light brown, medium to coarse sand, dry, loosely compacted with rounded gravel and cobbles.	1	AS	100		Stick-up = 0.81	
		Topsoil Dark brown, organic topsoil, moist, loosely compacted.					Concrete	
		Fine to Medium Sand Grey, fine to medium sand with localized trace silt, moist, loosely compacted. Light brown striations at 8 feet.	2	SS	65		Bentonite Chips	
			3	SS	65			
			4	SS	60		Silica Sand	
			5	SS	55		Well Screen = 1.52 m x 0.05 m	
		Fine to Medium Silty Sand Grey, fine to medium silty sand, wet, loosely compacted.						
		End of Borehole						

Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: August 1, 2006

Logged By: S. Reynolds

Checked By: T. Peters

Sheet: 1 of 1



Greenview

ENVIRONMENTAL MANAGEMENT

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Log of Monitoring Well: BH06-2D

Project No.: 107.06.002

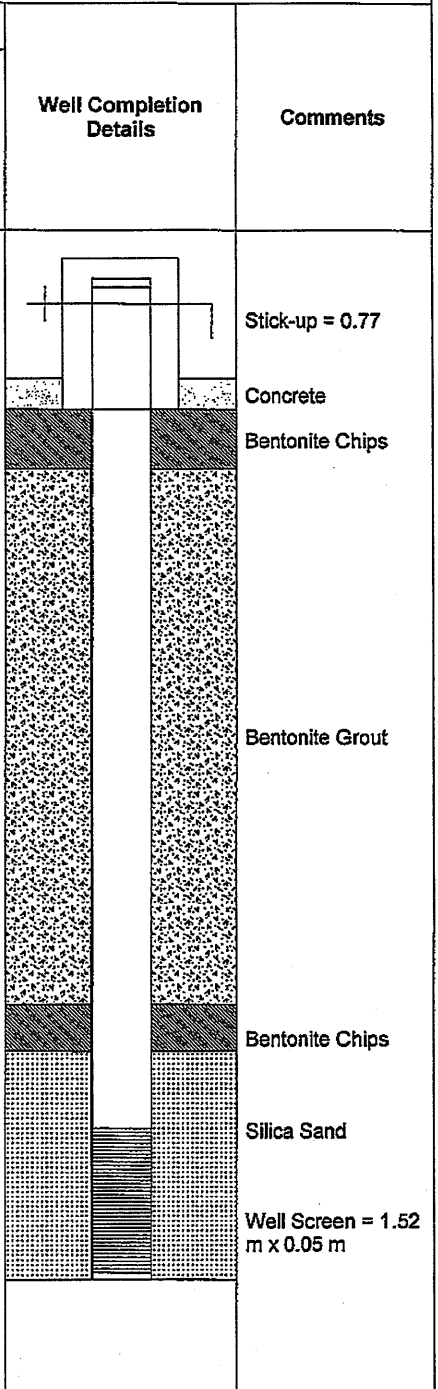
Project: Killaloe WDS

Client: Township of Killaloe, Hagarty and Richards

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
0		Ground Surface						
0 to 1.5	•••••	Fill Light brown, medium to coarse sand, dry, loosely compacted with rounded gravel and cobbles.	1	AS	100			
1.5 to 2.0	•••••	Topsoil Dark brown, organic topsoil, moist, loosely compacted.	2	SS	65			
2.0 to 16.0	•••••	Fine to Medium Sand Grey, fine to medium sand with localized trace silt, moist, loosely compacted. Light brown striations at 8 feet.	3	SS	65			
			4	SS	60			
			5	SS	55			
16.0 to 26.0	•••••	Fine to Medium Silty Sand Grey, fine to medium silty sand, wet, loosely compacted.	6	SS	45			
			7	SS	45			
			8	SS	65			
26.0 to 28.0	•••••	Fine Silt with Trace Sand Grey, fine silt with trace sand, wet, moderately compacted.	9	SS	75			
			10	SS	50			
28.0 to 30.0	•••••		11	SS	80			
30.0 to 32.0		End of Borehole						

SPT N-Value
0 15 30 45 60



Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: August 1, 2006

Logged By: S. Reynolds

Checked By: T. Peters

Sheet: 1 of 1



Greenview

ENVIRONMENTAL MANAGEMENT

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Log of Monitoring Well: MW07-3S

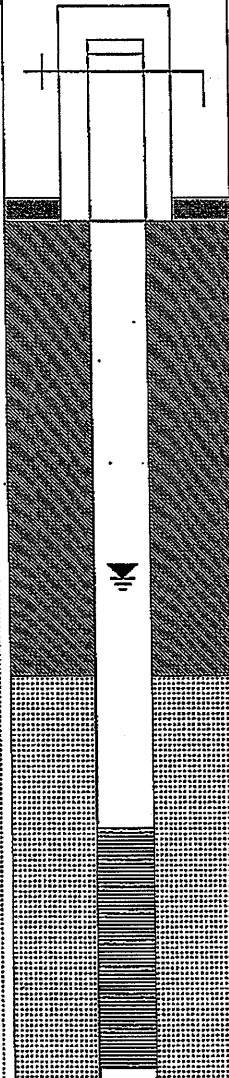
Project No.: 107.07.002

Project: Killaloe WDS

Client: Township of Killaloe, Hagarty and Richards

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
0		Ground Surface						
0		Fill Light brown, medium to coarse sand, with trace gravel, loosely compacted.	1	AS	100			
1		Medium to Coarse Sand Grey, medium to coarse sand, with trace sub-angular gravel, loosely compacted. Saturated at 2.44 m.	2	SS	50			
3			3	SS	60			
4			4	SS	50			
5			5	SS	40			
6			6	SS	30			
7			7	SS	40			
12		Fine to Medium Sand Grey, fine to medium sand with trace sub-angular gravel, wet, loosely compacted.						
18		End of Borehole						



Stick-up = 0.69 m

Concrete

Bentonite Chips

Silica Sand

Well Screen = 1.52 m x 0.05 m

Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: March 26, 2007

Logged By: J. Bailey

Checked By: S. Reynolds

Sheet: 1 of 1



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Log of Monitoring Well: MW07-3D

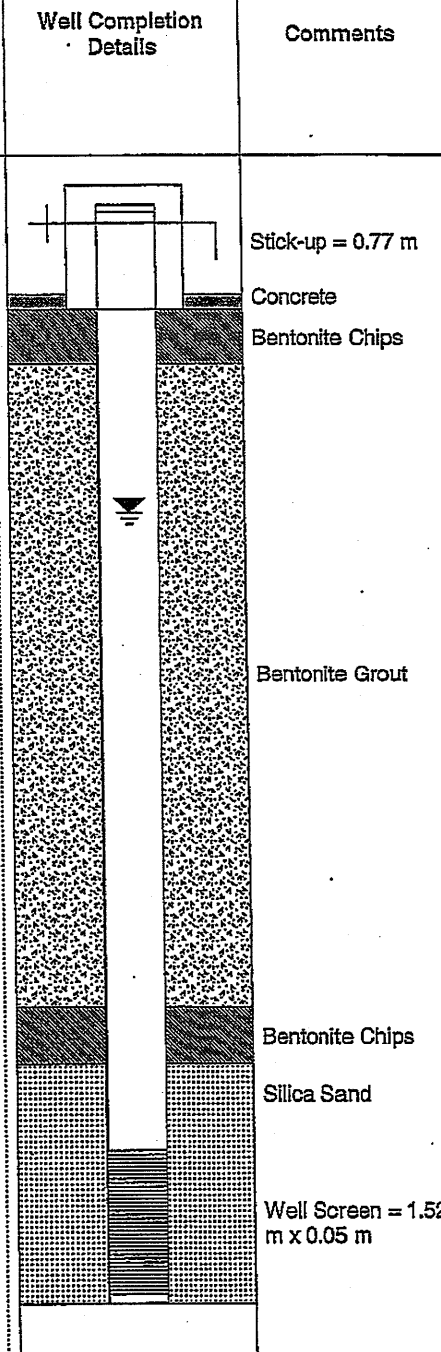
Project No.: 107.07.002

Project: Killaloe WDS

Client: Township of Killaloe, Hagarty and Richards

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
0		Ground Surface						
0 to 1		Fill Light brown, medium to coarse sand, with trace gravel, loosely compacted.	1	AS	100			
1 to 2.44		Medium to Coarse Sand Grey, medium to coarse sand, with trace sub-angular gravel, loosely compacted. Saturated at 2.44 m.	2	SS	50			
2.44 to 3			3	SS	60			
3 to 5			4	SS	50			
5 to 7		Fine to Medium Sand Grey, fine to medium sand with trace sub-angular gravel, wet, moderately compacted.	5	SS	40			
7 to 9			6	SS	30			
9 to 11			7	SS	40			
11 to 13			8	SS	30			
13 to 15			9	SS	50			
15 to 17			10	SS	75			
17 to 19			11	SS	80			
19 to 21			12	SS	80			
21 to 23			13	SS	50			
23 to 25			14	SS	60			
25 to 36		Fine Sandy Silt Grey, fine silty sand with trace sub-angular gravel, wet, very compact.						
36 to 38		End of Borehole						



Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: March 26, 2007

Logged By: J. Bailey

Checked By: S. Reynolds

Sheet: 1 of 1

APPENDIX D

Field Sampling Records



FIELD SAMPLING RECORD - GROUND WATER

LOCATION: Killarney Waste Disposal Site

DATE: May 14, 2009

SAMPLED BY: D. Hagen, E. Drost

PROJECT NO.: 107.09.002

WEATHER (SAMPLE DAY): Rain, 15°C

WEATHER (PREVIOUS DAY): Sunny, 18°C

Monitoring Location	Static Water Level	Borehole Depth (m)	Stick - Up (m)	Borehole Diameter (mm)	Purge Volumes (L) Needed	Purge Volumes (L) Obtained	Temperature (°C)	pH (units)	Conductivity (mS)	Dissolved Oxygen (mg/L)	Observations			Comments	
											Colour	Clarity	Odour		Sheen
BH00-1	3.08	8.96	0.82	50.8	35	35	7.37	6.66	109	6.20	white/grey	opaque	slight sulphur	none	
BH00-2	6.01	9.78	0.82	50.8	23	23	7.54	6.36	85	5.42	white/yellow	opaque	none	none	GW QM/QC, Sandy
BH00-3	2.17	8.35	0.83	50.8	37	37	6.73	6.31	86	4.85	grey	opaque	sulphur	none	
BH00-4	4.80	8.96	0.35	50.8	25	25	9.81	6.62	843	5.56	clear	clear	sulphur	none	
BH00-4B (S)	4.93	7.21	0.68	31.8	7	7	9.39	6.76	1022	5.96	white	opaque	sulphur	none	
BH00-4A (D)	4.84	11.76	0.57	31.8	21	21	9.79	6.61	131	4.72	white	cloudy	sulphur	none	
BH00-5	1.45	8.81	0.80	50.8	44	44	7.56	6.74	1044	6.66	grey/white	opaque	sulphur	none	Suspended Sediments
BH00-1S	0.97	4.45	0.80	31.8	10	10	6.93	6.52	683	6.59	grey	opaque	none	none	
BH00-1D	0.87	9.14	0.84	31.8	25	25	7.65	6.53	597	5.37	grey	opaque	none	none	
MW005-1S	1.69	5.12	0.69	50.8	21	21	8.19	6.36	264	4.69	clear	clear	sulphur	none	
MW005-1D	1.48	9.77	0.54	50.8	50	50	8.16	8.15	577	2.00	grey	opaque	none	none	
MW005-2S	1.45	5.47	0.68	50.8	24	24	7.33	6.52	79	4.74	yellow/brown	opaque	none	none	
MW005-2D	1.43	9.80	0.67	50.8	50	50	8.30	6.83	127	0.31	grey	opaque	none	none	Very silty
MW007-3S	1.71	6.21	0.68	50.8	27	12	7.41	7.13	708	9.81	grey	opaque	none	none	
MW007-3D	1.91	11.42	0.75	50.8	57	23	9.12	8.24	189	7.35	grey	opaque	none	none	
MW07-4	1.01	2	0.89	50.8	8	8	7.19	6.50	74	7.26	clear	cloudy	slight sulphur	none	
MW07-5	1.01	2.52	0.89	50.8	9	4	9.27	6.70	421	5.39	red	opaque	none	none	



FIELD SAMPLING RECORD - GROUND WATER

LOCATION: Killaloe Waste Disposal Site

DATE: August 24, 2009

SAMPLED BY: D. Hagan, E. Drost

PROJECT NO.: 107.09.002

WEATHER (SAMPLE DAY): Sunny, 24°C

WEATHER (PREVIOUS DAY): Rain, 25°C

Monitoring Location	Static Water Level	Borehole Depth (m)	Stick-Up (m)	Borehole Diameter (mm)	Purge Volumes (L)		Temperature (°C)	pH (units)	Conductivity (mS)	Dissolved Oxygen (mg/L)	Observations			Comments		
					Needed	Obtained					Colour	Clarity	Odour		Sheen	
BH00-1	3.35	8.94	0.82	50.8	33.54	34	7.22	6.79	119	5.65	opaque	white/grey	opaque	none	none	
BH00-2	6.28	9.76	0.82	50.8	20.88	21	7.35	6.83	89	7.30	clear	white/yellow	clear	none	none	Some Sand
BH00-3	2.28	8.35	0.83	50.8	36.42	36	6.81	7.22	73	7.29	opaque	dark grey	opaque	slight sulphur	none	Very Silty
BH00-4	5.02	8.88	0.35	50.8	23.76	24	9.90	6.66	947	5.42	opaque	yellow	opaque	sulphur	none	Foamy in Bucket
BH00-4B (S)	5.16	7.23	0.58	31.8	6.21	7	10.16	6.71	887	6.65	opaque	yellow	opaque	sulphur/garbage	none	Foamy in Bucket
BH00-4A (D)	5.12	11.74	0.57	31.8	19.86	20	10.08	6.55	120	7.80	opaque	grey	opaque	sulphur	none	
BH00-5	1.64	8.80	0.90	50.8	42.96	43	7.81	6.78	1061	6.37	opaque	yellow	opaque	sulphur	none	
BH04-1S	1.01	4.41	0.90	31.8	10.20	10	10.31	6.67	663	7.85	opaque	brown	opaque	earthy	none	
BH04-1D	0.95	9.12	0.84	31.8	24.50	25	7.70	6.77	549	6.63	opaque	yellow	opaque	earthy	none	
MW06-1S	1.65	5.12	0.69	50.8	20.82	24	8.02	6.52	281	7.08	opaque	brown	opaque	none	none	
MW06-1D	1.45	9.76	0.54	50.8	49.86	52	8.47	7.78	490	5.21	opaque	black	opaque	none	none	
MW06-2S	1.50	5.45	0.68	50.8	23.70	24	9.36	7.09	92	7.24	opaque	brown	opaque	none	none	
MW06-2D	1.59	8.68	0.67	50.8	42.54	43	8.65	5.91	141	4.81	opaque	black	opaque	none	none	
MW07-3S	2.56	6.22	0.68	50.8	21.96	11	10.67	7.06	769	7.60	opaque	brown	opaque	none	none	GW QA/QC
MW07-3D	2.75	11.42	0.75	50.8	52.02	25	9.51	6.37	216	8.63	opaque	black	opaque	none	none	
MW07-4	1.05	2.39	0.89	50.8	8.04	8	12.16	6.64	83	6.02	clear	clear	clear	none	none	
MW07-5	1.01	2.52	0.89	50.8	9.06	6	14.14	6.78	557	5.21	opaque	yellow	opaque	earthy	none	Located in Swamp



FIELD SAMPLING RECORD - GROUND WATER

LOCATION: Killaloe Waste Disposal Site

DATE: October 8, 2009

SAMPLED BY: D. Hagan, P. Cheslik

PROJECT NO.: 107.09.002

WEATHER (SAMPLE DAY): Sunny, 10°C

WEATHER (PREVIOUS DAY): Overcast/Rain, 11°C

Monitoring Location	Static Water Level	Borehole Depth (m)	Stick-Up (m)	Borehole Diameter (mm)	Purge Volumes (L)		Temperature (°C)	pH (units)	Conductivity (mS)	Dissolved Oxygen (mg/L)	Observations			Comments	
					Needed	Obtained					Colour	Clarity	Odour		Sheen
BH00-1	3.51	8.95	0.82	50.8	33	33	6.92	6.10	115	8.20	White	Cloudy	none	none	
BH00-2	6.41	9.81	0.82	50.8	20	20	7.02	6.12	86	7.04	Yellowish	cloudy	none	none	Sandy
BH00-3	2.34	8.43	0.83	50.8	37	37	6.71	6.65	70	8.12	grey	opaque	none	yes	Sandy/Silty
BH00-4	5.12	8.96	0.35	50.8	23	23	9.66	6.66	1001	3.28	grey	clear	sulphur	none	
BH00-4B (S)	5.24	7.22	0.58	31.8	6	6	0.09	6.93	1167	5.95	grey	cloudy	sulphur	none	
BH00-4A (D)	5.22	11.72	0.57	31.8	20	20	9.62	6.93	124	3.72	grey	opaque	sulphur	none	
BH00-5	1.71	8.81	0.90	50.8	43	43	7.73	7.05	1248	7.81	grey	cloudy	sulphur	none	
BH04-1S	1.30	4.46	0.90	31.8	24	24	9.84	7.07	708	6.72	grey	opaque	sulphur	none	
BH04-1D	0.95	9.14	0.84	31.8	25	25	7.87	7.11	604	7.07	grey	opaque	sulphur	none	
MW06-1S	1.67	5.10	0.69	50.8	21	21	8.21	6.80	284	6.44	brown	opaque	none	none	GW QA/QC
MW06-1D	1.44	9.70	0.54	50.8	50	50	7.96	8.03	466	6.09	grey	opaque	none	none	
MW06-2S	1.51	5.47	0.68	50.8	24	24	9.73	7.06	89	6.25	brown	opaque	none	none	
MW06-2D	1.50	8.90	0.67	50.8	44	44	8.21	6.63	116	1.65	grey	opaque	none	none	
MW07-3S	3.10	6.20	0.68	50.8	19	19	10.57	7.23	585	8.96	grey	opaque	none	none	
MW07-3D	3.14	11.38	0.75	50.8	49	49	9.33	8.40	206	8.25	grey	milky	none	none	
MW07-4	1.05	2.39	0.89	50.8	8	8	10.00	6.53	79	7.80	clear	clear	none	none	
MW07-5	1.01	2.52	0.89	50.8	9	4	10.25	6.66	495	7.65	orange	Cloudy	none	none	

APPENDIX E

Laboratory Certificates of Analysis



SGS Lakefield Research Limited
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Greenview Environmental Management

Attn : Tyler Peters tyler.peters@greenview-environmental.ca; dan.hagan@greenview-environmental.ca

Friday, June 05, 2009

Date Rec. : 15 May 2009
 LR Report: CA11053-MAY09
 Reference: 107.09.002 Killaloe GW

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	14-May-09															
			7: BH00-1	8: BH00-2	9: BH00-3	10: BH00-4S	11: BH00-4D	12: BH04-1S	13: BH04-1D	14: MW06-1S	15: MW06-1D	16: MW06-2S						
Sample Date & Time			14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	
Temperature Upon Receipt [°C]			6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Alkalinity [mg/L as CaCO3]	28-May-09	13:26	10	31	59	496	27	360	404	404	112	94	27	94	27	94	27	
Solids (Total Dissolved) [mg/L]	27-May-09	19:30	103	77	120	600	51	460	449	449	249	563	49	563	49	563	49	
COD [mg/L]	27-May-09	22:23	11	<8	<8	73	14	55	45	45	45	13	8	13	8	13	8	
Nitrogen-Kjeldahl (N) [mg/L]	21-May-09	12:50	<0.5	<0.5	<0.5	33.8	1.0	0.6	0.7	0.7	3.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Ammonia+Ammonium (N) [mg/L]	20-May-09	15:32	0.2	<0.1	0.2	35.6	1.0	0.3	0.4	0.4	2.6	0.2	0.2	0.2	0.2	0.2	0.2	
4AAP-Phenolics [mg/L]	21-May-09	11:58																
Sulphate [mg/L]	28-May-09	16:30	19	15	9.5	0.7	13	4.7	4.5	4.5	0.3	27	11	27	11	27	11	
Chloride [mg/L]	05-Jun-09	09:38	14	9.2	7.5	94	8.4	56	37	37	48	220	3.8	220	3.8	220	3.8	
Nitrite (as nitrogen) [mg/L]	25-May-09	10:13	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	
Nitrate (as nitrogen) [mg/L]	25-May-09	10:13	<0.05	<0.05	2.20	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Dissolved Organic Carbon [mg/L]	22-May-09	10:56	1.6	<1.0	<1.0	21.7	<1.0	10.1	9.5	9.5	16.0	1.1	1.4	1.1	1.4	1.1	1.4	
Aluminum [mg/L]	26-May-09	09:25	0.0508	0.0713	0.396	0.0432	0.240	0.0380	0.0868	0.0868	0.0519	0.361	0.0333	0.361	0.0333	0.361	0.0333	
Barium [mg/L]	26-May-09	09:25	0.0744	0.0716	0.0525	2.08	0.104	0.559	0.459	0.459	0.127	0.248	0.0549	0.248	0.0549	0.248	0.0549	
Boron [mg/L]	26-May-09	09:25	0.0079	0.0089	0.0079	0.399	0.0247	0.286	0.296	0.296	0.0157	0.0274	0.0215	0.0274	0.0215	0.0274	0.0215	
Calcium [mg/L]	26-May-09	09:25	8.29	10.9	12.3	83.2	8.82	57.7	69.9	69.9	37.3	98.8	7.89	98.8	7.89	98.8	7.89	
Cobalt [mg/L]	26-May-09	09:25	0.0205	0.0158	0.0191	0.0153	0.0142	0.0188	0.0204	0.0204	0.0160	0.0187	0.0193	0.0160	0.0187	0.0160	0.0193	
Chromium [mg/L]	26-May-09	09:25	0.0009	<0.0005	0.0009	0.0033	0.0027	0.0013	0.0014	0.0014	0.0010	0.0010	0.0005	0.0010	0.0010	0.0010	0.0005	
Copper [mg/L]	26-May-09	09:25	0.0014	0.0013	0.0018	0.0013	0.0009	0.0015	0.0018	0.0018	0.0006	0.0038	0.0008	0.0038	0.0006	0.0038	0.0006	



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LR Report : CA11053-MAY09

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	7: BH00-1	8: BH00-2	9: BH00-3	10: BH00-4S	11: BH00-4D	12: BH04-1S	13: BH04-1D	14: MW06-1S	15: MW06-1D	16: MW06-2S
Iron [mg/L]	26-May-09	09:25	19.7	1.39	0.43	73.4	21.0	79.8	34.0	1.30	0.57	8.09
Potassium [mg/L]	26-May-09	09:25	1.39	2.16	1.73	58.8	2.15	5.27	8.27	3.43	6.74	1.76
Magnesium [mg/L]	26-May-09	09:25	4.83	6.67	6.93	27.9	3.74	36.7	41.2	17.5	28.1	4.46
Manganese [mg/L]	26-May-09	09:25	0.0985	0.0634	0.167	2.42	0.125	0.999	1.17	0.336	0.130	0.102
Sodium [mg/L]	27-May-09	15:26	4.09	4.00	4.04	69.2	8.28	76.0	72.8	10.2	27.9	3.79
Phosphorus [mg/L]	26-May-09	09:25	0.02	<0.01	0.03	0.03	0.02	0.02	0.02	0.39	0.04	<0.01
Silica [mg/L]	26-May-09	09:25	8.43	7.60	8.75	12.8	10.5	10.7	9.36	13.3	8.13	6.73
Strontium [mg/L]	26-May-09	09:25	0.0480	0.0566	0.0626	0.518	0.0699	0.313	0.381	0.259	1.84	0.0464
Zinc [mg/L]	26-May-09	09:25	0.005	0.003	0.005	0.006	0.005	0.005	0.006	0.005	0.006	0.004

Brian Graham B.Sc.
 Project Specialist
 Environmental Services, Analytical



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Greenview Environmental Management

Attn : Tyler Peters tyler.peters@greenview-environmental.ca; dan.hagan@greenview-environmental.ca

Friday, June 05, 2009

Date Rec.: 15 May 2009
 LR Report: CA11053-MAY09
 Reference: 107.09.002 Killaloe GW

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	17:	18:	19:	20:	21:	22:	23:	24:	25:	26:	27:	28:
	MW06-2D	MW07-3S	MW07-3D	R1	R2	R3	GW QA/QC	BH00-4	BH00-5	MW07-4	MW07-5	MW07-6
Sample Date & Time	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09
Temperature Upon Receipt [°C]	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Alkalinity [mg/L as CaCO3]	75	76	83	95	57	74	29	437	663	18	186	43
Solids (Total Dissolved) [mg/L]	197	497	154	94	77	103	66	474	674	71	317	60
COD [mg/L]	36	13	9	8	<8	14	<8	54	67	11	65	11
Nitrogen-Kjeldahl (N) [mg/L]	0.8	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	24.2	25.2	<0.5	1.0	<0.5
Ammonia+Ammonium (N) [mg/L]	0.8	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	25.4	25.3	<0.1	0.6	<0.1
4AAP-Phenolics [mg/L]	---	---	---	---	---	---	---	0.003	0.002	<0.002	0.002	<0.002
Sulphate [mg/L]	18	27	20	16	21	7.9	14	3.3	0.6	16	1.8	5.3
Chloride [mg/L]	3.3	230	26	5.9	3.2	1.7	9.0	52	52	7.5	46	3.3
Nitrite (as nitrogen) [mg/L]	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Nitrate (as nitrogen) [mg/L]	<0.05	1.01	<0.05	5.91	<0.05	1.72	<0.05	<0.05	0.07	0.13	0.08	0.85
Dissolved Organic Carbon [mg/L]	4.5	2.8	1.3	2.8	<1.0	4.1	<1.0	9.6	12.6	<1.0	10.6	1.1
Aluminum [mg/L]	2.38	0.0741	0.228	0.0137	0.0027	0.0558	0.0559	0.0121	0.0452	0.0055	0.0018	0.0016
Barium [mg/L]	0.481	0.165	0.0658	0.116	0.0760	0.0421	0.0675	1.74	2.67	0.0471	0.328	0.0317
Boron [mg/L]	0.0089	0.0059	0.0128	0.0203	0.0425	0.0245	0.0096	0.361	0.479	0.0141	0.0106	0.0148
Calcium [mg/L]	20.7	34.3	28.8	18.9	21.4	28.4	10.2	71.9	109	5.46	41.0	4.77
Cobalt [mg/L]	0.0330	0.0111	0.0191	0.000390	0.000067	0.000184	0.0190	0.0183	0.0286	0.00889	0.00887	0.00923
Chromium [mg/L]	0.0038	0.0008	0.0007	0.0006	<0.0005	<0.0005	<0.0005	0.0030	0.0027	<0.0005	0.0048	<0.0005
Copper [mg/L]	0.0195	0.0034	0.0013	0.0311	0.0801	0.0040	0.0012	0.0010	0.0037	0.0005	0.0015	0.0008



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LR Report: CA11053-MAY09

Analysis	17: MW06-2D	18: MW07-3S	19: MW07-3D	20: R1	21: R2	22: R3	23: GW QA/QC	24: BH00-4	25: BH00-5	26: MW07-4	27: MW07-5	28: MW07-6
Iron [mg/L]	20.5	0.09	0.28	0.02	0.03	0.07	1.26	52.5	77.1	0.03	50.1	0.11
Potassium [mg/L]	2.12	5.41	5.46	3.54	1.68	9.15	1.96	52.8	74.7	1.40	2.37	0.60
Magnesium [mg/L]	7.46	17.2	11.1	8.02	5.52	1.60	6.28	23.7	40.8	3.59	19.2	1.25
Manganese [mg/L]	0.356	0.0416	0.0751	0.0103	0.0151	0.00899	0.0701	1.16	4.54	0.0454	0.524	0.151
Sodium [mg/L]	4.12	139	10.8	4.26	6.17	6.27	3.10	52.7	51.2	2.39	9.21	1.68
Phosphorus [mg/L]	0.21	< 0.01	0.02	< 0.01	< 0.01	0.05	< 0.01	0.04	0.02	< 0.01	0.02	< 0.01
Silica [mg/L]	14.6	9.09	7.56	4.84	5.85	5.05	8.16	12.7	14.9	6.77	9.90	2.17
Strontium [mg/L]	0.0819	0.282	0.237	0.102	0.904	0.181	0.0528	0.507	0.775	0.0253	0.184	0.0311
Zinc [mg/L]	0.016	0.007	0.005	0.020	0.002	0.001	0.004	0.005	0.007	6.50	66.5	23.3

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Thursday, May 28, 2009

Date Rec. : 15 May 2009
 LR Report: CA11054-MAY09
 Reference: 107.09.002 Killaloe SW

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	Sample Date & Time										
			6: SW 1	7: SW 2	8: SW 3	9: SW 5	10: SW 6	11: SW 8	12: SW 9	13: SW QAQC			
Temperature Upon Receipt [°C]	-	-	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09	14-May-09
Alkalinity [mg/L as CaCO3]	27-May-09	22:03	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Solids (Total Dissolved) [mg/L]	27-May-09	19:30	14	16	3	301	63	22	14	13	13	13	13
COD [mg/L]	20-May-09	15:58	114	134	103	389	123	74	83	106	106	106	106
Nitrogen-Kjeldahl (N) [mg/L]	21-May-09	12:13	79	102	73	50	44	38	58	60	60	60	60
Ammonia+Ammonium (N) [mg/L]	21-May-09	20:21	0.6	0.8	1.0	0.8	0.6	<0.5	0.6	0.6	0.6	0.6	0.6
4AAP-Phenolics [mg/L]	21-May-09	11:58	<0.1	<0.1	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphate [mg/L]	28-May-09	13:42	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloride [mg/L]	28-May-09	13:42	1.1	0.4	1.5	12	<0.2	2.5	0.9	0.9	0.9	0.9	0.9
Nitrite (as nitrogen) [mg/L]	25-May-09	10:10	2.4	2.0	6.3	43	2.6	6.0	11	11	11	11	11
Nitrate (as nitrogen) [mg/L]	25-May-09	10:10	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Dissolved Organic Carbon [mg/L]	25-May-09	10:55	<0.05	<0.05	0.06	0.05	<0.05	<0.05	0.96	0.96	0.96	0.96	0.96
Aluminum [mg/L]	25-May-09	14:58	29.8	36.8	27.4	16.0	16.1	14.4	25.4	26.0	26.0	26.0	26.0
Barium [mg/L]	25-May-09	14:58	0.157	0.373	0.356	0.0109	0.0284	0.0494	0.146	0.115	0.115	0.115	0.115
Boron [mg/L]	25-May-09	14:58	0.0188	0.0234	0.0267	0.0869	0.0316	0.0254	0.0238	0.0237	0.0237	0.0237	0.0237
Calcium [mg/L]	25-May-09	14:58	0.0058	0.0047	0.0046	0.151	0.0069	0.0076	0.0069	0.0070	0.0070	0.0070	0.0070
Cobalt [mg/L]	25-May-09	14:58	5.55	6.40	4.55	51.5	14.3	6.49	5.80	5.82	5.82	5.82	5.82
Chromium [mg/L]	25-May-09	14:58	0.000350	0.00139	0.00130	0.000874	0.000209	0.000141	0.000184	0.000174	0.000174	0.000174	0.000174
Copper [mg/L]	25-May-09	14:58	0.0006	0.0010	0.0011	<0.0005	0.0008	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	25-May-09	14:58	0.0008	0.0022	0.0018	0.0011	<0.0005	0.0007	0.0009	0.0011	0.0009	0.0011	0.0011



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LR Report : CA11054-MAY09

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	6: SW 1	7: SW 2	8: SW 3	9: SW 5	10: SW 6	11: SW 8	12: SW 9	13: SW/QAQC
Iron [mg/L]	25-May-09	14:58	0.60	2.15	3.81	2.84	2.85	0.20	1.65	1.61
Potassium [mg/L]	25-May-09	14:58	0.65	0.72	0.77	3.63	1.01	1.72	0.31	0.30
Magnesium [mg/L]	25-May-09	14:58	2.40	2.68	1.96	35.7	5.97	3.34	2.70	2.70
Manganese [mg/L]	25-May-09	14:58	0.0494	0.234	0.0429	0.282	0.0348	0.00799	0.0270	0.0269
Sodium [mg/L]	25-May-09	14:58	2.48	2.54	1.90	32.4	2.33	3.39	6.61	6.72
Phosphorus [mg/L]	25-May-09	14:58	0.04	0.06	0.03	0.03	0.02	0.02	0.03	0.03
Silica [mg/L]	25-May-09	14:58	2.41	2.64	4.22	8.21	2.67	2.70	0.64	0.58
Strontium [mg/L]	25-May-09	14:58	0.0333	0.0399	0.0335	0.324	0.107	0.0396	0.0431	0.0430
Zinc [mg/L]	25-May-09	14:58	0.005	0.009	0.007	0.004	0.001	0.004	0.002	0.002

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Date Rec. : 25 August 2009
 LR Report: CA10020-AUG09
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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date		4: Analysis Approval Time		7: BH00-1		8: BH00-2		9: BH00-3		10: BH00-4D		11: BH00-4S		12: BH04-1S	
	27-Aug-09	01-Sep-09	09:39	09:45	21	31	49	83	< 8	< 0.5	< 0.1	38	80	13	30.6	24.8
Sample Date & Time	27-Aug-09	01-Sep-09	09:39	09:45	21	31	49	83	< 8	< 0.5	< 0.1	38	80	13	30.6	24.8
Alkalinity [mg/L as CaCO3]																
Solids (Total Dissolved) [mg/L]																
COD [mg/L]																
Nitrogen-Kjeldahl (N) [mg/L]																
Ammonia+Ammonium (N) [mg/L]																
4AAP-Phenolics [mg/L]																
Sulphate [mg/L]																
Chloride [mg/L]																
Nitrite (as nitrogen) [mg/L]																
Nitrate (as nitrogen) [mg/L]																
Dissolved Organic Carbon [mg/L]																
Aluminum [mg/L]																
Barium [mg/L]																
Boron [mg/L]																
Calcium [mg/L]																
Cobalt [mg/L]																
Chromium [mg/L]																
Copper [mg/L]																
Iron [mg/L]																



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LR Report: CA10020-AUG09

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	7: BH00-1	8: BH00-2	9: BH00-3	10: BH00-4D	11: BH00-4S	12: BH04-1S
Potassium [mg/L]	31-Aug-09	07:57	1.36	2.21	1.53	2.31	67.4	5.13
Magnesium [mg/L]	31-Aug-09	07:57	4.60	5.81	5.28	3.35	27.0	30.5
Manganese [mg/L]	01-Sep-09	10:20	0.0775	0.0450	0.240	0.0964	1.15	0.855
Sodium [mg/L]	31-Aug-09	07:57	4.16	4.69	3.74	6.56	49.3	81.4
Phosphorus [mg/L]	31-Aug-09	07:57	0.02	< 0.01	0.03	0.02	0.03	0.02
Silica [mg/L]	31-Aug-09	07:57	7.77	6.32	8.05	9.87	13.6	10.1
Strontium [mg/L]	31-Aug-09	07:57	0.0476	0.0509	0.0484	0.0495	0.476	0.289
Zinc [mg/L]	01-Sep-09	10:20	0.005	0.005	0.005	0.004	0.005	0.006
Benzene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Bromodichloromethane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Bromoform [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Bromomethane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Carbon tetrachloride [ug/L]	01-Sep-09	11:03	< 0.2	--	--	--	--	--
Chloroethane [ug/L]	01-Sep-09	11:03	< 5	--	--	--	--	--
Chloroform [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Chloromethane [ug/L]	01-Sep-09	11:03	< 5	--	--	--	--	--
Dibromochloromethane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,2-Dichlorobenzene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,3-Dichlorobenzene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,4-Dichlorobenzene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,1-Dichloroethane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,2-Dichloroethane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,1-Dichloroethylene (vinylidene chloride) [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,2-Dichloropropane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
trans-1,2-Dichloroethene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
cis-1,2-Dichloroethene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
cis-1,3-Dichloropropene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
trans-1,3-Dichloropropene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Ethylbenzene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Ethylenedibromide [ug/L]	01-Sep-09	11:03	< 0.2	--	--	--	--	--
Dichloromethane [ug/L]	01-Sep-09	11:03	< 2	--	--	--	--	--
Monochlorobenzene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
Styrene [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--
1,1,2,2-Tetrachloroethane [ug/L]	01-Sep-09	11:03	< 0.5	--	--	--	--	--



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LR Report : CA10020-AUG09

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	7: BH00-1	8: BH00-2	9: BH00-3	10: BH00-4D	11: BH00-4S	12: BH04-1S
Tetrachloroethene [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
Toluene [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
Trichloroethylene [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
Vinyl Chloride [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
Trichlorofluoromethane [ug/L]	01-Sep-09	11:03	< 5	---	---	---	---	---
1,1,1-Trichloroethane [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
1,1,2-Trichloroethane [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
Xylene (Total) [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
o-xylene [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
m/p-xylene [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---
2-ChloroethyVinylether [ug/L]	01-Sep-09	11:03	*<5	---	---	---	---	---
1,1,1,2-Tetrachloroethane [ug/L]	01-Sep-09	11:03	< 0.5	---	---	---	---	---

*2-chloroethyl vinyl ether analyzed from vial preserved with HCl.

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Final Report

Analysis	13:	14:	15:	16:	17:	18:	19:	20:
	BH04-1D	MW06-1S	MW06-1D	MW06-2S	MW06-2D	MW07-3S	MW07-3D	R1
Sample Date & Time	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09
Alkalinity [mg/L as CaCO3]	410	137	100	31	72	94	96	57
Solids (Total Dissolved) [mg/L]	454	289	471	54	191	520	177	97
COD [mg/L]	53	70	< 8	11	42	10	8	10
Nitrogen-Kjeldahl (N) [mg/L]	0.8	5.2	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5
Ammonia+Ammonium (N) [mg/L]	0.4	4.6	0.2	< 0.1	0.7	< 0.1	0.2	< 0.1
4AAP-Phenolics [mg/L]	---	---	---	---	---	---	---	---
Sulphate [mg/L]	2.5	0.5	32	12	18	21	20	8.1
Chloride [mg/L]	41	48	160	4.2	3.7	240	30	2.2
Nitrite (as nitrogen) [mg/L]	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate (as nitrogen) [mg/L]	< 0.05	< 0.05	< 0.05	0.12	< 0.05	1.03	< 0.05	1.78
Dissolved Organic Carbon [mg/L]	9.2	26.0	< 1.0	1.2	3.5	2.4	< 1.0	1.7
Aluminum [mg/L]	0.0887	0.143	0.573	0.103	0.898	0.308	0.205	0.0243
Barium [mg/L]	0.436	0.125	0.205	0.0697	0.463	0.170	0.0724	0.0937
Boron [mg/L]	0.272	0.0141	0.0322	0.0238	0.0074	0.0068	0.0126	0.0225
Calcium [mg/L]	62.7	35.9	76.8	7.50	19.1	33.5	29.3	13.8
Cobalt [mg/L]	0.0114	0.0102	0.00939	0.00257	0.0243	0.0104	0.0206	0.000259
Chromium [mg/L]	0.0018	0.0024	0.0047	0.0009	0.0026	0.0016	0.0010	0.0009
Copper [mg/L]	0.0018	0.0015	0.0031	0.0022	0.0055	0.0041	0.0012	0.0234
Iron [mg/L]	31.0	1.60	0.90	8.76	19.0	0.55	0.28	0.02



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LR Report : CA10020-AUG09

Analysis	13: BH04-1D	14: MW06-1S	15: MW06-1D	16: MW06-2S	17: MW06-2D	18: MW07-3S	19: MW07-3D	20: R1
Potassium [mg/L]	8.24	3.37	6.08	1.84	1.71	5.67	5.40	3.13
Magnesium [mg/L]	33.9	15.7	21.4	4.07	6.36	16.5	11.1	5.73
Manganese [mg/L]	1.00	0.267	0.0946	0.0699	0.300	0.0516	0.0765	0.00659
Sodium [mg/L]	40.3	10.3	23.4	4.24	4.39	133	10.6	3.12
Phosphorus [mg/L]	0.03	0.50	0.07	0.02	0.11	0.02	0.02	< 0.01
Silica [mg/L]	8.71	13.3	8.02	6.71	12.7	10.6	7.03	4.72
Strontium [mg/L]	0.362	0.290	1.49	0.0472	0.0771	0.258	0.240	0.0719
Zinc [mg/L]	0.007	0.005	0.006	0.003	0.012	0.010	0.003	0.019
Benzene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromomethane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride [ug/L]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chloroethane [ug/L]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroform [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloromethane [ug/L]	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dibromochloromethane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethylene (vinylidene chloride) [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,2-Dichloroethene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylenedibromide [ug/L]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dichloromethane [ug/L]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Monochlorobenzene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Styrene [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane [ug/L]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5



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LR Report : CA10020-AUG09

Analysis	13: BH04-1D	14: MW06-1S	15: MW06-1D	16: MW06-2S	17: MW06-2D	18: MW07-3S	19: MW07-3D	20: R1
Tetrachloroethene [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Toluene [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Trichloroethylene [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Vinyl Chloride [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Trichlorofluoromethane [ug/L]	--	< 5	< 5	< 5	< 5	< 5	< 5	--
1,1,1-Trichloroethane [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
1,1,2-Trichloroethane [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
Xylene (Total) [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
o-xylene [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
m/p-xylene [ug/L]	--	*<5	*<5	*<5	*<5	*<5	*<5	--
2-Chloroethylvinylether [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--
1,1,1,2-Tetrachloroethane [ug/L]	--	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	--

*2-chloroethyl vinyl ether analyzed from vial preserved with HCl.

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Thursday, September 03, 2009

Date Rec. : 25 August 2009
LR Report: CA10020-AUG09
Reference: 107.09.002 Killaloe GW
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CERTIFICATE OF ANALYSIS
Final Report

Analysis	21:	22:	23:	24:	25:	26:	27:	28:
	R2	R3	GW QA/QC	BH00-4	BH00-5	MW07-4	MW07-5	MW07-6
Sample Date & Time	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09
Alkalinity [mg/L as CaCO3]	69	96	101	577	730	21	212	61
Solids (Total Dissolved) [mg/L]	100	146	529	591	749	54	309	63
COD [mg/L]	< 8	15	14	69	79	< 8	60	71
Nitrogen-Kjeldahl (N) [mg/L]	< 0.5	< 0.5	< 0.5	30.8	29.0	< 0.5	1.0	< 0.5
Ammonia+Ammonium (N) [mg/L]	< 0.1	< 0.1	< 0.1	30.5	29.1	0.3	0.6	< 0.1
4AAP-Phenolics [mg/L]	---	---	---	0.002	< 0.002	< 0.002	< 0.002	< 0.002
Sulphate [mg/L]	23	7.7	22	1.2	< 0.2	16	1.0	1.9
Chloride [mg/L]	2.6	1.5	210	73	67	6.6	51	2.5
Nitrite (as nitrogen) [mg/L]	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate (as nitrogen) [mg/L]	< 0.05	1.82	1.07	< 0.05	< 0.05	0.15	0.05	< 0.05
Dissolved Organic Carbon [mg/L]	< 1.0	3.9	2.5	23.3	13.7	1.0	12.5	< 1.0
Aluminum [mg/L]	0.0025	0.0417	0.135	0.0183	0.0661	0.0040	0.0045	0.0015
Barium [mg/L]	0.0605	0.0400	0.157	2.08	3.04	0.0497	0.369	0.0688
Boron [mg/L]	0.105	0.0258	0.0067	0.436	0.480	0.0120	0.0139	0.0207
Calcium [mg/L]	19.6	30.3	31.7	86.1	112	5.37	42.4	8.20
Cobalt [mg/L]	0.000033	0.000159	0.00273	0.00881	0.0209	0.00340	0.00841	0.00702
Chromium [mg/L]	< 0.0005	0.0006	0.0012	0.0040	0.0033	0.0009	0.0009	0.0005
Copper [mg/L]	0.0875	0.0042	0.0030	0.0009	0.0041	0.0006	0.0013	0.0010
Iron [mg/L]	0.04	0.03	0.21	65.1	84.8	0.31	58.3	0.08



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LR Report : CA10020-AUG09

Analysis	21: R2	22: R3	23: GW QA/QC	24: BH00-4	25: BH00-5	26: MW07-4	27: MW07-5	28: MW07-6
Potassium [mg/L]	1.44	9.01	5.61	52.7	70.9	1.75	2.54	0.99
Magnesium [mg/L]	4.65	1.22	15.7	23.7	38.5	3.28	19.0	2.08
Manganese [mg/L]	0.0124	0.00582	0.0316	1.21	4.09	0.0280	0.486	0.176
Sodium [mg/L]	11.6	6.07	175	47.6	43.3	2.55	9.59	2.59
Phosphorus [mg/L]	< 0.01	0.06	0.01	0.03	0.02	< 0.01	0.01	< 0.01
Silica [mg/L]	4.78	4.70	10.3	12.0	13.0	6.72	9.11	2.00
Strontium [mg/L]	0.875	0.196	0.256	0.599	0.797	0.0266	0.202	0.0544
Zinc [mg/L]	0.003	0.001	0.004	0.005	0.006	6.68	49.8	8.43
Benzene [ug/L]	--	--	--	--	3.3	--	--	--
Bromodichloromethane [ug/L]	--	--	--	--	< 0.5	--	--	--
Bromoform [ug/L]	--	--	--	--	< 0.5	--	--	--
Bromomethane [ug/L]	--	--	--	--	< 0.5	--	--	--
Carbon tetrachloride [ug/L]	--	--	--	--	< 0.2	--	--	--
Chloroethane [ug/L]	--	--	--	--	< 5	--	--	--
Chloroform [ug/L]	--	--	--	--	< 0.5	--	--	--
Chloromethane [ug/L]	--	--	--	--	< 5	--	--	--
Dibromochloromethane [ug/L]	--	--	--	--	< 0.5	--	--	--
1,2-Dichlorobenzene [ug/L]	--	--	--	--	< 0.5	--	--	--
1,3-Dichlorobenzene [ug/L]	--	--	--	--	< 0.5	--	--	--
1,4-Dichlorobenzene [ug/L]	--	--	--	--	1.9	--	--	--
1,1-Dichloroethane [ug/L]	--	--	--	--	0.84	--	--	--
1,2-Dichloroethane [ug/L]	--	--	--	--	< 0.5	--	--	--
1,1-Dichloroethylene (vinylidene chloride) [ug/L]	--	--	--	--	< 0.5	--	--	--
1,2-Dichloropropane [ug/L]	--	--	--	--	< 0.5	--	--	--
trans-1,2-Dichloroethene [ug/L]	--	--	--	--	< 0.5	--	--	--
cis-1,2-Dichloroethene [ug/L]	--	--	--	--	9.1	--	--	--
cis-1,3-Dichloropropene [ug/L]	--	--	--	--	< 0.5	--	--	--
trans-1,3-Dichloropropene [ug/L]	--	--	--	--	< 0.5	--	--	--
Ethylbenzene [ug/L]	--	--	--	--	4.3	--	--	--
Ethylendibromide [ug/L]	--	--	--	--	< 0.2	--	--	--
Dichloromethane [ug/L]	--	--	--	--	< 2	--	--	--
Monochlorobenzene [ug/L]	--	--	--	--	1.1	--	--	--
Styrene [ug/L]	--	--	--	--	< 0.5	--	--	--
1,1,2,2-Tetrachloroethane [ug/L]	--	--	--	--	< 0.5	--	--	--



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LR Report : CA10020-AUG09

Analysis	21: R2	22: R3	23: GW QA/QC	24: BH00-4	25: BH00-5	26: MW07-4	27: MW07-5	28: MW07-6
Tetrachloroethene [ug/L]	---	---	---	---	< 0.5	---	---	---
Toluene [ug/L]	---	---	---	---	2.4	---	---	---
Trichloroethylene [ug/L]	---	---	---	---	< 0.5	---	---	---
Vinyl Chloride [ug/L]	---	---	---	---	0.54	---	---	---
Trichlorofluoromethane [ug/L]	---	---	---	---	< 5	---	---	---
1,1,1-Trichloroethane [ug/L]	---	---	---	---	< 0.5	---	---	---
1,1,2-Trichloroethane [ug/L]	---	---	---	---	< 0.5	---	---	---
Xylene (Total) [ug/L]	---	---	---	---	1.6	---	---	---
o-xylene [ug/L]	---	---	---	---	< 0.5	---	---	---
m/p-xylene [ug/L]	---	---	---	---	1.2	---	---	---
2-Chloroethylvinylether [ug/L]	---	---	---	---	* < 5	---	---	---
1,1,1,2-Tetrachloroethane [ug/L]	---	---	---	---	< 0.5	---	---	---

*2-chloroethyl vinyl ether analyzed from vial preserved with HCl.

Brian Graham B. Sc.
 Project Specialist
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Greenview Environmental Management

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Tuesday, September 01, 2009

Date Rec. : 25 August 2009
 LR Report: CA10021-AUG09
 Reference: 107.09.002 Killaloe SW

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	6: SW 1		7: SW 2		8: SW 5		9: SW 6		10: SW 8		11: SW 9		12: SW QAQC	
			24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09	24-Aug-09
Sample Date & Time			10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Temperature Upon Receipt [°C]			28	36	458	106	41	39	41	186	186	186	186	186	186	186
Alkalinity [mg/L as CaCO3]	27-Aug-09	09:39	209	237	623	197	146	169	146	119	119	119	119	119	119	119
Solids (Total Dissolved) [mg/L]	27-Aug-09	08:40	150	338	131	65	90	110	90	0.9	0.9	0.9	0.9	0.9	0.9	0.9
COD [mg/L]	27-Aug-09	08:42	1.3	1.4	1.0	0.8	0.8	0.8	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrogen-Kjeldahl (N) [mg/L]	26-Aug-09	09:46	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ammonia+Ammonium (N) [mg/L]	26-Aug-09	09:10	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4AAP-Phenolics [mg/L]	28-Aug-09	09:49	<0.2	<0.2	1.1	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sulphate [mg/L]	31-Aug-09	16:21	2.9	1.5	57	3.8	6.6	8.2	6.6	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Chloride [mg/L]	31-Aug-09	16:21	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Nitrite (as nitrogen) [mg/L]	31-Aug-09	16:21	0.05	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate (as nitrogen) [mg/L]	31-Aug-09	16:21	56.0	75.5	35.4	24.8	31.1	33.7	31.1	34.3	34.3	34.3	34.3	34.3	34.3	34.3
Dissolved Organic Carbon [mg/L]	27-Aug-09	10:29	0.243	0.582	0.0204	0.0214	0.0939	0.0569	0.0939	0.0610	0.0610	0.0610	0.0610	0.0610	0.0610	0.0610
Aluminum [mg/L]	01-Sep-09	10:26	0.0450	0.0637	0.163	0.0707	0.0508	0.0505	0.0508	0.0494	0.0494	0.0494	0.0494	0.0494	0.0494	0.0494
Barium [mg/L]	01-Sep-09	14:53	0.0028	0.0020	0.113	0.0069	0.0031	0.0031	0.0031	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038
Boron [mg/L]	01-Sep-09	10:26	10.7	13.7	76.7	25.4	11.6	11.1	11.6	11.1	11.1	11.1	11.1	11.1	11.1	11.1
Calcium [mg/L]	01-Sep-09	14:53	0.00144	0.00274	0.00215	0.000558	0.000577	0.000577	0.000577	0.000568	0.000568	0.000568	0.000568	0.000568	0.000568	0.000568
Cobalt [mg/L]	01-Sep-09	10:26	0.0013	0.0021	0.0006	0.0005	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Chromium [mg/L]	01-Sep-09	10:26	0.0021	0.0014	0.0042	0.0006	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008
Copper [mg/L]	01-Sep-09	10:26	0.0021	0.0014	0.0042	0.0006	0.0007	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008



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LR Report : CA10021-AUG09

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	6: SW 1	7: SW 2	8: SW 5	9: SW 6	10: SW 8	11: SW 9	12: SW QA/QC
Iron [mg/L]	01-Sep-09	14:53	1.89	8.30	5.28	5.21	1.16	6.76	6.43
Potassium [mg/L]	01-Sep-09	14:53	0.47	0.50	4.29	1.36	0.69	0.67	0.70
Magnesium [mg/L]	01-Sep-09	14:53	4.17	5.11	46.3	9.39	5.31	5.17	5.15
Manganese [mg/L]	01-Sep-09	10:26	0.278	0.381	1.85	0.540	0.112	0.159	0.155
Sodium [mg/L]	01-Sep-09	14:53	2.66	2.13	41.8	2.84	3.50	4.70	5.06
Phosphorus [mg/L]	01-Sep-09	14:53	0.07	0.14	0.10	0.04	0.02	0.02	0.03
Silica [mg/L]	01-Sep-09	14:53	7.07	7.16	13.0	8.92	8.12	5.95	5.92
Strontium [mg/L]	01-Sep-09	14:53	0.0661	0.0862	0.506	0.130	0.0731	0.0849	0.0864
Zinc [mg/L]	01-Sep-09	10:26	0.015	0.018	0.006	0.002	0.008	0.003	0.004


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Greenview Environmental Management

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Monday, October 19, 2009

Date Rec.: 09 October 2009
 LR Report: CA10119-OCT09
 Reference: 107.09.002 Killaloe GW

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CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	08-Oct-09															
			7: BH00-1	8: BH00-2	9: BH00-3	10: BH00-4D	11: BH00-4S	12: BH04-1S	13: BH04-1D	14: MW06-1S	15: MW06-1D	16: MW06-2S						
Sample Date & Time	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09		
Temperature Upon Receipt [°C]	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Alkalinity [mg/L as CaCO3]	14-Oct-09	10:22	18	28	45	30	367	383	119	93	30	30	30	30	30	30		
Solids (Total Dissolved) [mg/L]	15-Oct-09	13:30	117	100	126	123	531	500	311	443	66	66	66	66	66	66		
COD [mg/L]	13-Oct-09	15:05	12	< 8	< 8	11	41	29	60	< 8	< 8	< 8	< 8	< 8	< 8	< 8		
Nitrogen-Kjeldahl (N) [mg/L]	16-Oct-09	13:27	< 0.5	< 0.5	< 0.5	1.1	0.8	1.0	5.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Ammonia+Ammonium (N) [mg/L]	14-Oct-09	09:58	0.2	< 0.1	0.1	0.9	0.1	0.4	4.8	< 0.1	0.1	0.1	0.1	0.1	0.1	0.1		
4AAP-Phenolics [mg/L]	14-Oct-09	09:27	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Sulphate [mg/L]	16-Oct-09	08:27	20	17	6.0	14	4.5	2.6	0.4	32	11	11	11	11	11	11		
Chloride [mg/L]	16-Oct-09	15:49	16	12	3.8	9.2	51	39	47	150	4.2	4.2	4.2	4.2	4.2	4.2		
Nitrite (as nitrogen) [mg/L]	15-Oct-09	12:56	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06		
Nitrate (as nitrogen) [mg/L]	15-Oct-09	12:56	< 0.05	< 0.05	0.36	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Dissolved Organic Carbon [mg/L]	15-Oct-09	10:04	1.7	< 1.0	1.4	1.1	10.1	9.6	26.5	1.2	1.4	1.4	1.4	1.4	1.4	1.4		
Aluminum [mg/L]	15-Oct-09	13:12	0.0574	0.0567	0.390	0.161	0.0491	0.0581	0.147	0.451	0.106	0.106	0.106	0.106	0.106	0.106		
Barium [mg/L]	15-Oct-09	13:12	0.0754	0.0737	0.0424	0.0881	2.48	0.438	0.108	0.168	0.0605	0.0605	0.0605	0.0605	0.0605	0.0605		
Boron [mg/L]	15-Oct-09	13:12	0.0201	0.0176	0.0133	0.0219	0.467	0.312	0.0187	0.0386	0.0254	0.0254	0.0254	0.0254	0.0254	0.0254		
Calcium [mg/L]	15-Oct-09	11:25	8.26	9.26	9.77	8.06	89.2	65.6	35.9	73.7	7.72	7.72	7.72	7.72	7.72	7.72		
Cobalt [mg/L]	15-Oct-09	13:12	0.00753	0.0122	0.0113	0.00540	0.00648	0.0122	0.00893	0.0120	0.00565	0.00565	0.00565	0.00565	0.00565	0.00565		
Chromium [mg/L]	15-Oct-09	13:12	0.0017	0.0010	0.0009	0.0026	0.0037	0.0016	0.0015	0.0022	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010		
Copper [mg/L]	15-Oct-09	13:12	0.0010	0.0008	0.0017	0.0008	0.0012	0.0011	0.0010	0.0024	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023		

Page 1 of 2
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 Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.



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LR Report : CA10119-OCT09

Analysis	3: Approval Date	4: Analysis Approval Time	7: BH00-1	8: BH00-2	9: BH00-3	10: BH00-4D	11: BH00-4S	12: BH04-1S	13: BH04-1D	14: MW06-1S	15: MW06-1D	16: MW06-2S
Iron [mg/L]	15-Oct-09	11:25	19.9	0.80	0.47	19.8	89.7	68.1	32.8	1.74	0.61	7.52
Potassium [mg/L]	15-Oct-09	11:25	1.35	2.09	1.56	2.11	71.1	5.10	8.20	3.29	5.44	1.87
Magnesium [mg/L]	15-Oct-09	11:25	4.71	5.92	5.53	3.36	32.5	30.9	35.4	15.6	20.4	4.24
Manganese [mg/L]	15-Oct-09	13:12	0.0723	0.0410	0.272	0.0959	1.50	0.848	1.10	0.256	0.0906	0.0677
Sodium [mg/L]	15-Oct-09	11:25	3.96	4.65	3.66	6.06	59.2	85.5	55.8	9.89	21.1	4.14
Phosphorus [mg/L]	15-Oct-09	11:25	0.02	< 0.01	0.03	0.02	0.04	0.02	0.02	0.57	0.04	0.01
Silica [mg/L]	15-Oct-09	11:25	7.93	6.11	8.41	10.00	14.9	10.4	8.91	13.9	8.16	6.98
Strontium [mg/L]	15-Oct-09	11:25	0.0475	0.0505	0.0492	0.0472	0.617	0.290	0.379	0.298	1.40	0.0464
Zinc [mg/L]	15-Oct-09	13:12	0.003	0.005	0.006	0.003	0.004	0.006	0.005	0.005	0.005	0.004

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Monday, October 19, 2009

Date Rec. : 09 October 2009
 LR Report: CA10119-OCT09
 Reference: 107.09.002 Killaloe GW
 Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	17: MW06-2D	18: MW07-3S	19: MW07-3D	20: R1	21: R2	22: R3	23: GW QA/QC	24: BH00-4	25: BH00-5	26: MW07-4	27: MW07-5	28: MW07-6
Sample Date & Time	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09
Temperature Upon Receipt [°C]	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Alkalinity [mg/L as CaCO3]	85	89	105	55	66	101	103	536	734	17	212	65
Solids (Total Dissolved) [mg/L]	174	211	486	109	117	137	306	631	889	80	406	66
COD [mg/L]	< 8	< 8	< 8	9	< 8	< 8	63	47	74	< 8	75	16
Nitrogen-Kjeldahl (N) [mg/L]	0.8	0.6	< 0.5	< 0.5	< 0.5	0.6	6.2	31.0	28.0	< 0.5	1.1	< 0.5
Ammonia+Ammonium (N) [mg/L]	0.6	< 0.1	0.3	< 0.1	< 0.1	< 0.1	5.6	31.3	28.2	< 0.1	0.7	0.2
4AAP-Phenolics [mg/L]	—	—	—	—	—	—	—	0.004	0.004	< 0.002	< 0.002	< 0.002
Sulphate [mg/L]	16	18	22	6.8	24	7.3	0.6	1.2	< 0.2	16	1.2	1.2
Chloride [mg/L]	3.6	26	190	1.7	2.0	1.4	48	64	89	6.7	49	2.2
Nitrite (as nitrogen) [mg/L]	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate (as nitrogen) [mg/L]	0.11	< 0.05	1.09	1.10	< 0.05	1.59	1.11	< 0.05	< 0.05	0.16	< 0.05	< 0.05
Dissolved Organic Carbon [mg/L]	3.9	2.0	3.2	2.8	< 1.0	4.0	27.5	10.0	15.4	< 1.0	11.3	< 1.0
Aluminum [mg/L]	0.0943	0.381	0.0524	0.0169	0.0027	0.0247	0.149	0.0173	0.0557	0.0028	0.0049	0.0022
Barium [mg/L]	0.555	0.0744	0.141	0.0896	0.0655	0.0366	0.104	2.04	3.31	0.0567	0.341	0.0550
Boron [mg/L]	0.0109	0.0151	0.0103	0.0251	0.0721	0.0280	0.0129	0.449	0.544	0.0184	0.0199	0.0256
Calcium [mg/L]	24.7	29.6	36.7	13.6	20.6	32.1	35.3	86.9	124	5.35	43.1	7.96
Cobalt [mg/L]	0.000521	0.0135	0.00457	0.000269	0.000051	0.000129	0.00787	0.0120	0.0266	0.00588	0.00301	0.00673
Chromium [mg/L]	0.0007	0.0013	0.0036	0.0010	< 0.0005	0.0006	0.0028	0.0034	0.0031	< 0.0005	0.0007	< 0.0005
Copper [mg/L]	0.0039	0.0014	0.0028	0.0556	0.0035	0.0034	0.0011	0.0009	0.0030	< 0.0005	0.0011	< 0.0005

Page 1 of 2
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 Test method information available upon request. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.



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LR Report: CA10119-OCT09

Analysis	17: MW06-2D	18: MW07-3S	19: MW07-3D	20: R1	21: R2	22: R3	23: GW QA/QC	24: BH00-4	25: BH00-5	26: MW07-4	27: MW07-5	28: MW07-6
Iron [mg/L]	0.09	0.53	0.10	0.03	0.03	<0.01	1.82	69.2	99.9	0.08	29.5	0.05
Potassium [mg/L]	1.75	5.30	5.20	3.22	1.53	9.02	3.29	52.3	71.0	1.51	2.45	0.89
Magnesium [mg/L]	6.64	11.3	17.3	6.02	5.15	1.06	15.4	23.6	42.5	3.40	19.2	2.08
Manganese [mg/L]	0.298	0.0609	0.0313	0.00681	0.0138	0.00105	0.243	1.33	4.10	0.0451	0.523	0.217
Sodium [mg/L]	4.21	9.12	136	2.65	7.93	5.83	10.3	62.8	67.2	2.44	9.60	2.33
Phosphorus [mg/L]	0.01	0.04	<0.01	<0.01	<0.01	0.08	0.64	0.03	0.03	0.01	0.02	<0.01
Silica [mg/L]	11.0	7.39	10.9	5.10	5.38	4.74	14.0	13.0	13.3	6.93	8.28	2.68
Strontium [mg/L]	0.0869	0.242	0.266	0.0700	0.877	0.216	0.298	0.604	0.873	0.0251	0.196	0.0509
Zinc [mg/L]	0.005	0.004	0.005	0.028	0.010	<0.001	0.004	0.005	0.006	---	---	---
Zinc [mg/L]	---	---	---	---	---	---	---	---	---	7.79	66.2	12.1

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Monday, October 26, 2009

Date Rec. : 09 October 2009
 LR Report: CA10120-OCT09
 Reference: 107.09.002 Killaloe SW

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	6: SW 1	7: SW 6	8: SW 8	9: SW 9	10: SW QAQC
Sample Date & Time			08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09	08-Oct-09
Temperature Upon Receipt [°C]	--	---	10.0	10.0	10.0	10.0	10.0
Alkalinity [mg/L as CaCO3]	14-Oct-09	10:21	14	71	23	33	34
Solids (Total Dissolved) [mg/L]	14-Oct-09	07:33	134	126	100	186	171
COD [mg/L]	13-Oct-09	15:05	87	41	34	111	123
Nitrogen-Kjeldahl (N) [mg/L]	15-Oct-09	11:02	1.1	0.7	0.7	2.5	1.3
Ammonia+Ammonium (N) [mg/L]	14-Oct-09	10:08	< 0.1	< 0.1	0.2	< 0.1	< 0.1
4AAP-Phenolics [mg/L]	14-Oct-09	09:27	< 0.001	< 0.001	< 0.001	0.002	0.002
Sulphate [mg/L]	15-Oct-09	08:50	1.1	0.4	0.6	0.2	0.3
Chloride [mg/L]	15-Oct-09	12:07	4.6	3.7	10	12	13
Nitrite (as nitrogen) [mg/L]	26-Oct-09	12:25	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Nitrate (as nitrogen) [mg/L]	26-Oct-09	12:25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dissolved Organic Carbon [mg/L]	15-Oct-09	10:06	25.1	12.7	13.3	30.3	26.7
Aluminum [mg/L]	16-Oct-09	08:14	0.120	0.103	0.0320	0.0760	0.0983
Barium [mg/L]	16-Oct-09	08:14	0.0217	0.0453	0.0249	0.0516	0.0522
Boron [mg/L]	16-Oct-09	08:14	0.0024	0.0036	0.0024	0.0028	0.0029
Calcium [mg/L]	16-Oct-09	08:14	6.97	17.8	7.22	10.7	10.7
Cobalt [mg/L]	16-Oct-09	08:14	0.000136	0.000377	0.000082	0.000530	0.000524
Chromium [mg/L]	16-Oct-09	08:14	0.0005	0.0006	< 0.0005	0.0006	0.0005
Copper [mg/L]	16-Oct-09	08:14	< 0.0005	< 0.0005	< 0.0005	0.0007	0.0007
Iron [mg/L]	16-Oct-09	08:14	0.58	4.66	0.18	9.37	9.50
Potassium [mg/L]	16-Oct-09	08:14	0.54	1.57	1.61	1.10	1.11
Magnesium [mg/L]	16-Oct-09	08:14	3.08	7.35	3.81	5.54	5.56
Manganese [mg/L]	16-Oct-09	08:14	0.0165	0.207	0.0065	0.138	0.136
Sodium [mg/L]	16-Oct-09	08:14	2.69	2.75	3.51	5.74	5.77
Phosphorus [mg/L]	16-Oct-09	08:14	< 0.01	0.02	< 0.01	< 0.01	0.01
Silica [mg/L]	16-Oct-09	08:14	6.86	6.39	8.00	7.95	8.03
Strontium [mg/L]	16-Oct-09	08:14	0.0400	0.105	0.0430	0.0761	0.0765
Zinc [mg/L]	16-Oct-09	08:14	0.005	0.003	0.002	0.004	0.005



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APPENDIX F

Statement of Service Conditions and Limitations



GREENVIEW ENVIRONMENTAL MANAGEMENT LIMITED - STATEMENT OF SERVICE CONDITIONS AND LIMITATIONS

Provision of Services and Payment

Upon documented acceptance of Greenview's proposed services, costs and associated terms by the client, Greenview may commence work on the proposed services directly. Upon retention of Greenview's services related to this project, the client agrees to remit payment for the services rendered for the specified period within (30) days of receipt as invoiced by Greenview on a typical monthly basis, unless otherwise arranged between the client and Greenview. In the event of non-payment by the client, Greenview reserves the right, without external influence or expense, to discontinue services and retain any documentation, data, reports, or other project information until such time as payment is received by Greenview.

Warranty, Limitations, and Reliance

Greenview relies on background and historical information from the client to determine the appropriate scope of services to meet the client's objectives, in accordance with applicable legislation, guidelines, industry practices, and accepted methodologies.

Greenview provides its services under the specific terms and conditions of a specific proposal (and where necessary formal contract), in accordance with the above requirements and the *Limitations Act 2002*, only.

The hypotheses, results, conclusions, and recommendations presented in documentation authored by Greenview are founded on the information provided by the client to Greenview in preparation for the work. Facts, conditions, and circumstances discovered by Greenview during the performance of the work requested by the client are assumed by Greenview to be part of preparatory information provided by the client as part of the proposal stage of the project. Greenview assumes that, until notified or discovered otherwise, that the information provided by, or obtained by Greenview from, the client is factual, accurate, and represents a true depiction of the circumstances that exist related to the time of the work.

Greenview relies on its clients to inform Greenview if there are changes to any related information to the work. Greenview does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Greenview will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Greenview during the period that services, work, or documentation preparation was performed by Greenview.

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A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Greenview's work or report considers any locations or times other than those from which information, sample results and data were specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those based on extrapolations.

Only conditions, and substances, at the site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the site that were not chosen for study by the client, or any other matter not specifically addressed in a report prepared by Greenview, are beyond the scope of the work performed by Greenview and such matters have not been investigated or addressed.

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