2023/2024 Monitoring Report

Final

Westmeath Waste Disposal Site – ECA No. A413602
Township of Whitewater Region

March 20, 2025

Jp2g Project # 17-6048I



Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

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EXECUTIVE SUMMARY

The Closed Westmeath Waste Disposal Site is owned and operated by the Township of Whitewater Region and is located within Part of Lot 20, Concession VI and EML, Part of Lot 30, North Front "A" and Part of the Road Allowance between Concession VI and North Front "A", in the geographic Township of Westmeath. The completion of the Report is required to satisfy Condition 47 of the Environmental Compliance Approval (ECA) Number A413602 last amended under Notice 6 dated March 20, 2008. The Ministry of the Environment and Climate Change in their letter dated September 23, 2014, confirmed the reporting frequency on a Biennial basis.

Groundwater levels obtained in 2023 and 2024 confirm the direction of overburden groundwater to be similar to previous years and is shown to be to the north/northwest from beneath the landfill site.

The chemical analysis indicates that the groundwater beneath the landfill site is impacted. Monitoring well BH11B is characterized by elevated leachate inorganic indicator parameters (chloride, sodium, potassium, boron, conductivity, alkalinity, COD, TDS and manganese) above background values. Other overburden monitors continue to reveal low chemical concentrations, although in some instances these values exceed background levels.

No health-related parameters were measured to exceed the Reasonable Use Policy Objectives (RUPO) in 2023 or 2024. Aesthetic exceedances included:

- manganese at BH8A, BH8B, BH4A, and BH14 during both monitoring events as well as at BH4B in 2023 and BH7B in 2024
- iron at monitor BH8B, BH4A, and BH14 during both monitoring events as well as at BH4B in 2023
- TDS at BH8B, BH4A, and BH14 during both monitoring events and BH7A and BH7B in 2024
- sodium at BH7A in 2024

The Ministry has confirmed the site meets the intent of the reasonable use policy.

The iron and manganese concentrations are variable across the site. The concentrations may in part be related to the local mineralogy of the soil and are typical of background levels in Renfrew County. As concluded by Gartner Lee Ltd. 2007, the slightly elevated TDS concentrations are probably due to leachate effects or may be due to the evaporative effects caused by the seasonal ponded area between the landfill and the downgradient monitors.

Surface water samples were collected for analysis in 2023 and 2024 from two upstream locations (SW-3 and SW-3A) and two downstream locations (SW-5 and SW-20).

The trigger assessment for the site has been reviewed and, based on the 2024 sampling values at SW-5, indicate that all values are below their respective guidelines and therefore the surface water trigger mechanism has not been exceeded.

The following is recommended to be completed at the site:

- Maintain all key monitoring wells in good working order.
- Complete monitoring and reporting as recommended in **Section 8** of this report.

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1.0 INTRODUCTION

The closed Westmeath Waste Disposal Site (WDS and or the Site) is owned and operated by the Township of Whitewater Region and is located within Part of Lot 20, Concession VI and EML, Part of Lot 30, North Front "A" and Part of the Road Allowance between Concession VI and North Front "A", in the geographic Township of Westmeath (**Figure 1**).

The completion of an Annual Monitoring Report is required to satisfy Condition 47 of the ECA No. A413602 last amended under Notice No. 6 dated March 20, 2008, for the use and operation of the Westmeath Waste Disposal Site. A copy of the ECA is provided in **Appendix A**.

In a letter dated September 23, 2014, from the Ottawa District Manager of the Ministry of the Environment, Conservation and Parks (MECP and/or the Ministry), future monitoring at the site was to be completed as outlined in Section 9.0 of the 2012 Annual Report (with changes). The frequency of reporting has been changed to biennial and the monitoring program has been amended as per this correspondence.

This report presents the results of the monitoring activities that were completed at the closed Westmeath Waste Disposal Site in 2023 and 2024. The monitoring was completed as described in Environmental Compliance Approval, (ECA) No. A413602 last amended under Notice No. 6 dated March 20, 2008, and as per Ministry correspondence dated September 23, 2014. The report and activities have been completed and reported on in general conformance with the November 2010 Ministry of the Environment Technical Guidance Document *Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water*. The "Monitoring and Screening Checklist" is provided in **Appendix B**.

1.1 Site Location

A detailed description of the site location is as follows:

- The site is located within Part of Lot 20 Concession VI and EML, Part of Lot 30, North Front "A" and Part of the Road Allowance between Concessions VI and North Front "A", in the former geographic Township of Westmeath. The site is owned and was previously operated by the Township of Whitewater Region (the site is now closed).
- The site is comprised of a 1.26 hectare closed landfilling area within a 7.07 ha site, and as required by Condition 15, a 0.436 ha buffer was purchased by the Township.
- The site is closed under ECA No. A413602 last amended March 20, 2008.
- The site coordinates are:
    - 45^0 47' 46.75" North - 76^0 53' 32.02" West
    - NAD 83 - UTM 18N – easting 352 960 northing 5 073 100 (acc +- 50 meters)

A site location map is provided as **Figure 1** based on Land Information Ontario shapefile data. The landfill site plan and surrounding features are provided in **Figure 2**.

1.2 Site Ownership and Key Personnel

The site is owned by the Township of Whitewater Region. Contacts for the municipality and the Competent Environmental Practitioner (CEP) are as follows:

Municipal Contact
Township of Whitewater Region
P.O Box 40
Cobden, ON K0L 1K0
Lane Cleroux
Manager of Public Works
Municipality of the Township of Whitewater Region
Tel: 613.646.2282 X218
Email: *lcleroux@whitewaterregion.ca*

CEP Contact Ground and Surface Water
Andrew Buzza, P.Geo
Tel Number: 613.828.7800
Email: andrew.buzza@jp2g.com

1.3 Description and Development of the Waste Disposal Site

This section provides a general description of the site including operational details. The following is provided:

Environmental Compliance Approval:
The site operated under ECA no. A413602. Notice No. 6 of ECA A413602 dated March 20, 2008, approved the Closure Plan application dated February 19, 2005.

Site Status:
The site ceased receiving waste for landfilling in March 2006.

Site Capacity:
Total waste disposal volume is equal to 63,000m^3; the final contours have been reached.

Area of current waste cell footprint and approved footprint in hectares:
The approved landfilling area was 1.26 hectares.

Area of entire waste disposal site in hectares:
The ECA lists a 1.26 ha closed site within a 7.07 ha site. In addition to the 7.07 ha site the Township acquired a 0.436 ha buffer along the southern edge of the waste mound to satisfy Condition 15 of the ECA.

Total property area in hectares:
The entire site is 7.5 hectares including the 0.436 ha CAZ acquired by the municipality to satisfy Condition 15 of the amended ECA. The site configuration is illustrated on **Figure 2.**

Dates when waste disposal site opened, operated and closed as applicable:
The site reportedly opened on or around 1972 and was closed in March 2006.

Information on final cover, slopes and engineering controls:
The final application of cover was applied in 2008. A section of the southwestern slope of the waste mound was re-graded in the fall of 2012 to better satisfy a 3:1 slope. The slope re-grading relevant Ministry correspondence is discussed in **Section 2.2**. There are no engineering controls.

Any Permits To Take Water associated with the site:
There are no Permits To Take Water associated with the site.

Other authorizing and or control instruments associated with the site:
There are no authorizing and or control instruments associated with the site.

Description of any storm water management facilities:
There are no storm water management facilities associated with the site.

Description of any leachate collection systems; and any sewage works, including the ECA number of the works:
The Westmeath Waste Disposal Site is based on natural attenuation. There is no collection system and or any sewage works at the site.

Any site developments, which occurred during the year of the monitoring report:
On occasion the municipal Public Works Department stockpiled clean earth material on site which is obtained by nearby excavating projects. No work was completed in 2023 or 2024.

Any new developments in the vicinity of the site of relevance from a monitoring perspective:
There are no new developments of relevance from a monitoring perspective.

Historical Site Overview

Environmental baseline investigations which were undertaken:
Historical monitoring has been completed at the Westmeath Waste Disposal Site. The earliest monitoring reported in this report is from the year 1990. Since this time, monitoring and monitoring well installations and well decommissioning programs have been completed. A list of relevant studies is provided in the **References** section at the end of this report.

Design and construction of the site:
A Site Development and Operations Report was submitted in 1998.

Development of environmental monitoring systems:
The development of environmental monitoring programs was initially provided in early documents. Jp2g has reported on the environmental monitoring since 2006. Subsequent to this, the environmental monitoring has been amended at various times to reflect the comments provided by the Technical Support Section (TSS) and the latest ECA notice. The monitoring program has been most recently amended as per a letter from the District Manager of the Ministry dated September 23, 2014. The amended monitoring program is outlined in Section 9 of the 2012 Annual Monitoring Report (Jp2g March 2013). The correspondence dated September 23, 2014, approved changes to the monitoring program. The in-field monitoring resulting from this correspondence began in 2015. The amended monitoring program has been reported on in the biennial reports since 2015-2016.

Development of engineered control systems:
There are no engineered control systems.

Conceptual Site Model:
The site is based on natural attenuation, details regarding the physiography and hydrogeology are provided in **Section 3.0** of this report.

Problems associated with the function or operation of the waste disposal site:
The site is closed; there have not been any reported issues.

Placement of final cover:
The placement of final cover was completed in 2008 with the final grading of the western slope to 3:1 in 2012.

Date of site closure, actual or projected, including any closure plans:
The site was closed for use in March of 2006.

1.4 Monitoring and Reporting Program

Monitoring and reporting at the site completed in 2023 and 2024 was conducted as outlined in the letter dated September 23, 2014, from the Ministry's Ottawa District Manager which is based on the monitoring program outlined in Section 9.0 of the 2012 Annual Report. The Ministry's District Manager further provided suggestions regarding the trigger mechanism as did the TSS Surface water reviewer in their April 21, 2020, comments. These suggestions are incorporated into this report. In November 2017 seventeen (17) monitoring wells were decommissioned as they were not part of the approved program. All monitoring locations are shown in **Figure 2**.

2.0 BACKGROUND

The objectives of the 2023 and 2024 Monitoring Program are as follows:

- Measure groundwater water levels during the summer monitoring event
- Collect groundwater samples from selected monitoring stations in the summer
- Collect surface water samples in the spring or fall
- Provide an assessment of the data collected

2.1 Ministry Correspondence

The correspondence which details the current monitoring program is as follows:

- On March 26, 2014, a memorandum was provided by the Ministry's Technical Support Section (TSS). The memorandum confirmed that the site satisfies the intent of the Reasonable Use Guideline B-7, and that the horizontal extent of the leachate plume is sufficiently delineated. The amendments to the monitoring program proposed by Jp2g Consultants Inc. in the 2012 Annual monitoring report are satisfactory.

- On July 22, 2014, a memorandum was provided by the Ministry's TSS confirming the acceptability of the reduction of the surface water monitoring to once per year.

- On September 23, 2014, a letter to the Township was provided by the Ottawa District Manager. The letter formally accepted the changes to the monitoring program and confirmed the required parameters for the trigger assessment and the appropriate background surface water location. Additionally, the letter confirmed the biennial reporting.

- On April 21, 2020, a memorandum was provided by the Ministry's TSS surface water section who confirmed that the monitoring list of parameters can be reduced to the leachate indicator parameters as designated by Jp2g and Mr. Kinney's assessment in 2014 and a couple of conservative non-leachate parameters. It was also recommended that the trigger mechanism be updated.

The most recent surface water and groundwater comments from the Ministry and Jp2g's responses are provided in **Appendix C** and summarized in **Table 1**.

Table 1
Ministry TSS Groundwater & Surface Water Comments and Reponses

Ministry 2014 Groundwater Comments on the 2011 and 2012 Reports	Response
The site satisfies the intent of Reasonable Use Guideline B-7. The affected off-site wetland lies below the Ottawa River regulatory flood line and will not be used for domestic groundwater supply.	Agreed. A discussion on the Reasonable Use Guideline B-7 is outlined in **Section 6.6** of this report.
The horizontal extent of the leachate plume is sufficiently delineated.	Agreed.
The primary pathway for the migration of leachate is northwest towards the floodplain of the Ottawa River.	Agreed. **Figure 3** shows the direction of groundwater flow to the northwest.
The potential exists for surface water impacts to occur to a seasonal pond. Additionally, a drainage feature approaches within 20 metres of the fill area, connects to the ponded area, and flows to Bellowes Bay on the Ottawa River	Surface Water impacts are discussed in **Section 7.0** of this report.
The proposed amendments to the groundwater monitoring and reporting program are satisfactory.	Monitoring locations have been reduced to 1B, 4A/4B, 7A/7B, 8A/8B, 11B and 14 to be completed once a year in the summer. Groundwater elevation monitoring continues to occur at all existing monitoring wells. Groundwater samples have been analyzed for the parameters listed in Column 1, Schedule 5 Biennial reporting will continue at the site as outlined in **Section 8** of this report.

Ministry 2020 Surface Water Comments on the 2018 Report	Response
SW3a appears to be upgradient of the landfill and one would not expect such a difference in water quality in a road culvert from SW3. Do other sources impact SW3a?	As suggested by Gartner Lee in 2006, elevated concentrations may be a result of wintertime maintenance activities along County Road 12. County Road 12 is located immediately upgradient of the background monitoring station SW-3A. As discussed, the small ditch originates south of the County Road and is fed by agricultural runoff and from the tile drains. Impacts from farming may also be contributors to elevated concentrations. Other contributors to SW-3A could include the roadside ditch that is located on the west side of County Road 12 and flows both north and south to SW-3A. It was noted that in 2020, south of SW-3A, the ditch was occupied by several carcasses and waste which were noted again during the current monitoring program. These features could account for differences in water quality between SW-3 and SW-3A.
The trigger mechanism requires an overhaul so it can trigger contingencies should surface water deteriorate at the site.	The updated trigger mechanism is outlined in **Section 7.3** of this report.
The monitoring list of parameters for Westmeath can be reduced as many parameter concentrations have remained unchanged. The list could be limited to leachate indicator parameters as designated by Jp2g and Mr. Kinney's assessment in 2014 and a couple of conservative non-leachate parameters.	The monitoring list of parameters has been reduced to the following leachate indicator parameters – chloride, sulphate, conductivity, ammonia, manganese, boron, TKN, total phosphorous, alkalinity, potassium, barium, calcium, unionized ammonia, sodium, magnesium, and TDS.
Some explanation for the elevated concentrations at SW5 should be forthcoming.	The elevated concentrations at SW5 are a result of historical landfilling activities at the site.

2.2 Re-grading and Final Closure

The site was closed for waste disposal in March 2006. The western slope of the waste mound was originally graded to a 2:1 slope following site closure and subsequent final cover application in 2006 and 2008. In a Site Inspection Report following the closure of the site, the Ministry requested that the western slope be re-graded to better satisfy the design slopes outlined in the closure plan documentation. In response to this, re-grading of this surface took place in the fall of 2012 using soil stockpiled on site by the Township. On November 5, 2012, Jp2g Consultants Inc. performed a survey of the waste mound to verify the newly graded western slope. The updated survey is provided as an as-built drawing and updated final closure plan. Relevant drawings (**Figure D1**, Final Closure Plan, and **Figure D2**, Cross Sections A and B) can be found in **Appendix D.**

3.0 PHYSICAL SETTING

The physiography, geology and hydrogeology of the waste disposal site are described in the following sections and are repeated in part or in whole from previous reports submitted to the Municipality (Golder Associates Ltd. in 1990, 1992 and monitoring by Gartner Lee Limited up to 2006). The landfill site is situated on a 6m to 8m high scarp oriented parallel to the Ottawa River. The stratigraphy of the site consists of surficial fine sand underlain by silt. The silt is underlain by silty clay which is subdivided into a reddish-brown weathered silty clay and a deep grey unweathered silty clay. Shallow groundwater flow is perpendicular to the river within the surficial sands and to a lesser extent the weathered silty clay horizon. Copies of a Geological Cross Section (**Figure E1**) and Borehole Logs are provided in **Appendix E**.

3.1 Subsurface Conditions

The following is a summarized account of the subsurface conditions in the vicinity of the landfill site and is taken from Golder Associates Ltd. (GAL) 1992. It should be noted that stratigraphic boundaries shown on the Record of Borehole Sheets are inferred and may represent a transition between soil types rather than an exact plane of geologic change. The surface stratigraphy described represents the conditions encountered at the borehole locations only and should not be considered to be representative of all the potential variations in the subsurface conditions in the vicinity of the landfill site.

Stratigraphic units identified at the site are as follows: topsoil/peat, sands, silty clay, silt, sandy silt, silty sand, sand and gravel and glacial till.

A surficial topsoil/peat layer was encountered in the three boreholes and ranges in thickness from 0.16 to 0.15 metres. A surficial granular soil layer was encountered at Boreholes 13, 14 and 15 immediately overlying the marine silty clay deposits. The surficial layer consists of a 0.3 metre thickness of fine sand with some silt at Boreholes 13 and 14. At Borehole 15, the surficial granular layer consists of 0.6 metres of fine sand which is underlain by approximately 0.5 metres of silt.

A silty clay unit was encountered immediately underlying the surficial granular unit at Boreholes 13, 14 and 15. The silty clay unit was weathered to a grey to brown colour to the depth investigated. The boreholes were terminated in the weathered silty clay unit.

3.2 Groundwater Levels and Flow Directions

Groundwater levels obtained during the August 2023 and August 2024 monitoring events were used to confirm the direction of shallow overburden groundwater flow at the site. The tabulated water level data is provided in **Appendix F**, and the direction of groundwater flow is provided in **Figure 3** for 2023 and 2024. The direction of groundwater flow is consistent with previous years and was found to be approximately north/northwest from beneath the landfill site.

3.3 Hydraulic Gradients

Historically, the average horizontal hydraulic gradient between the landfill site and the northernmost monitoring wells in a direction roughly parallel to groundwater flow is estimated to range from 0.005 to 0.01 (GAL 1992).

Vertical hydraulic gradients were determined from the 2023 and 2024 water level data that is provided in **Table 2** and **Appendix F**.

Table 2
Summary of Water Level Data and Vertical Gradients

Monitoring Well	Ground Level Elev. (mASL)	Top fo Pipe Elev. (mASL)	August 2023 (mASL)	August 2024 (mASL)
BH1-B (Middle)	121.69	122.81	117.88	117.57
BH4-B (Shallow)	111.28	111.85	110.30 ⇧	110.09 ⇩
BH4-A (Deep)	111.28	111.85	110.49	110.01
BH7-B (Shallow)	111.66	111.22	--	109.78 ⇧
BH7-A (Deep)	111.66	112.67	--	110.70
BH8-B (Shallow)	111.45	111.45	110.81 ⇧	110.53 ⇧
BH8-A (Deep)	111.45	112.43	110.87	110.61
BH11-B (Shallow)	112.25	113.29	111.84	111.73
BH14	111.97	112.35	111.18	110.79

⇧ - *Direction of vertical hydraulic gradient*

** Groundwater Monitoring Program Reduction as Per Approval from the MOECC District Manager September 2014*

Typically, the groundwater will discharge to the low area northwest of the site. From this location the ponded water will flow to the swale located to the east of the site and then to Bellows Bay on the Ottawa River.

3.4 Horizontal Hydraulic Conductivity

Estimates of the horizontal hydraulic conductivities of the various subsurface strata in the vicinity of the monitoring well intake screens at Boreholes 13, 14 and 15 were obtained from rising head tests performed on the monitoring wells installed during the 1992 investigation. The data from the rising head tests were analyzed by GAL using the Hvorslev method. A summary of the horizontal hydraulic conductivity is provided in **Table 3.**

Table 3
Summary of Horizontal Hydraulic Conductivity

Monitoring Well	Subsurface Strata	Hydraulic Conductivity (cm/sec)
13	Silty Clay (weathered)	4.30E-05
14	Silty Clay (weathered)	7.60E-04
15	Fine sand/silt/silty clay (weathered)	1.90E-06

From GAL 1992

GAL 1992 suggests that the bulk hydraulic conductivity of the surficial granular layer and weathered silty clay based on the results of the rising head tests ranges from 1.9 x 10^{-6} cm/sec to 7.6 x 10^{-4} cm/sec.

3.5 Groundwater Flux

Groundwater flux or specific discharge, q, is the discharge of groundwater per unit area per unit time ($cm^3/sec/cm^2$) and is calculated from Darcy's equation. Because the groundwater flux has the dimensions of a velocity, it is sometimes known as the Darcy velocity or Darcy flux (Hubbert, 1940; Freeze and Cherry, 1979). The Darcy Flux is calculated from the equation:

$$q = Ki$$

where q = Darcy flux (cm/sec)
K = horizontal hydraulic conductivity (cm/sec)
i = horizontal hydraulic gradient (dimensions)

Using the above equation, a horizontal hydraulic gradient ranging from 0.005 to 0.01, and a range in hydraulic conductivity for the upper higher permeability zone from 1.9×10^{-6} cm/sec to 7.6×10^{-4} cm/sec, the corresponding horizontal Darcy flux for the shallow overburden was determined to range from 9.5×10^{-9} cm/sec to 7.6×10^{-6} cm/sec.

3.6 Groundwater Velocity

Groundwater velocity, *v* is directly proportional to the Darcy flux and inversely proportional to formation porosity. The average linear groundwater velocity is calculated using the equation:

$$v = \frac{Ki}{n} = \frac{q}{n}$$

where v = average linear groundwater velocity (cm/sec)
n = formation porosity (dimensionless)
K = horizontal hydraulic conductivity (cm/sec)
i = horizontal hydraulic gradient (dimensionless)

For unconsolidated deposits such as silts and sand, typical porosity values can range from 25 to 50 percent (Freeze and Cherry, 1979). Assuming an average porosity value of 35 percent, the groundwater velocity in the surficial granular layer in the vicinity of the landfill site is estimated to range from less than one metre per year to approximately 7 metres per year.

3.7 Surface Water Features

The surface water at the Westmeath WDS includes a drainage ditch that parallels the eastern edge of the site. This ditch originates on the east side of County Road 12 and picks up water from the roadside ditch and tile drained fields. From there, the water passes under County Road 12 and then follows the eastern property boundary of the site. On the west side of County Road 12, there is a roadside ditch (north and south) that also at times (storm events) contributes to the flow of surface water. Overall, the small eastern drainage ditch is characterized as being approximately 0.5 meters wide and 5 - 10 centimeters deep with generally low flow velocity. Northwest of the site and northwest of SW-20, the ditch is less defined and is characterized by ponding water. This watercourse from this location eventually discharges to the Ottawa River.

Also, north of the site, down the side of the hill, there are seeps, and the water from the seeps in an unorganized fashion makes its way to the eastern stream just prior to SW-20.

West of the site, there is a low-lying flat area that catches ponded water. Monitoring of this area ceased in 2014.

Sample locations SW-3, SW-3A, SW-5 and SW-20 are located along the eastern watercourse. Specific locations are as follows:

- SW-3 and SW-3A are located up gradient of the site and are considered representative of background values. SW-3 is located on the east side of County Road 12, SW-3A is located on the west side of County Road 12.
- SW-5 is downstream of the confluence with former sampling stations SW-15 and SW-16.
- SW-20 is located approximately 220 meters downstream of the waste mound.

Surface water locations are shown in **Figures 2** and **3**.

4.0 MONITORING WELL STATUS

Monitoring is currently completed at three (3) bi-level wells and three (3) single level wells. Other wells that have historically existed at the site have been either decommissioned and/or destroyed. All wells are listed in **Table 4** and show the well type, location, the operational status, and whether they are included in the monitoring program. The well records for the decommissioned wells are included in **Appendix G**.

Table 4
Monitoring Well Status

Monitoring Well	Well Type	Coordinates		Operational Status
		Easting	Northing	
BH1-B (Middle)	Upgradient - Background	352992	5073082	Operational
BH3-A (Deep)	Downgradient	-	-	Destroyed
BH3-B (Shallow)	Downgradient - Historical leachate	-	-	Destroyed
BH4-A (Deep)	Downgradient	352834	5073437	Operational
BH4-B (Shallow)	Downgradient	352834	5073437	Operational
BH7-A (Deep)	Downgradient	352793	5073262	Operational
BH7-B (Shallow)	Downgradient	352793	5073262	Operational
BH8-A (Deep)	Downgradient	352730	5073149	Operational
BH8-B (Shallow)	Downgradient	352730	5073149	Operational
BH11-B (Shallow)	Downgradient - Current leachate	352897	5073229	Operational
BH14 (Shallow)	Peripheral - Crossgradient	352920	5073419	Operational

Notes:
** Groundwater Monitoring Program Reduction as Per Approval from the MOECC District Manager September 2014*
All other wells were decommisioned in November 2017

Of the bi-level monitoring wells, the deep piezometer settings vary in depth from approximately 5 to 7.5 metres. The shallow settings vary in depth from approximately 1.5 to 3 metres. The average separation between the deep and shallow settings is approximately 3.2 meters. Specific details on well depth and construction are provided in **Appendix E**.

5.0 DESCRIPTION OF MONITORING PROGRAM

The monitoring program completed during the 2023 and 2024 monitoring events is provided in **Table 5.** Water level measurements were collected at all locations.

Table 5
Monitoring Program

Groundwater Monitoring Completed in 2023 & 2024		
Shallow Monitors		
1B, 4B, 7B, 8B, 14	Column 1, Schedule 5 - C/W VOCs from Column 1 + Hardness	Once per year (August)
Deep Monitors		
4A, 7A, 8A	Column 1, Schedule 5 - C/W VOCs from Column 1 + Hardness	Once per year (August)
Leachate Monitor		
11B	Column 1, Schedule 5 - C/W VOCs from Column 1 + Hardness, BOD5 & TSS	Once per year (August)
Surface Water Monitoring Program Completed in 2023 & 2024		
Surface Water		
SW3, SW3A (Background), SW5, SW20	Column 3, Schedule 5 + Ca, Na, K, Mg, Mn, Zn & DOC	Once per year (May)

Locations of the monitoring stations are provided in **Figure 2**. All groundwater water level information is provided in **Appendix F**. Photographs of the monitoring wells are included in **Appendix H,** water quality data is provided in **Appendix I**.

The groundwater samples collected for the 2023 and 2024 monitoring program are detailed in **Table 6.** It is noted landfill gas was measured at each well head. No landfill gas was detected during the 2023 or 2024 monitoring events.

Table 6
2023 and 2024 Environmental Groundwater Monitoring Details

Revised Groundwater Monitoring Program Approved by MOECC District Manager Sept 23, 2014				Aug-23 Sampling		Aug-24 Sampling	
Monitoring Well	Water Level	Sampling	Frequency	Water Level	Sample Collected	Water Level	Sample Collected
BH1B (Middle)	√	√	Annual Summer	√	√ + Dup	√	√
BH3A (Deep)				Destroyed		Destroyed	
BH3B (Shallow)				Destroyed		Destroyed	
BH4A (Deep)	√	√	Annual Summer	√	√	√	√ + Dup
BH4B (Shallow)	√	√	Annual Summer	√	√	√	INS
BH7A (Deep)	√	√	Annual Summer	--	--	√	√
BH7B (Shallow)	√	√	Annual Summer	--	--	√	√
BH8A (Deep)	√	√	Annual Summer	√	√	√	√
BH8B (Shallow)	√	√	Annual Summer	√	√	√	√
BH11B (Shallow)	√	√	Annual Summer	√	√	√	√
BH14 (Shallow)	√	√	Annual Summer	√	√	√	√

Notes:
INS - Insufficient water quantity for sample
DUP - Duplicate sample was taken
-- No sample collected

In 2023 and 2024, surface water monitoring events were completed in May as outlined in **Table 7**. Photographic coverage of the sampling locations is included in **Appendix H**.

Table 7
2023 and 2024 Environmental Surface Water Monitoring Details

Revised Surface Water Monitoring Program Approved by Steve Burns District Manager MOECC Sept 23, 2014					Sample Collection Record	
SW Station #	Sampling	Location		Frequency	2023 May	2024 May
		Easting	Northing			
SW-3	√	353161	5073220	Spring or Fall	√	√
SW-3A (Background)	√	353126	5073221	Spring or Fall	√ + Dup	√ + Dup
SW-5	√	352919	5073330	Spring or Fall	√	√
SW-20	√	352845	5073459	Spring orFall	√	√

NS - No sample taken - no water
DUP - Duplicate sample was taken
Coordinates Listed Reference NAD83 UTM Zone 18

All surface water samples collected during the 2023 and 2024 environmental monitoring events were analyzed for the parameters listed in Column 3, Schedule 5, of the Ministry of the Environment Landfill Standards Guideline as well as calcium, sodium, potassium, manganese, magnesium, zinc and DOC. All surface water quality data is provided in **Appendix I.**

All sampling was completed in general conformance with standard sampling protocol as provided in **Appendix J.**

6.0 GROUNDWATER QUALITY

6.1 Assessment Program

Groundwater sampling was completed at the Westmeath WDS to evaluate the water quality and to assess any impact that the closed WDS may have on the local groundwater environment. Results of the chemical analysis are provided in **Appendix I**. The following sections discuss the variation of chemical concentrations of the sampled water at monitoring locations at the waste disposal site. These sections include assessments of the site background water quality, leachate impacted groundwater and water quality from other sample locations about the site. Chemical concentrations have been compared to the Ontario Drinking Water Standards, Objectives and Guidelines (ODWS/OG), Provincial Water Quality Objectives (PWQO), and other criteria where applicable.

6.2 Background Water Quality

Background water quality is defined as the groundwater which is believed to be unaffected by leachate from the waste disposal site. At the Westmeath Waste Disposal Site, background sampling well BH1B is located up gradient of the former waste site and is not considered to be impacted by landfill leachate.

Table 8 outlines the range of overburden background indicator parameters at the site. The values presented in **Table 8** reflect concentrations determined from the historical sampling from BH1B. All of the concentrations presented are within the range of historical sampling results. Median values are taken from the last 10 sampling events.

Table 8
Background Values Monitoring Well BH1B

Parameters	ODWS/OG	BH1B Range of Concentrations (1991-2022)	BH1B Median Values last 10 events
Chloride	250	2 - 52	29
Sulphate	500	8 - 70	8
Sodium	200	8 - 24	15
Potassium		2 - 4	3
Boron	5	0.007 - 0.04	0.01
Alkalinity	30-500	38 - 60	53
Conductivity µs/cm		167 - 311	231
COD		< 5 - 54	5
TDS	500	100 - 202	128
Manganese	0.05	<0.001 - **0.08**	0.01

All concentrations in mg/L unless otherwise noted
BOLD *indicates exceedance of ODWS/OG*
No Impact
Leachate Impact
Minor Impact

A sample was collected from BH1B in 2023 and 2024. All indicator parameters are less than the ODWS/OG. It is noted that County Road 12 is located less than 100m upgradient from the well which could be a source of any impact.

6.3 Leachate Characteristics

Leachate characteristics are typically those chemical concentrations that exhibit the highest chemical values. In the case of the Westmeath Waste Disposal Site, leachate values are considered to be representative from samples collected from monitoring well BH11B. Monitoring well BH11B is located immediately downgradient of the historical landfilling area.

Table 9 details the range of the minimum and maximum analytical results for leachate indicator parameters from monitoring well BH11B in comparison to the 2023 and 2024 sampling results and background values at the site.

Table 9
Range of Leachate Values

Parameters	ODWS/OG	BH1B	BH11B	BH 11B	BH 11B
		Median Background Values	1991-2022	Aug-23	Aug-24
Chloride	250	29	86 - **796**	**540**	**690**
Sulphate	500	8	62 - **722**	58	57
Sodium	200	15	100 - **426**	**395**	**427**
Potassium		3	7 - 92	83	88
Boron	5	0.01	0.54 - 4.94	4.18	**5.4**
Alkalinity	30-500	53	**620 - 1510**	**1530**	**1500**
Conductivity		231	2160 - 4570	3800	4080
COD		5	22 - 272	78	103
TDS	500	128	**1390 - 2940**	**2470**	**2650**
Manganese	0.05	0.01	0.03 - **5.93**	**5.93**	**6.34**

All concentrations are in mg/L
Background concentrations are median values, leachate values are given as a range (min - max)
Bold *values exceed ODWS/OG*

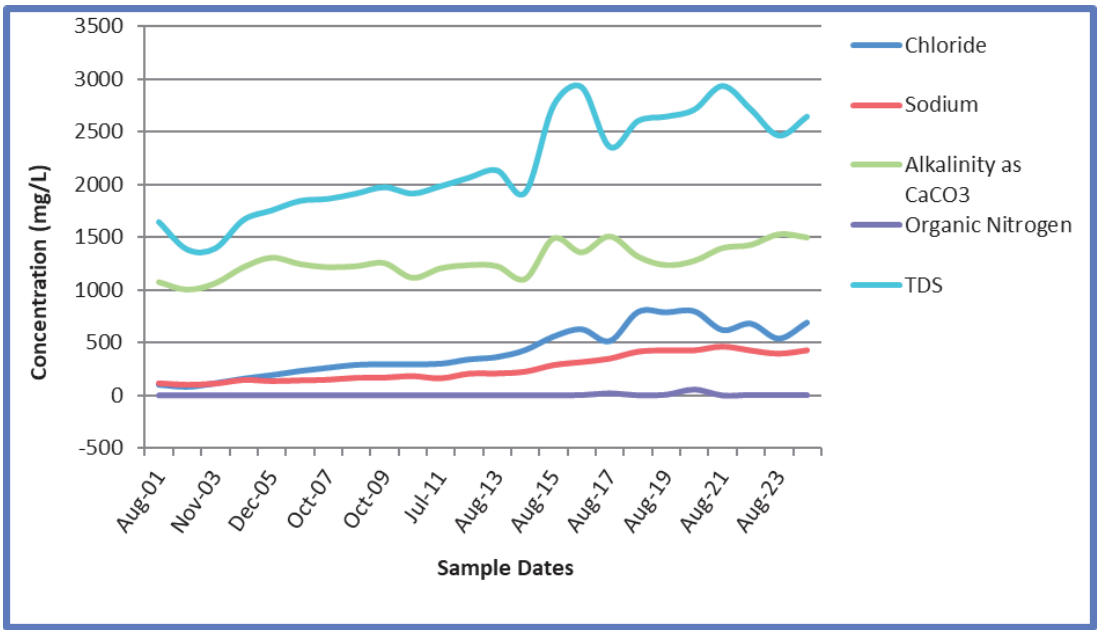
No Impact
Leachate Impact
Minor Impact

ODWS exceedances occurred in 2023 and 2024 for the following:

Chloride 540 mg/L (2023), 690 mg/L (2024)
Sodium 395 mg/L (2023), 427 mg/L (2024)
Boron 5.4 mg/L (2024)
Manganese 5.93 mg/L (2023), 6.34 mg/L (2024)
Hardness 1110 mg/L (2023) and 1250 mg/L (2024)
Alkalinity 1530 mg/L (2023), 1500 mg/L (2024)
Organic nitrogen 3.7 mg/L (2023), 4.4 mg/L (2024)
DOC 30 mg/L (2023), 34 mg/L (2024)
TDS 2470 mg/L (2023), 2650 mg/L (2024)

Concentrations of leachate indicator parameters including sodium, potassium, and TDS reveal an increasing trend since about 2012. Historical trends of selected parameters from monitoring well BH11B are illustrated in **Graph 1.**

Graph 1
Water Quality Trends Monitoring Well BH11B



6.4 Overburden Groundwater

The following sections provide a discussion on the analytical results from the samples collected from individual sample locations. Following the same theme as previous reports, the discussion on the groundwater quality has been provided for those wells considered to be background and peripheral wells and those considered to be downgradient wells as follows:

Background Peripheral Monitors: **BH1B, BH14**
Downgradient Monitors: **BH4A, BH4B, BH7A, BH7B, BH8A, BH8B, BH11B**

Background Peripheral Monitors

Monitoring Well BH1

Monitoring well BH1 has previously been determined to be representative of background conditions at the site (see **Section 6.2**)

Monitoring well BH14

Monitoring well BH14 is a single level piezometer and is located approximately 160 metres north of the landfilling area on the east side of the drainage course. This well is screened at a shallow depth (i.e., approximately 2 metres below ground surface). **Table 10** presents the 2023 and 2024 chemical analysis in comparison to the ODWS/OG, historical values, and background and leachate concentrations.

Table 10
Water Quality Results at Monitor BH14

Parameter	ODWS/OG	BH1B	BH11B	BH14		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	18 - 111	92	124
Sulphate	500	8	62 - **722**	21 - 95	20	20
Sodium	200	15	100 - **426**	25 - 50	33	35
Potassium		3	7 - 92	2 - 5.6	3	4
Boron	5	0.01	0.54 - 4.94	0.012 - 0.28	0.05	0.05
Alkalinity	30-500	53	**620 - 1510**	197 - 406	254	258
Conductivity µs/cm		231	2160 - 4570	500 - 1025	756	796
COD		5	22 - 272	<5 - 3360	<5	18
TDS	500	128	**1390 - 2940**	321 - **572**	491	**517**
Manganese	0.05	0.01	0.03 - **5.93**	<0.01 - **0.173**	0.1	0.1

All concentrations are in mg/L unless otherwise noted
Background concentrations are median values, leachate values are given as a range (min - max)
***Bold** values exceed ODWS/OG*
N/S Indicates No Sample Collected

No Impact
Leachate Impact
Minor Impact

Monitoring well BH14 was sampled during the 2023 and 2024 sampling period. All parameters revealed concentrations that were less than ODWS/OG with the exception of iron 0.43 mg/L (2023); hardness 300 mg/L (2023) and 346 mg/L (2024); organic nitrogen 0.781 mg/L (2023) and 0.166 mg/L (2024); and TDS 517 mg/L (2024). The values of leachate indicator parameters detailed in **Table 10,** for the most part show slight elevation over background parameters indicating the potential for a weak leachate impact at this location.

Downgradient Monitors

In the current monitoring program downgradient monitoring wells include 4A, 4B, 7A, 7B, 8A, 8B, and 11B.

Monitoring Well BH4

Monitoring well BH4 is a bi-level monitor (BH4A deep setting, BH4B shallow setting) that is located approximately 220 metres northeast of the landfilling area. **Table 11** presents the 2023 and 2024 chemical analysis in comparison to the ODWS/OG, historical values, and background and leachate concentrations.

Table 11
Water Quality Results at Monitor BH4A

Parameter	ODWS/OG	BH1B	BH11B	BH4A (Deep)		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	0.7 - 3	1	2
Sulphate	500	8	62 - **722**	10 - 25	21	16
Sodium	200	15	100 - **426**	74 - 93.4	77	82
Potassium		3	7 - 92	7 - 10	7	8
Boron	5	0.01	0.54 - 4.94	0.22 - 0.33	0.25	0.3
Alkalinity	30-500	53	**620 - 1510**	235 - 303	314	296
Conductivity µs/cm		231	2160 - 4570	450 - 746	564	554
COD		5	22 - 272	13 - 1070	11	36
TDS	500	128	**1390 - 2940**	302 - 384	367	360
Manganese	0.05	0.01	0.03 - **5.93**	0.02 - **0.14**	**0.15**	**0.10**

All concentrations are in mg/L unless otherwise noted
Background concentrations are median values, leachate values are given as a range (min - max)
***Bold** values exceed ODWS/OG*

No Impact
Leachate Impact
Minor Impact

All parameter concentrations from 2023 and 2024 were less than ODWS/OG with the exception of manganese 0.15 mg/L (2023) and 0.10 mg/L (2024); hardness 129 mg/L (2023) and 134 mg/L (2024); organic nitrogen 0.734 mg/L (2023) and 0.602 mg/L (2024); and DOC 7.7 mg/L (2023) and 6.6 mg/L (2024). Parameter concentrations in 2023 and 2024 were within the historical range of concentrations with the exception of alkalinity and manganese (slightly above historical range in 2023). This location is considered to be slightly impacted by the landfill site.

Monitoring well BH4B leachate indicator parameter concentration range of values and 2023 monitoring results are shown in **Table 12**. This location was dry during the 2024 monitoring event.

Table 12
Water Quality Results at Monitor BH4B

Parameter	ODWS/OG	BH1B	BH11B	BH4B (Shallow)		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	1 - 6	3	--
Sulphate	500	8	62 - **722**	8 - 95	9	--
Sodium	200	15	100 - **426**	8 - 30	13	--
Potassium		3	7 - 92	0.5 - 4	<1	--
Boron	5	0.01	0.54 - 4.94	<0.005 - 0.19	0.03	--
Alkalinity	30-500	53	**620 - 1510**	54 - 297	267	--
Conductivity µs/cm		231	2160 - 4570	128 - 617	454	--
COD		5	22 - 272	13 - 925	41	--
TDS	500	128	**1390 - 2940**	83 - 401	295	--
Manganese	0.05	0.01	0.03 - **5.93**	<0.01 - **0.382**	**0.13**	--

All concentrations are in mg/L unless otherwise noted
Background concentrations are median values, leachate values are given as a range (min - max)
***Bold** values exceed ODWS/OG*
-- *Indicates No Sample Collected*
No Impact
Leachate Impact
Minor Impact

Generally, current and historical parameter concentrations are around background concentrations and significantly below leachate concentrations. This location does not reveal impact from the landfill site.

Monitoring Well BH7

Monitoring well BH7 is a bi-level monitor (BH7A deep setting, BH7B shallow setting) that is located approximately 120 metres northwest of the landfill site. The wells could not be sampled in 2023; however, samples were collected from both settings in 2024. Prior to 2007, monitoring well BH7A had not been sampled since November 1996. **Table 13** presents the 2024 chemical analysis from monitoring well BH7A in comparison to the ODWS/OG, historical values, and background and leachate concentrations.

Table 13
Water Quality Results at Monitor BH7A

Parameter	ODWS/OG	BH1B	BH11B	BH7A (Deep)		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	2 - 79.9	--	4
Sulphate	500	8	62 - **722**	6 - 227	--	6
Sodium	200	15	100 - **426**	59 - 126	--	115
Potassium		3	7 - 92	7 - 13	--	10
Boron	5	0.01	0.54 - 4.94	0.1 - 0.34	--	0.38
Alkalinity	30-500	53	**620 - 1510**	273 - 370	--	299
Conductivity µs/cm		231	2160 - 4570	553 - 1200	--	557
COD		5	22 - 272	<5 - 1990	--	57
TDS	500	128	**1390 - 2940**	313 - **787**	--	362
Manganese	0.05	0.01	0.03 - **5.93**	0.019 - **1.17**	--	0.03

All concentrations are in mg/L unless otherwise noted

Background concentrations are median values, leachate values are given as a range (min - max)

***Bold** values exceed ODWS/OG*

-- Indicates No Sample Collected

No Impact

Leachate Impact

Minor Impact

The 2024 chemical results reveal all parameters to be less than ODWS/OG with the exception of DOC 9.2 mg/L and organic nitrogen 1.2 mg/L. Leachate indicator parameters reveal concentrations that are generally in-line with background concentrations with the exception of sodium, boron, alkalinity, conductivity, COD and TDS and manganese which are above background concentrations but generally less than leachate concentrations.

All 2024 parameter concentrations were below PWQOs, IPWQOs or CWQGs with the exception of arsenic 0.002 mg/ and total phosphorus 79.2 mg/L.

All parameter concentrations shown in **Table 13** from BH7A were within the range of historical values. This location is considered to be slightly impacted by the landfill site.

Table 14 presents the 2024 chemical analysis from monitoring well BH7B in comparison to the ODWS/OG, historical values, and background and leachate concentrations.

Table 14
Water Quality Results at Monitor BH7B

Parameter	ODWS/OG	BH1B	BH11B	BH7B (Shallow)		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	2 - 125	--	88
Sulphate	500	8	62 - **722**	5 - 276	--	234
Sodium	200	15	100 - **426**	41 - 98	--	77
Potassium		3	7 - 92	5 - 9	--	7
Boron	5	0.01	0.54 - 4.94	0.07 - 0.31	--	0.16
Alkalinity	30-500	53	**620 - 1510**	219 - 392	--	321
Conductivity µs/cm		231	2160 - 4570	421 - 1270	--	1150
COD		5	22 - 272	<5 - 122	--	36
TDS	500	128	**1390 - 2940**	274 - **872**	--	**748**
Manganese	0.05	0.01	0.03 - **5.93**	0.02 - **1.06**	**--**	**1.19**

All concentrations are in mg/L unless otherwise noted

Background concentrations are median values, leachate values are given as a range (min - max)

***Bold** values exceed ODWS/OG*

-- Indicates No Sample Collected

No Impact

Leachate Impact

Minor Impact

The 2024 chemical results reveal all parameters to be less than ODWS/OG with the exception of manganese 1.19 mg/L, iron 0.44 mg/L, hardness 495 mg/L, organic nitrogen 0.455 mg/L, DOC 10.2 mg/L, and TDS 748 mg/L.

Parameter concentrations reveal values that are, on balance, greater than background values and less than concentrations considered to be representative of leachate at the site. Concentrations of the parameters shown in **Table 14** from the 2024 monitoring reveal all values to be within the range of historical concentrations, with the exception of the concentration of manganese which was slightly above the historical range.

Samples collected in 2024 from monitoring well BH7B were compared to PWQO's. All parameters revealed concentrations less than PWQO's with the exception of iron 0.44 mg/L, and total phosphorus 7.19 mg/L.

Overall, this monitoring point is considered to be slightly impacted by the historical landfill.

Monitoring Well BH8

Monitoring well BH8 is a bi-level monitor (BH8A deep setting, BH8B shallow setting) that is located approximately 170 metres west of the site along the southern limit of the designated contaminant attenuation zone. The screened interval for the deep setting is 4.0 – 5.5 metres and the screened interval for the shallow setting is 1.5 – 3.0 metres. Samples were collected from both the deep and shallow settings in 2023 and 2024. **Table 15** presents the 2023 and 2024 chemical analysis from monitoring well BH8A in comparison to the ODWS/OG, historical values, and background and leachate concentrations.

Table 15
Water Quality Results at Monitor BH8A

Parameter	ODWS/OG	BH1B	BH11B	BH8A (Deep)		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	0.5 - 36	<1	1
Sulphate	500	8	62 - **722**	3 - 92	4	4
Sodium	200	15	100 - **426**	20 - 68	54	54
Potassium		3	7 - 92	5 - 12	10	9
Boron	5	0.01	0.54 - 4.94	0.08 - 0.25	0.25	0.27
Alkalinity	30-500	53	**620 - 1510**	195 - 274	265	246
Conductivity µs/cm		231	2160 - 4570	440 - 757	338	461
COD		5	22 - 272	6 - 4500	21	46
TDS	500	128	**1390 - 2940**	246 - **502**	220	300
Manganese	0.05	0.01	0.03 - **5.93**	0.02 - **0.69**	0.05	0.05

All concentrations are in mg/L unless otherwise noted

Background concentrations are median values, leachate values are given as a range (min - max)

***Bold** values exceed ODWS/OG*

No Impact
Leachate Impact
Minor Impact

The 2023 and 2024 sampling revealed all concentrations to be less than ODWS/OG with the exception of organic nitrogen 1.35 mg/L (2023) and 2.12 mg/L (2024).

The 2023 and 2024 leachate indicator parameter concentrations are within the range of historical concentrations with the exception of boron (above range of concentrations 2024). Many parameters reveal concentrations that are slightly above background values but less than values representative of leachate at the site. This location does not reveal impact from the landfill site.

Concentrations at BH8A were compared to PWQOs, IPWQOs, and CWQGs. All parameters were less than surface water quality objectives with the exception of total phosphorus 73.6 mg/L (2023) and 91.2 mg/L (2024).

Table 16 presents the 2023 and 2024 chemical analysis from monitoring well BH8B in comparison to the ODWS/OG, historical values, and background and leachate concentrations.

Table 16
Water Quality Results at Monitor BH8B

Parameter	ODWS/OG	BH1B	BH11B	BH8B (Shallow)		
		Background	Leachate	1990 - 2022	2023	2024
Chloride	250	29	86 - **796**	1 - 100	20	24
Sulphate	500	8	62 - **722**	4 - 102	69	71
Sodium	200	15	100 - **426**	17 - 55	28	27
Potassium		3	7 - 92	2 - 10	5	6
Boron	5	0.01	0.54 - 4.94	0.02 - 0.23	0.11	0.11
Alkalinity	30-500	53	**620 - 1510**	87 - 308	322	293
Conductivity µs/cm		231	2160 - 4570	441 - 819	716	695
COD		5	22 - 272	8 - 850	30	75
TDS	500	128	**1390 - 2940**	295 - **532**	465	452
Manganese	0.05	0.01	0.03 - **5.93**	<0.01 - **0.689**	**0.59**	**0.56**

All concentrations are in mg/L unless otherwise noted

Background concentrations are median values, leachate values are given as a range (min - max)

***Bold** values exceed ODWS/OG*

No Impact

Leachate Impact

Minor Impact

The 2023 and 2024 chemical results reveal concentrations of all parameters to be less than ODWS/OG with the exception of iron 3.01 mg/L (2023) and 3.42 mg/L (2024), manganese 0.59 mg/L (2023) and 0.56 mg/L (2024), organic nitrogen 0.813 mg/L (2023) and 0.607 mg/L (2024), and DOC 7.8 mg/L (2023) and 6.5 mg/L (2024).

The 2023 and 2024 parameter concentrations shown in **Table 16** are within the range of historical concentrations, with the exception of the 2023 alkalinity concentrations which is slightly above historical concentrations. Monitoring well BH8B revealed iron 3.01 mg/L (2023) and 3.42 mg/L (2024), and total phosphorus 17.3 mg/L (2023) and 34.8 mg/L (2024) to exceed PWQOs.

This location is considered to be slightly impacted by the landfill site.

6.5 Organic Sampling

Organic analysis (VOC's) as listed in Column 1 Schedule 5 of the landfill standards document was completed on all sampled wells in 2023 and 2024. Concentrations of all VOC's are below ODWS/OG. Concentrations of VOCs exceeded the laboratory detection limits at BH11B for 1-4 dichlorobenzene 1.8 µg/L (2023) and 2.0 µg/L (2024), and benzene 1.6 µg/L (2024).

The compiled analysis of VOCs is provided in **Appendix I**.

6.6 Site Compliance

Ministry Guideline B-7

The Reasonable Use Concept addresses the levels of off-site contaminants, which are considered acceptable by the Ministry. The Reasonable Use Criteria allow for the definition of the level of contamination in the groundwater beyond which mitigating action should be undertaken. The acceptability of the site in terms of its impact on groundwater has been assessed using the Reasonable Use Criteria (RUC). The RUC establish the acceptability of change in groundwater quality (C_m) as follows:

Aesthetic Parameters

Degradation of less than 50% of the difference between the background quality and the established objective for the particular health related parameter.

Health Related Parameters

Degradation of less than 25% of the difference between the background quality and the established objective for the particular health related parameter. Acceptable concentrations are based on background levels and water quality guidelines (i.e. drinking water objectives).

The chosen background values are utilized to calculate the RUC allowable concentrations for specific parameters, as per the following formulas:

Health Related:

$C_{allow} = P_b + (C_m - P_b) \times 25\%$

Non-Health Related:

$C_{allow} = P_b + (C_m - P_b) \times 50\%$

where:

C_{allow} = Maximum allowable concentration of parameter as per the RUC guidelines

C_m = Maximum acceptable concentration (MAC) of parameter as per the ODWS/OG

P_b = Chosen background value of parameter (background values are the median value from background location 1B)

The Reasonable Use assessment has been provided for the following parameters:

- Health Related: *Nitrate, Boron*
- Aesthetic: *Sodium, Chloride, Sulphate, Manganese, Iron and TDS*

Table 17 outlines the Reasonable Use Criteria.

Table 17
Reasonable Use Criteria

Parameter	P_b [1]	C_m	F	C_{allow}
Nitrate	3.63	10	0.25	5.22
Boron	0.01	5	0.25	1.26
Sodium	15	200	0.5	108
Chloride	29	250	0.5	140
Sulphate	8	500	0.5	254
Manganese	0.01	0.05	0.5	0.03
Iron	0.03	0.3	0.5	0.17
TDS	128	500	0.5	314

NOTES:

All parameters are in mg/L

(1) - Background values are the median values from the last 10 monitoring events at BH1B

Piezometers used in the assessment are those located at or beyond the property boundaries as follows:

- West CAZ Boundary – Monitoring well 8A and 8B
- North West CAZ Boundary – Monitoring well 7A and 7B
- North CAZ Boundary – Monitoring well 4A and 4B
- North East CAZ Boundary – Monitoring well 14

Table 18 provides the Reasonable Use Criteria for those points examined.

Table 18
Summary of 2023 and 2024 MOE Guideline B-7 (Reasonable Use) Calculations

August-23									
Parameters		C_{allow}	BH8A West CAZ Boundary	BH8B West CAZ Boundary	BH7A NW CAZ Boundary	BH7B NW CAZ Boundary	BH4A North CAZ Boundary	BH4B North CAZ Boundary	BH14 NE CAZ Boundary
Health Related	Nitrate	5.22	< 0.10	<0.10	--	--	<0.10	<0.10	<0.10
	Boron	1.26	0.25	0.11	--	--	0.25	0.03	0.04
Aesthetic Parameters	Sodium	108	54	28	--	--	77	13	33
	Chloride	140	<1	20	--	--	1	3	92
	Sulphate	254	4	69	--	--	21	9	20
	Manganese	0.03	0.06	0.59	--	--	0.15	0.13	0.10
	Iron	0.17	0.05	3.01	--	--	0.31	0.86	0.43
	TDS	314	220	465	--	--	367	295	491

All parameters are in mg/L
-- - Not Sampled
- Exceeds Reasonable Use Criteria
No Impact
Leachate Impact
Minor Impact

August-24									
Parameters		C_{allow}	BH8A West CAZ Boundary	BH8B West CAZ Boundary	BH7A NW CAZ Boundary	BH7B NW CAZ Boundary	BH4A North CAZ Boundary	BH4B North CAZ Boundary	BH14 NE CAZ Boundary
Health Related	Nitrate	5.22	<0.10	<0.10	<0.10	<0.10	<0.10	--	<0.10
	Boron	1.26	0.27	0.11	0.38	0.16	0.3	--	0.03
Aesthetic Parameters	Sodium	108	54	27	114	77	82	--	35
	Chloride	140	1	24	3	88	2	--	124
	Sulphate	254	4	71	7	222	16	--	20
	Manganese	0.03	0.06	0.56	0.03	0.85	0.10	--	0.10
	Iron	0.17	0.05	3.42	<0.03	<0.03	0.21	--	0.20
	TDS	314	300	452	363	722	360	--	517

All parameters are in mg/L
-- - Not Sampled
- Exceeds Reasonable Use Criteria
No Impact
Leachate Impact
Minor Impact

In **Table 18,** highlighted concentrations exceed the Guideline B-7 limits. No health-related parameters exceeded the Reasonable Use Policy Objectives (RUPO) in 2023 or 2024.

The iron and manganese concentrations are variable across the site. The concentrations may in part be related to the local mineralogy of the soil and are typical of background levels in Renfrew County. As concluded by Gartner Lee Ltd. (2007) the slightly elevated TDS concentrations are probably due to leachate effects or may be due to the evaporative effects caused by the seasonal ponded area between the landfill and the monitors. All parameters with RUC exceedances are aesthetic parameters and do not pose a health risk. The area down gradient of the site in which the RUPO exceedances occur is low lying, often saturated, and within the Ottawa River Floodplain (Floodway elevation of 111.5 m CSC datum, design elevation of 112.5 m CSC datum).

As confirmed by the Ministry in their TSS review dated March 26, 2014, there is no reasonable use of the groundwater for development in this area. In addition to the physical characteristics that limit any reasonable use of the property, the municipality has control (ownership) over any potential groundwater uses in the CAZ, and no development is permitted in the floodplain. As a result, no mitigation action is required. The Ministry in their TSS review of March 2014 confirm the Westmeath closed landfill site satisfies the intent of Guideline B-7.

7.0 SURFACE WATER QUALITY

Surface water sampling was completed at the Westmeath Waste Disposal Site during 2023 and 2024. Samples were collected as outlined in **Table 7**. The location of the surface water stations is provided in **Figure 2**. Water quality results, including field data where applicable, are provided in **Appendix I**. Shaded values represent concentrations that exceed regulatory criteria. Selected photographs of the sample locations are provided in **Appendix H.**

The surface water at the Westmeath WDS is characterized by two features, a swale/drainage ditch that parallels the eastern edge of the site and a low-lying flat area north of the site that catches ponded water and runoff from the adjacent escarpment.

Drainage Ditch

The small drainage ditch originates south of County Road 12 and is typically approximately 0.5 metres wide and 10 centimeters deep. The ditch in 2023 and 2024 was similar to these conditions. South of the site, the small ditch originates in farmers' fields and is characterized as being fed by agricultural runoff and from tile drains that manage the fields. The ditch flows under County Rd 12 where it is possible that it picks up contributions from the roadside ditch in this area. Northwest of County Road 12, the small ditch historically parallels the site along the eastern edge. North of the site, the ditch is less defined and is characterized by ponding water. This watercourse eventually discharges to the Ottawa River.

Sample locations SW-3, SW-3A, SW-5 and SW-20 are located along this watercourse. Specific locations are as follows:

- SW-3 and SW-3A are located up gradient of the site and are considered representative of background values.
- SW-5 is downstream of the confluence with former sampling stations SW-15 and SW-16.
- SW-20 is located approximately 220 metres downstream of the waste mound.

Northern Low-Lying Area

North of the site is a flat low-lying area that extends from the eastern ditch west to the western edge of the CAZ. There is no defined channel in this area, and it is characterized by little or no discernible flow. The surface water in this area typically accumulates during the spring melt and after storm events. There is no up gradient or upstream "headwater" from this area. For much of the year, this area is dry. During wetter periods, although with no discernible flow, the surface water along this stretch likely contributes to the flow in the eastern ditch.

Seeps Northwest

Northwest of the site, there are seeps that at times meander to the ditch in the vicinity of SW20.

All surface sampling locations and features are outlined in **Figures 2** and **3.**

7.1 Discharge Measurements

Discharge measurements were collected at the site in 2023 and 2024. In the spring of 2023 discharge measurements varied from 24.8 L/s at the upstream location (SW-3) to 30.6 L/s downstream (SW-20). In the spring of 2024 discharge measurements varied from 5.1 L/s at upstream location (SW-3) to 9.1 L/s downstream (SW-20).

Discharge measurements were typically collected by measuring water velocity at equal intervals across the watercourse. The channel area was calculated by using the cross-sectional method. **Table 19** outlines the discharge at surface water monitoring stations at the site in 2023 and 2024.

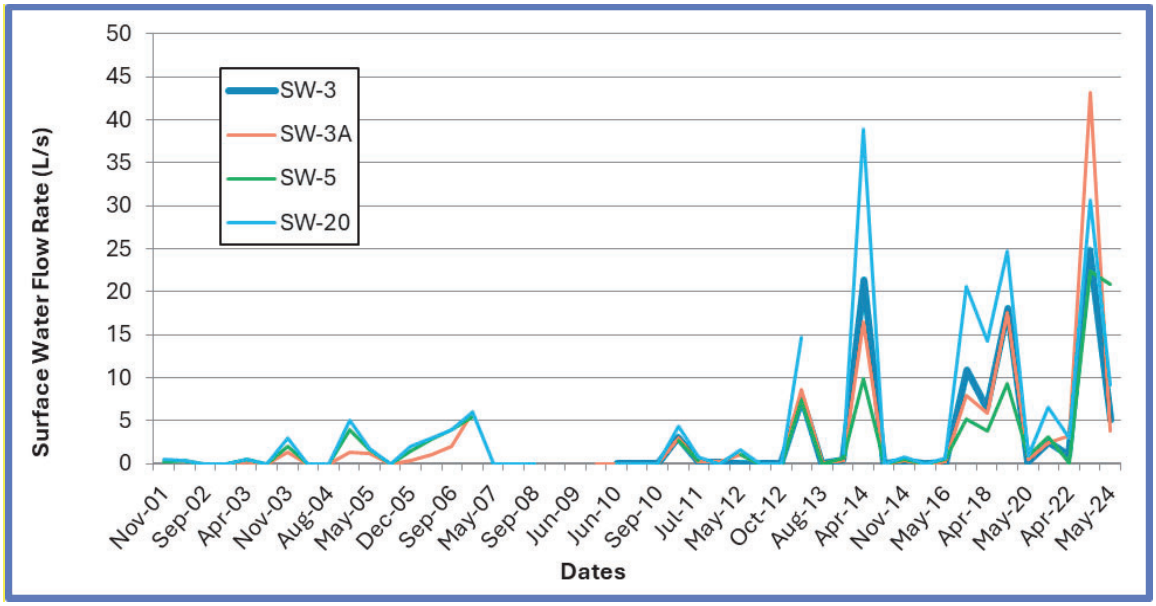
Historical flows from these locations are provided in **Graph 2**.

Table 19
Surface Water Discharge 2023 – 2024

Sample Location	May-23	May-24
SW-3	24.8	5.1
SW-3A	43.2	3.8
SW-5	22.4	20.9
SW-20	30.6	9.1

All discharge measurements in L/second

Graph 2
Historical Surface Water Flows



In the spring of 2023, the highest flows were recorded at SW-3A and in 2024 the highest flows were recorded downgradient at SW-5. It is likely that some of the water is diverted into the springs to the northeast as a result of the watercourse upstream of SW-5 changing its original flow path further to the northeast. Historically, the upgradient stations (SW-3 and SW-3A) contribute up to 50% of the flows to station SW-20. Typically, the higher flows at SW-20 are due to contributions from the low-lying area northwest of the landfill site that extends over 250 meters west to the western limits of the CAZ. There is also some potential contribution from the seeps. Although the water in the north low-lying area contains some run-off from the landfill, the majority is received from a very large entrapment area that extends along the length of the natural escarpment that follows the Ottawa River and during the spring melt and high precipitation events.

7.2 Surface Water Results

Results

Samples were collected from all four surface water monitoring locations in 2023 and 2024.

Table 20 and **Appendix K** provide a comparison of water quality from the respective surface water sampling stations as well as highlighting those parameters that exceed Provincial Water Quality Objectives (PWQO), Canadian Water Quality Guidelines (CWQG), Livestock Water Guidelines (LWG) and Aquatic Protection Values (APV).

Table 20
Summary of 2023-2024 Surface Water Quality

Leachate Indicator Parameters	PWQO	LWG	CWQG	APV	SW-3A Background Value (2023 - 2024)	Groundwater Leachate Range 1991 - 2024	SW-3 May 23 - May 24	SW-5 May 23 - May 24	SW-20 May 23 - May 24
Chloride		1000		180	18 - 36	86 - **796**	2 - 3	38 - 97	38 - 84
Sulphate					3 - 3	62 - 722	2 - 3	8 - 17	5 - 7
Boron	0.2	5	1.15	3.55	<0.01 - <0.01	**0.54 - 4.94**	<0.01 - <0.01	0.04 - **0.63**	0.04 - **0.22**
Alkalinity as CaCO3					32 - 90	620 - 1510	25 - 80	84 - 347	72 - 200
Conductivity (µS/cm)					121 - 243	2160 - 4570	59 - 149	250 - 952	228 - 644
COD					60 - 46	22 - 272	58 - 47	42 - 36	46 - 31
TDS		3000			79 - 158	1390 - 2940	38 - 97	162 - 619	148 - 419
Iron	0.3		0.3		**0.57 - 1.04**	0.0011 - **0.44**	**0.58 - 1.14**	**0.48 - 0.51**	**0.47 - 0.59**
Total P	0.03				**0.038 - 0.067**	0.03 - **10.2**	**0.038 - 0.068**	**0.038 - 0.171**	**0.041 - 0.086**
Copper	0.005	0.5 - 5.0	0.002	0.07	0.001 - 0.002	0.002 - 0.0172	0.001 - 0.002	<0.001 - <0.001	0.001 - 0.001

All values are in mg/L unless otherwise noted
BOLD Exceeds Criteria
Background surface water station is SW-3A as Approved by the MOECC District Manager
Groundwater leachate range is from groundwater monitoring well BH-11B
No Impact
Leachate Impact
Minor Impact

The 2023 and 2024 sampling revealed leachate indicator concentrations to be below PWQOs, CWQGs, livestock values and APVs except for:

Iron

- 0.58 mg/L (2023) and 1.14 mg/L (2024) at SW-3
- 0.48 mg/L (2023) and 0.51 mg/L (2024) at SW-5
- 0.47 mg/L (2023) and 0.59 mg/L (2024) at SW-20

Total phosphorous

- 0.038 mg/L (2023) and 0.068 mg/L (2024) at SW-3
- 0.038 mg/L (2023) and 0.171 mg/L (2024) at SW-5
- 0.041 mg/L (2023) and 0.086 mg/L (2024) at SW-20

In 2023 and 2024 monitoring station SW-3A that is located on the downgradient side of County Road 12, in most cases, revealed slightly higher chemical loading than the upstream side of County Road 12. Historically, this has been the case for selected parameters.

The differences between SW-3 and SW-3A may in part be due to the varied contributions from the roadside ditches on the respective sides of County Rd 12.

Overall, the chemical values at the upstream locations are less than the concentrations considered representative of leachate at the site.

As suggested by Gartner Lee in 2006, elevated concentrations may be a result of wintertime maintenance activities along County Road 12. County Road 12 is located immediately upgradient of the background monitoring station SW-3A. As discussed, the small ditch originates south of the County Road and is fed by agricultural runoff and from the tile drains. Impacts from farming may also be contributors to elevated concentrations.

During the 2023 and 2024 sampling, monitoring station SW-5 revealed the following exceedances:

Total Phosphorus: exceeded PWQO in 2023 and 2024
Iron: exceeded the PWQO and CWQG in 2023 and 2024

Generally, concentrations of parameters shown in **Table 20** are slightly above the range of concentrations revealed at SW-3A. The closed landfill site appears to be having a slight impact on the surface water at monitoring station SW-5.

The 2023 and 2024 monitoring of SW-20 revealed the following exceedances:

Iron: exceeded the PWQO and CWQG in 2023 and 2024
Total Phosphorus: exceeded PWQO in 2023 and 2024
Ammonia: exceeded PWQ) in 2023

Samples from station SW-20 in 2023 and 2024 reveal concentrations that are on balance less than SW-5 indicating a reduction of parameter concentrations at distance from the landfill. This is consistent with historical results. Samples from this location reveal parameter concentrations similar to background values with the exception of boron, alkalinity, conductivity, and TDS.

Historically, it has been confirmed that parameters decrease in concentration with distance from the landfill site and typically reveal a significant reduction in comparison to leachate values.

As suggested by the Ministry in their TSS review dated April 21, 2020, it is unlikely that the concentrations found at SW-5 and SW-20 are negatively impacting aquatic life in Bellows Bay of the Ottawa River and that the swale is described as being dry most of the year so little flow inputs to the River in any given year.

This suggests that the site is not creating unacceptable impacts, and that the site continues to operate as a natural attenuation site. Concentrations will be further reduced by any vegetative uptake along the shoreline. There is no suspected impact on the Ottawa River.

Surface water historical concentrations are shown in **Appendix K.**

7.3 Surface Water Trigger Mechanism

A letter from the MECP Ottawa District Manager dated September 23, 2014, confirmed that the surface water trigger mechanism to be used at the Westmeath landfill site is to be based on the trigger mechanism proposed by Jp2g Consultants Inc. in their 2012 Annual Monitoring Report (dated March 2013) with the following exceptions:

1. The trigger mechanism parameters in the surface water monitoring program should include calcium, potassium, iron, manganese, and boron
2. The trigger concentrations be set based on background concentrations at SW-3A

Additional correspondence from the Ministry dated April 21, 2020, suggested that at this time an "overhaul" of the trigger mechanism is required, and that it would be appropriate for the triggering mechanism to be based on a percentile of the upstream water quality from SW-3A. A triggering mechanism based on this principal will intuitively trigger the contingencies on a regular basis. Monitoring station SW-5 is located beyond the landfill site and is susceptible to impacts from the closed station and from any flow beneath the slope of the closed fill area and, when compared to the upgradient background, the values are most surely to be greater.

Trigger Parameters

The trigger parameters for the site are selected from the list of leachate indicator parameters with available water quality guidelines, preferably Provincial Water Quality Objectives, and or Canadian Water Quality Guidelines (PWQO, CWQGs). The parameters selected are those that are indicative of leachate impacts and that can be distinguished from naturally occurring or ambient background conditions. Accordingly, the trigger list is: unionized ammonia, boron, chloride, and sulphate.

Trigger Concentrations

The surface water trigger concentrations are the PWQO for each of the trigger parameters. In the absence of PWQO, the Canadian Water Quality Guideline (CWQG) is used for chloride and the British Columbia guideline is used for sulphate. The CWQG of 1.5 mg/L is also used for boron.

The compliance evaluation is done by comparing the 75th percentile concentrations at the trigger location (SW-5) to the PWQO/CWQG/British Columbia guideline. The 75th percentile concentrations have been calculated for the data set with the exception of unionized ammonia which is taken over the last 10 events.

The 75th percentile concentrations are used as an estimate of the water quality concentrations at the trigger location (SW-5). A 75th percentile concentration above the applicable water quality guideline would indicate a potential risk to the aquatic life and trigger the contingency plan. **Table 21** shows the results of the trigger assessment.

Table 21
Surface Water Trigger Values

Trigger Parameter	SW5 75th Percentile Value[1]	Guideline	
		Value	Criteria
Chloride	90.5	120	CWQG
Sulphate	73	271	BC
Boron	0.54	1.5	CWQG
Unionized	<0.02	0.02	PWQO

1 - Range of data used is 1991 to 2024

All values in mg/L

Sulphate criteria is the average

All trigger values are below the respective guideline values and therefore the trigger mechanism has not been exceeded at SW-5.

Contingency measures would be implemented if:

- the calculated 75th percentile concentrations exceed the PWQO (or other applicable quality criterion) for the trigger location for any one of the trigger parameters over two consecutive sampling events and the exceedances are not associated with background or ambient conditions: and/or
- there are significant changes in downstream surface water quality (i.e. increase in leachate indicator parameters downstream versus upstream or an apparent increase in indicator parameter concentrations over time).

Contingency Measures

The surface water contingency plan includes:

- Verification of results
- A detailed review of the trigger mechanisms including the methodology for the selection of the trigger parameters and trigger values and the location of the sampling locations to confirm that they are still the most appropriate for the site based on up-to-date information.
- Desktop review of local and regional trends to confirm whether the reported value is significantly different.
- Increased sampling frequency;
- Analysis of additional indicator parameters such as toxicity testing;
- Re-direction of surface water within the waste disposal site;
- Use of additional cover material to influence leachate generation, and;
- Remedial alternatives.

Administrative measures

- Limit the access to the surface and groundwater downgradient of the landfill. Currently the County Official Plan and the Westmeath Comprehensive Zoning By-law 98-13 apply some form of restrictions and/or reporting for development within 500m of the site and for the downgradient Environmental Protection zone.
- The area down gradient of the site is low lying, often saturated, and within the Ottawa River Floodplain (Floodway elevation of 111.5 m CSC datum, design elevation of 112.5 m CSC datum). In addition to the physical characteristics of the downgradient area, the municipality has control over the area, and no development is permitted in the floodplain.

The Ministry would be consulted prior to implementation of any contingency measure.

8.0 MONITORING PROGRAM

An essential component of an effective water quality monitoring program is a well-developed and maintained sampling plan. It is necessary to follow the same procedures and protocols during each phase of the monitoring program to ensure that all measurements and samples are representative of the actual conditions. Standard sampling protocols are provided in **Appendix J**.

The following sections outline the proposed sampling stations, sampling frequencies and chemical parameters intended to support the monitoring program for the closed Westmeath Landfill Site.

In general, the monitoring program will be reflective of the recommendations of the 2012 Annual Monitoring Report (March 2013) and as agreed upon by the MECP in their letter dated September 23, 2014, and April 21, 2020.

8.1 Groundwater

The post-closure monitoring program is limited to the sampling of the key monitors as shown on **Table 22**.

Table 22
Groundwater Monitoring Locations and Schedule for 2025/2026 Monitoring Events

Monitoring Location	Parameters	Frequency
Shallow Monitors		
1B, 4B, 7B, 8B, 14	Column 1, Schedule 5 - C/W VOCs from Column 1 + Hardness	Once per year (August)
Deep Monitors		
4A, 7A, 8A	Column 1, Schedule 5 - C/W VOCs from Column 1 + Hardness	Once per year (August)
Leachate Monitor		
11B	Column 1, Schedule 5 - C/W VOCs from Column 1 + Hardness, BOD5 & TSS	Once per year (August)

- One monitoring event: (Summer) monitoring of groundwater levels at all monitoring locations.
- Biennial reporting of the chemical results with the next report due in March 31, 2027 (including an assessment of the 2025 and 2026 monitoring results).
- All groundwater monitoring stations should be clearly marked, have adequate access and be maintained in good working order.
- In the event that a monitoring well becomes disabled an assessment should be provided as to whether or not the well is to be replaced or decommissioned.
- Record the status of all monitoring wells and a statement as to the compliance with O.Reg. 903.
- All wells that are not included in the monitoring program should be abandoned/decommissioned as per the Ontario Regulation 903 as amended.

8.2 Surface Water

The post closure surface water monitoring program is outlined in **Table 23** and surface water locations are provided in **Figure 2.**

Table 23
Surface Water Monitoring Locations and Schedule for 2025/2026 Monitoring Events

Monitoring Location	Parameters	Frequency
Surface Water		
SW3, SW3A (Background), SW5, SW20	Chloride, sulphate, calcium, magnesium, sodium, potassium, barium, boron, conductivity, manganese, total phosphorous, alkalinity, TKN, ammonia, TDS, un-ionized ammonia	Once per year (Spring)

Note:

- *1 Blind duplicate to be collected for each monitoring event*
- *Flow measurement to be conducted for all surface water stations*
- *Photographs of monitoring stations to be taken during each monitoring event*

- The sampling of four surface water stations. The location of the surface water monitoring stations is as follows:
  - **SW-3** – Upstream of SW-3A west side of culvert crossing County Road 12
  - **SW-3A** – Upstream of SW-5 east side of culvert crossing County Road 12
  - **SW-5** – Drainage ditch north of the site
  - **SW-20** – Downstream of SW-5
- The completion of one surface water sampling event with analysis of chemical parameters listed in **Table 22.** Minimum detection limit to meet PWQOs.
- Biennial reporting of the chemical results with the next report due March 2027 (i.e. assessment of the 2025 and 2026 analytical results).
- All surface water monitoring stations should be clearly labelled.

8.3 Landfill Gas

Landfill gas is to be monitored at each monitoring well coinciding with the groundwater monitoring program. It is noted that during the 2023 and 2024 monitoring events, landfill gas was monitored, and no gas was detected.

9.0 DISCUSSION AND RECOMMENDATIONS

Ground and surface water sampling were completed at the Closed Westmeath Waste Disposal Site in 2023 and 2024. The following is a summary of the activities and investigation.

- Samples were collected from selected groundwater monitoring stations in August 2023 and August 2024; water levels were measured prior to sampling.
- Surface water monitoring events were completed in Spring 2023 and Spring 2024.
- The direction of groundwater flow is similar to previous years. Groundwater flow is to the north northwest from the former landfill area towards the Ottawa River floodplain.
- The chemical analysis indicates that the groundwater beneath the landfill site is impacted (monitor BH11B) and characterized by elevated inorganic parameters (chloride, sulphate, sodium, potassium, boron, conductivity, hardness, alkalinity and TDS) above background values.
- Other overburden monitors continue to reveal low chemical concentrations characteristic of weak leachate strength.
- The Site meets compliance with Guideline B-7 as there is no use of the downgradient groundwater.
- No health-related parameters were measured to exceed the Reasonable Use Policy Objectives (RUPO) in 2023 or 2024. Aesthetic exceedances included sodium at BH7A in 2024; manganese at BH8A, BH8B, BH4A, and BH14 during both monitoring events as well as at BH4B in 2023 and BH7B in 2024; iron at monitor BH8B, BH4A, and BH14 during both monitoring events as well as at BH4B in 2023; and TDS at BH8B, BH4A, and BH14 during both monitoring events and BH7A and BH7B in 2024. A sample could not be collected from BH7A and BH7B during the 2023 monitoring event, or from BH4B during the 2024 monitoring event. The MECP have confirmed the site meets the intent of the reasonable use policy.
- The iron and manganese concentrations are variable across the site. The concentrations may in part be related to the local mineralogy of the soil and are typical of background levels in Renfrew County. As concluded by Gartner Lee Ltd. 2007, the slightly elevated TDS concentrations are probably due to leachate effects or may be due to the evaporative effects caused by the seasonal ponded area between the landfill and the downgradient monitors.
- Surface water samples were collected for analysis in 2023 and 2024 from two upstream locations (SW-3 and SW-3A) and two downstream locations (SW-5 and SW-20).
- The trigger assessment based on the 2024 sampling values indicates that all values are below their respective guidelines and therefore the surface water trigger mechanism has not been exceeded at SW-5.

The following is recommended to be completed at the site:

- Maintain all key monitoring wells in good working order.
- Complete monitoring and reporting as recommended in **Section 8** of this report.

10.0 LIMITATIONS AND USE OF THE REPORT

This report was prepared for the exclusive use of the Township of Whitewater Region. Any use which a third party makes of this report, or and reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Jp2g Consultants Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This landfill impact report involves a limited sampling of locations to assess the probability of contamination on site. The test data, chemical analyses, and conclusions given herein are the results of analyzing the groundwater and surface water encountered during the sampling programs. Based upon the total number of monitoring wells and surface water monitoring stations, these are considered to be fairly representative of the groundwater and surface water conditions at the site. It should be noted, however, that any assessment regarding the presence of contamination on the property is based on interpretation of conditions determined at specific locations and depths. Chemical results are limited to those parameters tested.

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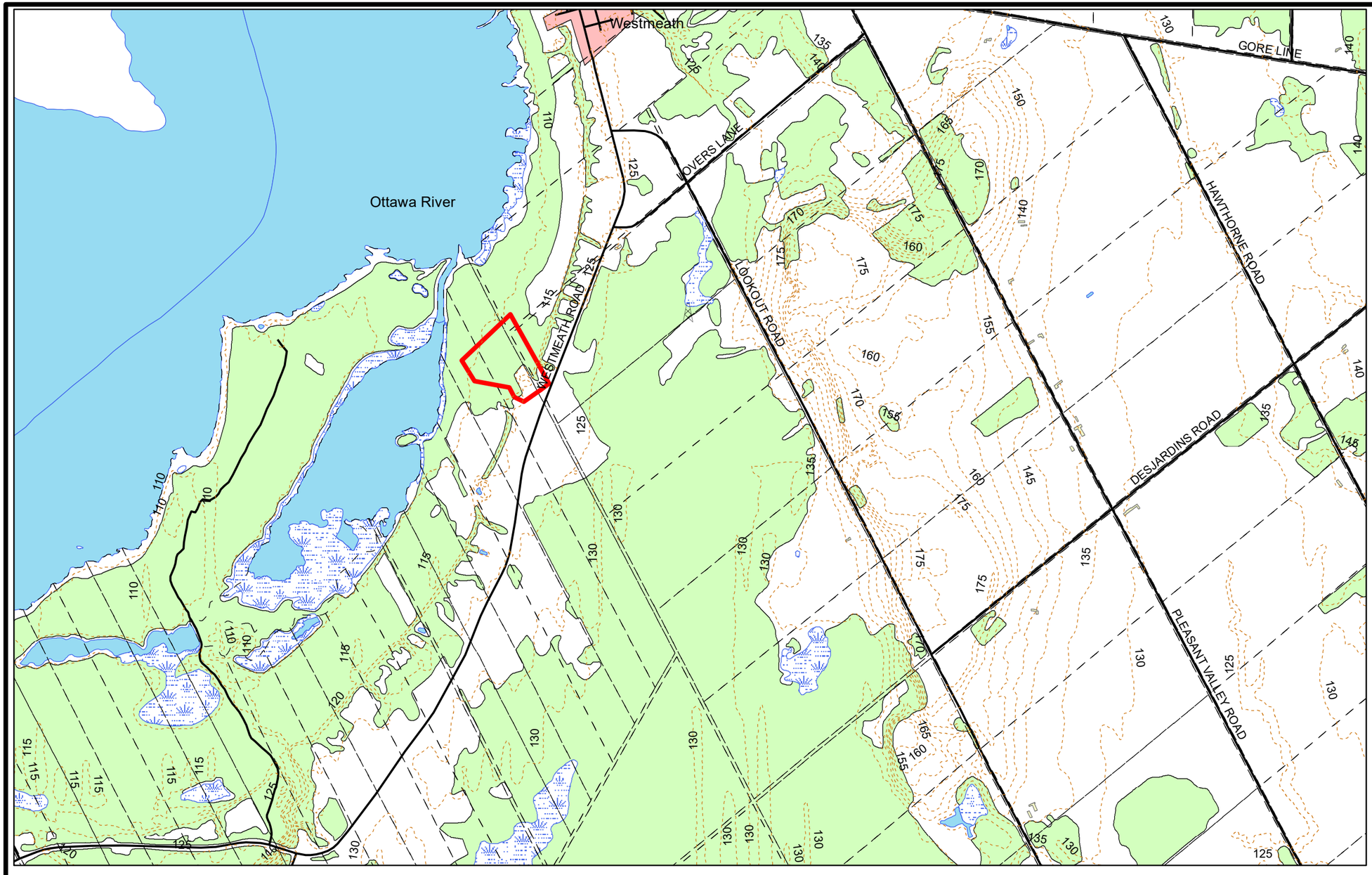
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Figures



Legend

- Tower
- Contour
- Road
- Railway
- Landfill Site
- Lot Fabric
- Waterbody
- Watercourse
- Wetland
- Built up Area
- Wooded Area
- Building

Data From Land Information Ontario

N
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0 500 1,000 2,000 Meters

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Westmeath WDS

Township of Whitewater Region

Scale 1:25000

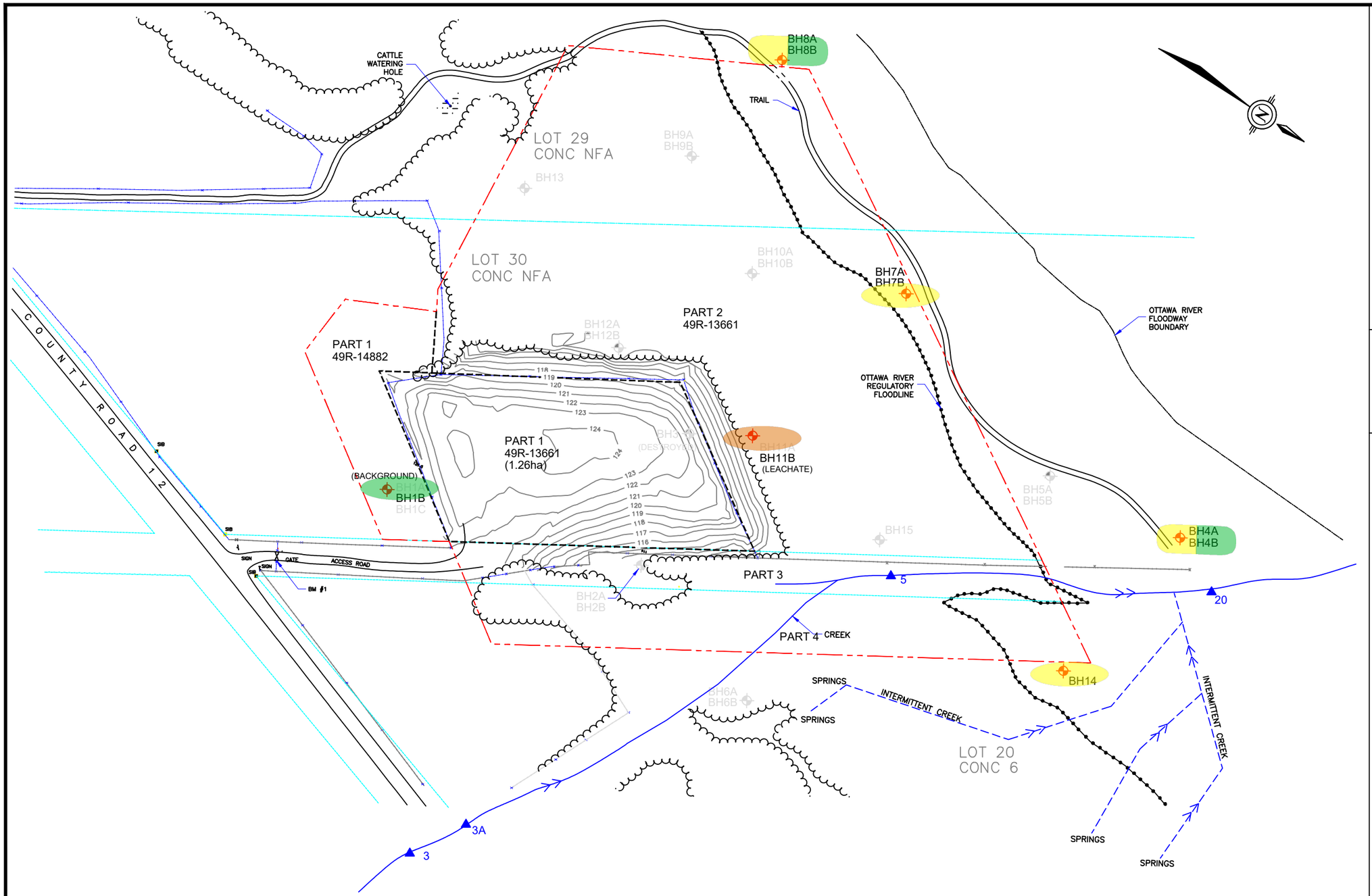
Project 17-6048I

Figure 1 - Site Location Map

Drawn By: BK

Checked by: AB

Date: March 2025



40 0 20 40 80 120 160 200

METERS

LEGEND

- LANDFILL SITE BOUNDARIES
- 3 — SURFACE WATER MONITORING LOCATION
- BH8A BH8B — GROUNDWATER MONITORING LOCATION
- MONITORING WELLS TO BE DECOMMISSIONED
- CREEK
- TREELINE
- 118 — SURFACE CONTOURS

NOTE:

PARTS 1–4 PLAN 49R–13661: 7.07 ha

PART 1 PLAN 49R–14882: 0.436 ha

- LEACHATE IMPACT
- MODERATE LEACHATE IMPACT
- NO LEACHATE IMPACT

No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.

ENGINEERS · PLANNERS · PROJECT MANAGERS

1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON K2H 8S9

PHONE: 613-828-7800 FAX: 613-828-2600

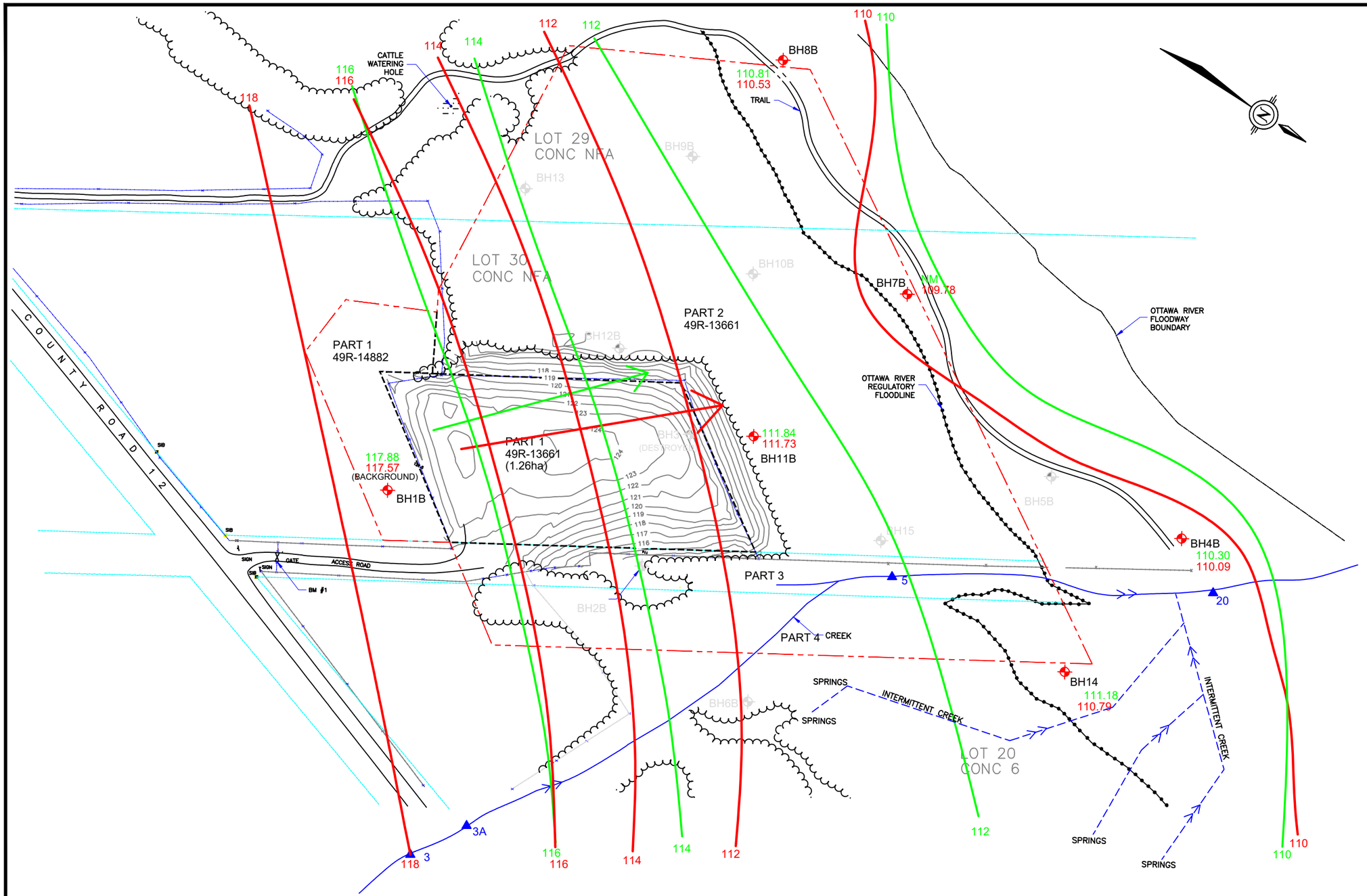
DESIGNED	PJ
DRAWN	AS
CHECKED	BK
APPROVED	KM
SCALE	1:2000

WESTMEATH WASTE DISPOSAL SITE

TOWNSHIP OF WHITEWATER REGION

SITE PLAN

DATE	JANUARY 2025
PROJECT	17–6048!
PLOTTED	24–JAN–2025
DRAWING	FIG. 2



LEGEND

- LANDFILL SITE BOUNDARIES
- 3 — SURFACE WATER MONITORING LOCATION
- BH8A / BH8B — GROUNDWATER MONITORING LOCATION
- MONITORING WELLS DECOMMISSIONED IN 2017
- CREEK
- TREELINE
- 118 — SURFACE CONTOURS
- 110.09 — 2023 GROUNDWATER ELEVATIONS
- 110 — 2023 GROUNDWATER CONTOUR
- 2023 GROUNDWATER FLOW
- 110.09 — 2024 GROUNDWATER ELEVATIONS
- 110 — 2024 GROUNDWATER CONTOUR
- 2024 GROUNDWATER FLOW

No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS
1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON K2H 8S9
PHONE: 613-828-7800 FAX: 613-828-2600

DESIGNED	PJ
DRAWN	AS
CHECKED	BK
APPROVED	KM
SCALE	1:2000

WESTMEATH WASTE DISPOSAL SITE

TOWNSHIP OF WHITEWATER REGION

2023/2024 GROUNDWATER ELEVATIONS AND FLOW DIRECTION (SHALLOW OVERBURDEN)

DATE	JANUARY 2025
PROJECT	17-6048I
PLOTTED	23-JAN-2025
DRAWING	FIG. 3

Appendix A

Environmental Compliance Approval

Ontario

Ministry of the Environment *Ministère de l'Environnement*

The Corporation of the Township of Westmeath
General Delivery
Westmeath, Ontario
KO J 2LO

You are hereby notified that the terms and conditions of the Provisional Certificate of Approval no. A 413602, dated February 5,1971 and March 24,1980 are amended by Notice and approval is granted for the use and operation of 1.26 hectares landfilling area within a total site area of 7.07 hectares.

all in accordance with the following plans and specifications: as listed in Schedule "A"
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) domestic, commercial and non-hazardous solid industrial waste.

and subject to the following conditions:

1.0 DEFINITIONS

For the purpose of this Provisional Certificate of Approval:

1.1 "Director" means any Ministry employee appointed by the Minister pursuant to Section 5 of the Environmental Protection Act;

1.2 "MOE" means the Ministry of the Environment;

1.3 "Regional Director" means the Regional Director, Eastern Region of the Ministry of Environment;

1.4 "District Manager" means the District Manager of the Ottawa District Office, Eastern Region of the Ministry of the Environment;

1.5 "This Certificate "means Provisional Certificate of Approval No. A 413602, dated July 7, 2000;

1.6 "Owner" means the Corporation of the Township of Westmeath,

1.7 "Site" means 1.26 hectares landfilling area within a total Site area of 7.07 hectares shown in Plan of Surveys, Plan 49R- 13661, dated February 17,1998, in Item no.3, Schedule "A";

1.8 " Contaminant Attenuation Zone" means area indicated by the site contaminant boundary limits in Drawing 1 site plan Item no.3, Schedule"A";

1.9 "ODWO" means the Ontario Drinking Water Objectives dated February, 1994 (and as amended);

1.10 "RUPO" means the Ministry of the Environment Reasonable Use Policy Objectives (Policy no. B-7; and

1.11 "PWQO" means the Provincial Water Quality Objectives dated July, 1994 (and as amended).

GENERAL CONDITIONS

The terms and conditions contained in the Provisional Certificate of Approval no. A 413602, dated February 5, 1971 and March 24, 1980 are hereby revoked and replaced by the following new terms and conditions.

2. Pursuant to Section 197 of the Environmental Protection Act, neither the Owner nor any person having an interest in the Site shall deal with the Site in any way without first giving a copy of this Certificate to each person acquiring an interest in the Site as a result of the dealing.

2.1 The Owner shall:

Within 60 days of the date of this Certificate submit to the Director for the Director's signature two copies of a complete Certificate of Prohibition containing a registerable description of the Site, in accordance with Form 1 of O. Reg. 14/92.

2.2 Within 10 calendar days of receiving the Certificate of Prohibition signed by the Director, register the Certificate of Prohibition in the appropriate Land Registry Office on title to the Site and submit to the Director immediately following registration the duplicate registered copy.

3. The Owner shall re-registered this Provisional Certificate of Approval to indicate on title the lands acquired for the contaminant attenuation zone for the total landfilling area for the waste disposal site. No operation shall be carried out at the site after 60 days of this condition becoming enforceable unless the Certificate has been registered by the Owner as an instrument in the appropriate Land Registry Office against title to the Site and unless a duplicate registered copy there of has been returned by the Owner to the Director.

4. The Owner shall be bound by the conditions of this Certificate. The conditions of this Certificate shall extend to and bind any successor and/or subsequent Owner(s)/Operator(s) of this Site subject to the approval of MOE.

5. The Site shall be operated and maintained by the Owner in accordance with all documents listed in the Schedule "A" of this Certificate.

6. The Site shall accept waste only from the Township of Westmeath.

7. The Owner shall place a sign at the main entrance to the Site on which is displayed in prominent letters the following information:

7.1 the name of the Site and the Certificate of Approval number for the Site;

7.2 the operating authority, telephone number and mailing address;

7.3 the hours the Site is open to accept waste from the public;

7.4 the telephone number for reporting emergency situations occurring at the Site during non-operating hours;

7.5 the waste acceptable for disposal at the Site;and

7.6 tipping fee rates.

7.7 The Site shall be permitted to operate Monday to Saturday 9:00 am to 5:00 pm throughout the year. The time of operation can be amended from time to time by writing to the District Manager.

8. The Owner shall maintain daily records with monthly summary of the quantity and types of waste disposed of at the Site.

9. The following information shall be recorded on loads refused access to the Site for disposal purposes:

9.1 date;
9.2 name of persons;
9.3 company name on vehicle;
9.4 vehicle description;
9.5 waste refused; and
9.6 reasons for refusals.

10. During non-operating hours of the Site, the entrance shall be locked.

11. No waste shall be received at the Site or removed from the Site, unless a Site Supervisor and/or designated alternative person (s) are present to supervise the operation.

12. The Owner shall ensure that the Site Supervisor and/or designated alternative person (s) have been adequately trained with respect to the following procedures without limitations:

12.1 conditions and Schedules of this Certificate;

12.2 the operation and maintenance of this Site;

12.3 relevant waste management regulations and legislation;

12.4 environmental conditions and concerns related to waste handling operations at the Site;

12.5 occupational health and safety activities pertaining to the workplace and waste handling operations at the Site.

13. The Owner shall keep a copy of this Certificate and Schedule "A" at the Site.

14. The Owner shall provide within one (1) year of the issuance of this Notice a supplementary report or in the alternative it can form part of the annual report required by condition 42. This report shall provide a schedule for the implementation program for screening along County Road 12 and any other area along the site boundary that is within the sight line of the general public.

15. The Owner shall bring the Site into compliance with the Environment Protection Act, Ontario Regulation 232/98, by purchasing an additional 30 metres of land as part of the Buffer Zone for the Site, as shown in Drawing 1, Item no 2. Schedule "A".

Site Inspection

Litter Control

16. Litter Control shall be carried out by the Owner in accordance with procedures described in Schedule "A".

Dust Control

17. The Owner shall take all necessary mitigative actions for dust control.

18. A dust suppressant shall be applied to the on-Site roads, when dust becomes a problem during the dry periods of the year.

Pest Control

19. The Owner shall ensure that there are no pests that shall pose a hazard to the health and safety of persons.

Scavenging

20. The Owner shall ensure that there is no scavenging of waste at the Site.

Odour Control

21. The Owner shall operate the Site in such a manner to minimise off-Site impact of odours at all time.

Noise Control

22. The Owner shall operate the Site in such a manner to minimise noise impact from haulage trucks and operating equipment on the natural environment and persons.

Surface water Control

23. The Owner shall provide a storm water and surface water drainage plan for the Site. The report shall address the impact of the berms on the drainage pattern around the Site and on the surface water quality at a number of monitoring locations. The assessment/study shall form part the operational and development plan and shall be completed within one (1) year of the issuance of this Notice.

Gas Control

24. The Owner shall conduct methane monitoring at the Site to show that methane gas does not pose a threat to the health and safety of persons and does not create an off- Site impact. The methane gas monitoring can consist of one round of sampling and testing to indicate the baseline concentrations of methane gas in the monitoring wells. The monitoring of methane gas at the Site can be amended subject to the approval of the District Manager.

Leachate Control

25. The Owner shall operate the Site and ensure that the leachate management objectives for the design of the Site for surface water quality protection as outlined in the monitoring report in Section 3.4, Item 3, Schedule "A" are complied with. In order to ensure the protection of the surface water quality during high watertable conditions when leachate contaminated groundwater discharges to the on-Site swale which in turn discharges to the Ottawa River (Bellows Bay), the trigger value of 75% of PWQO shall not be exceeded. In the event, the 75% of the PWQO trigger values are exceeded for surface water, the Owner shall prepare and submit to the Director for approval a contingency plan for leachate control within one (1) year of the discovery of the incident and excursion.

26. The Owner shall prepare and submit to the Director for approval a contingency plan for leachate control within one (1) year of the issuance of this Notice, to ensure the Site is brought into compliance with the RUPO. The contingency plan shall address the non-compliance at BH-7B and at boundary of the contaminant attenuation zone.

Burning of Waste

27. The Owner shall ensure that there is no burning of waste at the Site.

28. The burning of brush, trees and clean wood can be conducted at the Site as indicated in Appendix E in Item no. 3 and Section 4.21, MOE Guidance Manual For Landfill Site Receiving Municipal Waste, dated November, 1993.

Daily Cover

29. The Owner shall ensure that all waste accepted for disposal at the site shall be covered at the end of each working day by a daily cover that shall be 150 millimetres minimum thickness, weather permitting.

30. A suitable stock pile of clean granular cover material, which shall be equivalent to 50% of the quantity of the required annual daily cover material shall be maintained at the Site as a contingency measure.

Alternative Cover

31. The use of contaminated soils as daily cover shall be subject to the Generator demonstrating to the Owner that contaminated soils is non-hazardous and meets Regulation 347 of the Ontario Environmental Protection Act.

31.1 The volume of contaminated soils (waste) received at the Site shall be subject to the approval of the District Manager. The volume of contaminated soils stored at the Site shall not exceed the limitation of the annual daily cover material requirements as determined by the previous annual report.

32. The Owner/Generator prior to using strontium residue material from Timminco Metals as an alternative cover material at the Site, shall conduct a pilot study to demonstrate the material is suitable for use for cover at the Site. The Owner shall consult and seek guidance in Section 4.14 and 6.10.2 in the Document entitled: " Landfill Standards a Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites," prepared by the Ministry of the Environment dated May, 1998 and in accordance to Item no 4 in Schedule"A".

Intermediate Cover

33. The Owner shall cover the daily covered waste in the completed fill area with an intermediate soil cover that shall be a minimum thickness of 300 millimetres. The Owner shall provide in the operation and development plan more details for the scheduling for the intermediate cover application and the cover material that shall be used at the Site.

Final Cover

34. The maximum height of the peak/crown for the refuse and final cover shall not exceed 125.0 metres above the assumed elevation datum as indicated in Item no2. Drawing 3 in Schedule "A". This final maximum elevation shall be pursuant to conditions 35, based the volumetric calculation of the total Site air space which can support the Site design.

35. The Site maximum theoretical capacity is 63,000 cubic metres based on the calculation provided in Item no.4 of Schedule "A".

36. No waste shall be deposited at the Site after the final approved contours have been attained.

Berm

37. The Owner can construct the north berm that shall act as a retaining wall for the waste as shown on Drawings 2.0, 3.0 of Item 2 , Schedule "A", provided the Site design and Site capacity meet conditions 34, 35 and 36.

37.1 The Owner shall ensure that the clean fill excavated material from the Phase 1 area used for the construction of the north berm/retaining wall shall perform and maintain its structural integrity stability for the life of Site. The Owner shall submit to the District Manager within six (6) months upon the completion of the north berm/retaining wall, a report that shall monitor the performance of the berm/retaining wall. The report shall include but not limited to the following; an inspection of the berm wall for erosion, slope stability, surface, groundwater and leachate seeps every six (6) months. The semi-annual report shall be included in the annual report operation and development report.

37.2 In the event, the berms do not perform as designed and problems are identified with geotechnical stability, the Owner shall submit to the Director for approvals a contingency plan that shall provide the necessary appropriate measures to mitigate the problem within one (1) month, after the problem is identified.

Groundwater Monitoring

38. The groundwater monitoring program shall be undertaken by the Owner in accordance with Item no 3. in Schedule "A ". The Owner shall provide with the annual report an evaluation of the groundwater condition for long term monitoring purposes and the number of wells required on site to provide an accurate configuration of the vertical and horizontal hydrogeochemical plume and conditions at the Site. The 1998 monitoring program indicates that RUPO are exceeded at the Site. The Owner in consultation with the MOE, Eastern Region's regional hydrogeologist shall re-evaluate and amend the monitoring program to better assess the RUPO exceedance at the Site. Upon completion of this consultation, the owner shall provide recommendations to bring the Site into compliance. The proposed changes to the monitoring program shall be subject to the approval of the Regional Director.

38.1 The Owner pursuant to condition 38 shall recalculate the RUPO concentrations to reflect the current site conditions and remove any skewed values. The Owner shall consult and seek the approval of the regional hydrogeologist on the RUPO trigger values for the Site.

38.2 The Owner shall address the elevated strontium concentrations detected in the groundwater. The parameter being atypical substance, the owner shall conduct a literature search of US. EPA, WHO and/or other jurisdictions that have conducted studies on the health and safety aspects for this substance. This evaluation/study shall be included in the annual monitoring report, within the 12 months of the issuances of this Notice.

39. The Owner shall provide to the Regional Director/Director a contingency and remediation implementation Schedule plan to address the off-Site contamination and to bring the Site into compliance at the west/north. The financial cost for implementing the remedial action plan and abatement program shall be the responsibility of the Owner. The Contingency plan shall be implemented upon approval of the Director and within one year of the issuance of this Notice.

Surface water Monitoring

40. The surface water monitoring program shall be conducted in accordance with Item 2. in Schedule "A".

Closure Plan Landfill Site

41. One year before the Site is expected to close and stop receiving waste, as determined by Conditions 34, 35, and 36, the Owner shall develop and submit an updated Closure Plan. The Closure Plan shall be submitted for the Director's approval and should outline post-closure maintenance and monitoring program. The plan shall include, but not be limited to the following:

    41.1 Changes to the final contour plan that have occurred and have been previously identified in the annual reports or recommended in the development of the detailed closure plan;

    41.2 fencing and access control;

    41.3 details of any vegetative planting planned;

    41.4 the sequence and schedules for the final cover installation;

    41.5 post-closure and end-use plans;

    41.6 plans and schedules for the management and continued monitoring of the surface water and groundwater;

    41.7 plans and schedules for routine monitoring and maintenance of stormwater facilities; and

    41.8 plans and schedules for the routine monitoring of leachate seeps, the final cover and Site settlement.

Annual Report

42. The Owner shall prepare and submit an annual report to the Regional Director by March 31, of the year following the calendar year covered by the report which shall include as a minimum, but not limited to the following:

42.1 a survey of the Landfill Site waste disposal area conducted every three years and a map illustrating existing contours.

42.2 a summary of the total annual quantities of waste received on a quarterly basis for the Site;

42.3 a drawing(s) indicating all groundwater and surface water monitoring locations;

42.4 tables outlining monitoring locations, analytical parameters sampled and the frequency of sampling;

42.5 an interpretation of the surface water, groundwater and leachate monitoring data; a review of the adequacy of the monitoring programs; provide conclusions and recommendations for changes made in the monitoring programs;

42.6 an assessment of the groundwater quality as it relates to the RUPO and ODWO;

42.7 an assessment of the surface water quality with respect to the PWQO/Guidelines;

42.8 an update of any changes made in the operations, equipment, or procedures at the Site and Facility and operating difficulties encountered;

42.9 drawings showing the areas of fill, buffer areas, current landfill contours, percentages of available space utilized, and an estimate of the remaining disposal capacity and the landfill life span;

42.10 a summary discussion of landfill daily cover requirements and erosion protection;

42.11 a statement of compliance with all the conditions with respect to the inspection and reporting requirements as indicated in the Certificate;

42.12 a summary of any complaints made regarding the landfill Site operations and response from the Owner/Operator and the necessary actions taken to address these complaints;

42.13 recommendations with respect to any proposed changes made in the operation and monitoring programs for the Site; and

42.14 proposed changes made in the operation and monitoring program for the Site shall be subject to the approval of the Regional Director.

Ontario

Ministry of the Environment / *Ministère de l'Environnement*

SCHEDULE "A"

This Schedule "A" forms part of the Provisional Certificate of Approval no. A 413602 and contains an application along with documentation submitted in support to this application:

1. Application for Approval of a Waste Disposal Site, the Corporation of the Township of Westmeath, submitted by R. Keith, Clerk-Treasurer dated July 14, 1998.

2. "Township of Westmeath Waste Disposal Site , Site Development and Operations plan, final report," prepared by Janota Patrick & Associations Ltd dated May, 1998.

3. "Westmeath Landfill Site 1997 Ground and Surface Water Monitoring Report," prepared for Janota Paterick & Associations Limited by Gartner Lee Limited dated May, 1998.

4. Letter report prepared by Janota Patrick & Associates and Gartner Lee Limited dated May 10, 2000.

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

2. Conditions 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 and 28 are to ensure the Site is operated in compliance and in accordance with the Provisional Certificate of Approval, EPA and other supporting documents submitted in Schedule "A".

3. Conditions 29, 30, 31, 32, 33, 34, 35 and 36 are to ensure that Site capacity is not exceeded beyond final contours and the site capacity is recalculated to meet the site design. All alternative cover proposed to be used at the Site shall meet Regulation 347, EPA.

4. Condition 37 is to ensure that the berm/retaining wall is properly constructed and the performance meet shall meet geotechnical standards and performance of the life of the Site.

5. Conditions 38, 39, and 40, are to ensure that the surface water and groundwater monitoring programs are conducted so that the Site is operated in compliance with the Ontario Water Resources Act, Environmental Protection Act and the conditions in this Certificate.

6. Condition 41 provides guidance to ensure that the Site is closed in accordance with the Certificate. The Site shall be maintained and inspected so that it causes no impact on the natural environment does not create a nuisance and poses no threat to the health and safety of persons. The long term maintenance of the Site shall be such that, it at all times be in compliance with the Ontario Water Resources Act, Environmental Protection Act and Conditions in this Certificate.

7. Condition 42 provides and outlines the requirements for the annual report that must be submitted to the Ministry. The annual report shall provide an update of all surface water and groundwater monitoring programs, waste placements, site plans and all other operational development activities on the Site as set out in the Certificate.

Ontario

Ministry of the Environment *Ministère de l'Environnement*

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:

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.

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 disposal site is located;

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

This Notice must be served upon:

The Secretary,*
Environmental Appeal Board,
2300 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 Avenue West, Floor 12A
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 7th *day of* July, 2000

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

c: District Manager, MOE Ottawa District Office

Ministry of the Environment / Ministère de l'Environnement

Ontario

NOTICE
Page 1 of 3

The Corporation of the Township of Westmeath
General Delivery
Westmeath, Ontario
K0J 2L0

You are hereby notified that I have revoked Condition 29 and replaced it with a new Condition 43 for the Provisional Certificate of Approval no. A 413602 dated July 7, 2000.

A. Condition 29 is revoked and replaced by the following new condition;

Condition 43. The Owner shall ensure that all waste accepted for disposal at the Site shall be covered at the end of each working day by a daily cover that shall be 150 millimetres minimum thickness, weather permitting. The Owner from time to time can in writing apply to amend the frequency of the daily cover application at the Site subject to the approval of the District Manager. In the event, it is determined that the reduced frequency of daily cover application at the Site causes an adverse effect, then the Owner shall forthwith return to once a day application rate.

SCHEDULE "A"

This schedule "A" forms part of the Provisional Certificate of Approval no. A 413602 and contains an application along with documentation submitted in support to this application.

5. Letter prepared by Janota Patrick & Associates Ltd to The Secretary Environmental Appeal Board and The Director, Section 39, Environmental Protection Act. Ministry of the Environment dated July 28, 2000 requiring a "Notice Requiring a Hearing by the Environmental Appeal Board Provisional Certificate of Approval No. A 413602, Waste Disposal Site for the Corporation of the Township of Westmeath Part of Lot 20, Concession 6 ,Township of Westmeath, County of Renfrew."

6. Letter prepared by Janota Patrick & Associates Ltd to The Secretary Environmental Appeal Board and The Director, Section 39, Environmental Protection Act. Ministry of the Environment dated August 9, 2000. The Township of Westmeath is prepared to withdraw the appeal.

7. Letter prepared by Janota Patrick & Associates Ltd to Ms. Susan Dunn, The Secretary, Environmental Appeal Board and The Director, Section 39, *Environmental Protection Act*. Ministry of the Environment dated August 9, 2000. The Township of Westmeath is prepared to withdraw the appeal and submitted wording change for condition 29.

Ontario

Ministry of the Environment / Ministère de l'Environnement

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

8. Condition 43 is to ensure the Site is operated in compliance and in accordance with the Provisional Certificate of Approval and EPA. It also gives the Owner some flexibility to request a reduced frequency to daily cover application at the Site subject to the approval of the District Manager.

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:

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.

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 disposal site is located;

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

This Notice must be served upon:

The Secretary,*
Environmental Appeal Board,
2300 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 Avenue, 12A Floor,
Toronto, Ontario.
M4V 1L5

Ontario

Ministry of the Environment / Ministère de l'Environnement

*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 29th *day of* August, 2000.

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

c: District Manager, MOE Ottawa District Office

Ontario

Ministry of the Environment | Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A413602
Notice No. 2

RECEIVED
JAN 12 2001

Corporation of the Township of Westmeath
1798 Westmeath Road
Westmeath, Ontario
L0J 2L0

Site Location: Westmeath Landfill Site
1597 Westmeath Road
Westmeath Township, County Of Renfrew
K0J 2L0

You are hereby notified that I have amended Provisional Certificate of Approval No. A413602 issued on March 24, 1980 for the use and operation of 1.26 hectares landfilling area within a total site area of 7.07 hectares, as follows:

Condition 6 is hereby revoked and replaced with:

6. The Site shall accept waste only from the Township of Westmeath and the Village of Beachburg.

The following document is hereby added to Schedule "A".

8. Letter dated October 25, 2000 from R. Keith, Clerk-Treasurer, Township of Westmeath to A. Dominski, MOE requesting the addition of the Village of Beachburg to the approved Service Area of Westmeath Waste Disposal Site.

The reason for this amendment to the Certificate of Approval is as follows:

Receipt of letter requesting amendment, dated October 25, 2000 and signed by R. Keith.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A413602 dated March 24, 1980.

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 Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

2. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
   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 Appeal Board
2300 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 Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board 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 2nd day of January, 2001

Andrzej Dominski, P.Eng.
Director
Section 39, *Environmental Protection Act*

JB/

c: District Manager, MOE Ottawa
Brian Whitehead, Planner, Jp2g Consultants Ltd.

2006048 C 2006-04-28-14-3

Ontario

Ministry of Environment and Energy | Ministère de l'Environnement et de l'Énergie

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A413602
Notice No. 3

The Corporation of the Township of Whitewater Region
PO Box 40
Cobden, Ontario
K0J 1K0

Site Location: Westmeath Landfill Site
1597 Westmeath Road
Westmeath Township, County Of Renfrew
K0J 2L0

You are hereby notified that I have amended Provisional Certificate of Approval No. A413602 issued on March 24, 1980 for the use and operation of a 1.26 hectare landfill area on a 7.07 hectare site for disposal of domestic, commercial and non-hazardous solid industrial waste, as follows:

I. The Municipality name and address is changed to:

The Corporation of the Township of Whitewater Region
PO Box 40
Cobden, Ontario
K0J 1K0

II. Condition 6 is hereby revoked and replaced with:

6. The site shall accept waste only from the Township of Whitewater Region.

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

1. The reason for Part I is to update the site ownership change resulting from amalgamation.

2. The reason for Condition 6) is to amend the service area from the Township of Westmeath to include the entire Township of Whitewater Region.

SCHEDULE "A"

The following items are added to Schedule A:

8. Application for Approval of a Waste Disposal Site dated March 5, 2002 .

9. Letter from Brian Whitehead, Jp2g Consultants Inc. to Ian Parrott, Ministry of the Environment (and Energy), dated March 5, 2002, with details pertaining to the requested service area amendment.

10. Letter from Lauree Armstrong, Jp2g Consultants Inc. to Heather Brodie-Brown, Ministry of the Environment and Energy, dated July 24, 2002 confirming the Townships acquisition of the 30 m buffer zone required to meet Condition 15 of the Certificate of Approval, and including a copy of the Transfer/Deed of Land.

11. Copy of an order, dated March 31, 1999, made under the Municipal Act to amalgamate the Corporation of the Village of Beachburg, The Corporation of the Township of Ross and The Corporation of the Township of Westmeath as a township municipality under the name of "The Corporation of the Township of Whitewater Region".

12. Fax from Lauree Armstrong, Jp2g Consultants Inc. to Heather Brodie-Brown, Ministry of the Environment, dated October 24, 2002, including documentation of public notification for change of service area.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A413602 dated March 24, 1980.

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., 12th Floor
P.O. Box 2382
Toronto, Ontario

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of Environment and Energy
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario

M4P 1E4

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 30th day of October, 2002

THIS NOTICE WAS MAILED
ON Nov. 7, 2002
DC
(Signed)

Ian Parrott, P.Eng.
Director
Section 39, *Environmental Protection Act*

HB/

c: District Manager, MOEE Ottawa
Lauree Armstrong, Jp2g Consultants Inc. ✓

Ontario

Ministry of the Environment | Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A413602

The Corporation of the Township of Whitewater Region
1798 Westmeath Road
Westmeath, Ontario
K0J 2L0

Site Location: Westmeath Landfill Site
1597 Westmeath Road
Westmeath Township, County Of Renfrew
K0J 2L0

You are hereby notified that I have amended Provisional Certificate of Approval No. A413602 issued on March 24, 1980 for the use and operation of a 1.26 hectare fill area on a 7.07 hectare site for disposal of domestic, commercial and non-hazardous solid industrial waste, as follows:

1. Condition 32 is amended to read as follows:

   32. The Owner shall not use strontium residue waste from Timminco Metals as an alternative daily cover.

2. Schedule "A" is amended to add the following documentation:

   5. Application for Approval of a Waste Disposal Site dated March 5, 2002, and signed by Dean Sauriol, the Corporation of the Township of Whitewater Region.

   6. Report entitled "Application for Amendment to the Certificate of Approval for the Westmeath Waste Disposal Site, CofA No. A413602", dated March 2002, and prepared by Jp2g Consultants Inc.

   7. Letter from Steven Hodson, Landfill Operations Manager, the Corporation of the Whitewater Region, dated February 11, 2005, confirming that strontium residual waste will not be used as daily cover.

3. Reason 3 is amended to read as follows:

   3. Conditions 29, 30 and 33 are included to ensure that waste is adequately covered to minimize the possibility of an adverse effect to the natural environment or any persons. Condition 31 is

included to ensure that the use of contaminated soil as the cover material is within the limitations of this Approval and that its use does pose a risk of an adverse effect to the natural environment or any persons. Condition 32 is include to prohibit the use of strontium residue waste as daily cover to minimize the likelihood of leachate breakouts in the sides of the landfill. Conditions 34, 35 and 36 are included to ensure that the Site's capacity is not exceed beyond the final contours which are based on the maximum theoretical capacity of the Site.

All in accordance with the application for approval dated March 5, 2002 and supporting information and documentation prepared by Jp2g Consultants Inc. and listed as Items # 5 - 7, in the amended Schedule "A".

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A413602 dated March 24, 1980

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., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of Environment and Energy
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 8th day of March, 2005

THIS CERTIFICATE WAS MAILED
ON March 11, 2005
DC
(Signed)

Ian Parrott, P.Eng.
Director
Section 39, *Environmental Protection Act*

MW/
c: District Manager, MOE Ottawa
Lauree Armstrong, Jp2g Consultants Inc.

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A413602
Notice No. 6
Issue Date: March 20, 2008

The Corporation of the Township of Whitewater Region
PO Box 40
Cobden, Ontario
K0J 1K0

Site Location: Westmeath Landfill Site
1597 Westmeath Road
Westmeath Township, County Of Renfrew
K0J 2L0

You are hereby notified that I have amended Provisional Certificate of Approval No. A413602 issued on March 24, 1980 for the use and operation of a 1.26 hectare fill area on a 7.07 hectare site for disposal of domestic, commercial and non-hazardous solid industrial waste , as follows:

I. The closure plan of the Westmeath Landfill Site is hereby approved and the Condition 6, 7, 8, 9, 11, 14, 23, 24, 25, 26, 29, 30, 31, 32, 33, 37, 38, 39, 40, 41, 42, and 43 are no longer applicable.

II. The following Conditions are hereby added:

44. The Township of Whitewater Region shall close the Westmeath Landfill Site in accordance with the Items 9 to 13 of Schedule "A" and no more waste shall be received at the Westmeath Landfill Site.

45. The groundwater and surface water samples shall be collected and analysed at the pre-determined frequency in accordance with the Schedule "B".

46. Final Cover:
   (i) Township of Whitewater Region shall place 600 mm of soil final cover and 150 mm of top soil over waste landfilled.
   (ii) Only clean soil shall be used for final cover.
   (iii) Seeding of the final cover shall be undertaken in the next growing season following the placement of the final cover.
   (iv) Slopes of the final cover shall not be less than 5% to promote effective surface water run-off.

47. The Township of Whitewater Region shall provide an annual report which outlines the results of the sampling program to the Ottawa District Office on or before March 31 of each year.

48. If concentrations at downstream location exceed the PWQO for parameters with the existing background below the PWQO, or exceeding the existing background for parameters with the existing background above the PWQO for two consecutive sampling events, and these exceedences are due to the landfill impact, then within thirty (30) days, The Township of Whitewater Region shall submit for the District Manager's approval the contingency measures to be undertaken at the landfill.

49. The Westmeath Landfill Site shall be in compliance with Guideline B-7 (Reasonable Use Guideline).

50. The groundwater and surface water monitoring program may be amended from time-to-time with the written prior consent of the District Manager.

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

9. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated February 19, 2005 and signed by Steven Hodson, Landfill Operations Manager, Township of Whitewater Region.

10. "Westmeath Landfill Site Closure Plan", dated January 2005, prepared by Waste Mangement Department of Township of Whitewater Region.

11. "Westmeath Township Landfill Site - 2006 Groundwater and Surface Water Monitoring Results", Dated March 2007, prepared by Gartner Lee Ltd.

12. Memorandum dated November 9, 2007 from Dana Cruikshank, Surface Water Scientist of Eastern Region Technical Support Section to Marc Etienne Lesieur, Senior Enviornmental Officer of Ottawa District Office.

13. Memorandum dated March 3, 2008 from Shawn Kinney, Hydrogeologist of Eastern Region Technical Support Section to Marc Etienne Lesieur, Senior Enviornmental Officer of Ottawa District Office.

IV. Schedule "B" is hereby added:

Schedule "B"

This Schedule "B" forms part of Certificate of Approval No: A413602

Groundwater Monitoring

Sampling Location	Parameters	Frequency
Shallow Monitors: 1C, 2B, 4B, 5B, 6B, 7B, 8B, 9B, 10B, 11B, 12B, 13, 14,15	Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Calcium, Chloride, Chromium, Conductivity,	Once a year (Summer)

Deep Monitors: 1A, 2A, 4A, 5A, 6A, 7A, 8A, 9A, 10A, 11A, 12A	Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nitrite (NO2-N), Nitrate (NO3-N), pH, T.K.N., Total Phosphorus, Phenol, Potassium, Sodium, Suspended Solids, Total Dissolved Solids, Sulphate, Zinc, BOD-5, COD, VOCs.	

Surface Water Monitoring

Sampling Location	Parameters	Frequency
SW-3, SW-3A (Background) SW-5, SW-20	Alkalinity, Ammonia, Arsenic, Barium, Boron, Cadmium, Chloride, Chromium, Conductivity, Copper, Iron, Lead, Mercury, Nitrite (NO2-N), Nitrate (NO3-N), pH, T.K.N., Total Phosphorus, Phenol, Suspended Solids, Total Dissolved Solids, Sulphate, Zinc, BOD-5, COD, Dissolved Oxygen.	Three times a year (April, August and November)

The reason for this amendment to the Certificate of Approval is as follows:

1. To approve the closure plan sumbitted by The Township of Whitewater Region, dated February 19, 2005, as amended

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A413602 dated March 24, 1980, 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
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 20th day of March, 2008

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

AT/

c: District Manager, MOE Ottawa
Steven Hodson, The Corporation of the Township of Whitewater Region

Appendix B

Monitoring and Screening Checklist

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	Westmeath WDS
Location (e.g. street address, lot, concession)	Pt lot 20, Con VI and EML, Pt lot 30 North Front "A" and Part of Road Allowance between Con VI and North Front "A" Geographic Township of Westmeath , now Township of Whitewater Region
GPS Location (taken within the property boundary at front gate/ front entry)	o 450 47' 46.75" North - 760 53' 32.02" West o NAD 83 - UTM 18N – easting 352 960 northing 5 073 100 (acc +- 50 meters)
Municipality	Township of Whitewater Region
Client and/or Site Owner	Township of Whitewater Region
Monitoring Period (Year)	2023 and 2024
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	A413602
Director's Order No.:	N/A
Provincial Officer's Order No.:	N/A
Other:	N/A

Report Submission Frequency	○ **Annual** ◉ **Other**	Biennial	
The site is: **(Operation Status)**	○ **Open** ○ **Inactive** ◉ **Closed**		
Does your Site have a Total Approved Capacity?	○ **Yes** ◉ **No**		
If yes, please specify Total Approved Capacity		*Units*	Cubic Metres
Does your Site have a Maximum Approved Fill Rate?	○ **Yes** ◉ **No**		
If yes, please specify Maximum Approved Fill Rate		*Units*	
Total Waste Received within Monitoring Period (Year)	0	*Units*	Cubic Metres
Total Waste Received within Monitoring Period (Year) *Methodology*	N/A		
Estimated Remaining Capacity	0	*Units*	Cubic Metres
Estimated Remaining Capacity *Methodology*	Site closed since 2006		
Estimated Remaining Capacity *Date Last Determined*	Site is closed		
Non-Hazardous Approved Waste Types	☐ Domestic ☐ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☐ Tires	☐ Contaminated Soil ☐ Wood Waste ☐ Blue Box Material ☐ Processed Organics ☐ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other: N/A
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*	N/A		
Year Site Opened *(enter the Calendar Year only)*		**Current ECA Issue Date**	March 20, 2008
Is your Site required to submit Financial Assurance?		○ **Yes** ◉ **No**	
Describe how your Landfill is designed.		◉ Natural Attenuation only ○ Fully engineered Facility ○ Partially engineered Facility	
Does your Site have an approved Contaminant Attenuation Zone?		◉ **Yes** ○ **No**	

If closed, specify C of A, control or authorizing document closure date:	N/A

Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**
If yes, provide details:	N/A
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)	○ Yes ◉ No

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	(●) **Yes** ( ) **No**	The monitoring program continues to effectively characterize the site conditions. All monitoring wells are in good condition. The monitoring wells not included in current monitoring program were decommissioned in November 2017.
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document (s):	( ) **Yes** (●) **No** ( ) **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
BH 4B	Insufficient water	August 2024
BH7A, BH7B	Inaccessible	August 2023

3) a) Is landfill gas being monitored or controlled at the site?	◉ **Yes** ○ **No**	
If yes to 3(a), please answer the next two questions below.		
b) Have any measurements been taken since the last reporting period that indicate landfill gas is present in the subsurface at levels exceeding criteria established for the site?	○ **Yes** ◉ **No**	
c) Has the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	○ **Yes** ○ **No** ◉ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	Sampling completed in general as per Jp2g Consultants standard practices as described in report

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	◉ Yes ○ No		
6) The site meets compliance and assessment criteria.	◉ Yes ○ No	See Report Section 6.6	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	◉ Yes ○ No		
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/ treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ Yes ○ No	**Note which practice(s):**	☐ (a) ☐ (b) ☒ (c)
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ Yes ○ No ◉ Not Applicable		

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No changes to the monitoring program are recommended**	Changes were recommended in 2013 and have been accepted as per MOECC correspondence dated September 23, 2014. No changes from this monitoring program are recommended.
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No Changes to site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/ are recommended:**	

Name:	Andrew Buzza, P.Geo Note: Report signed and stamped.		
Seal:	Add Image		
Signature:		**Date:**	
CEP Contact Information:	Andrew Buzza, P.Geo		
Company:	Jp2g Consultants Inc.		
Address:	1150 Morrison Drive Suite 410 Ottawa ON K2H 8S9		
Telephone No.:	613 828-7800	Fax No. :	613 828-2600
E-mail Address:	andrew.buzza@jp2g.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	
Signature:		**Date:**	

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	drainage ditch that parallels the eastern edge of the site (<100m)
Distance(s)	<100m

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	◉ Yes ○ No	
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	◉ Yes ○ No ○ **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	○ **Yes** ○ **No** ◉ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	Sampling completed in general as per Jp2g Consultants standard practices as described in report

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	○ **Yes** ◉ **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
		SEE ATTACHMENT 1
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	○ **Yes** ◉ **No**	The closed landfill site appears to be having a slight impact on the surface water at monitoring station SW-5.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	◉ **Yes** ◯ **No**	
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	◉ Yes ◯ No ◯ Not Known ◯ Not Applicable	Groundwater monitoring locations were compared to surface water criteria in chemical database (Appendix I) and described in Section 6.4 of the report
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	◯ **Yes** ◉ **No** ◯ **Not Applicable**	See Report Section 7.3

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

○ **No Changes to the monitoring program are recommended**	In MECPs April 21, 2020 comments, they stated that the monitoring list of parameters for Westmeath can be reduced as many parameter concentrations have remained unchanged. The revised monitoring program is included in Table 23 in Section 8.2 of the report.
◉ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/are recommended:**	

CEP Signature	
Relevant Discipline	Professional Geo Scientist, Education and over 30 years experience
Date:	
CEP Contact Information:	Andrew Buzza, P Geo
Company:	Jp2g Consultants Inc.
Address:	1150 Morrison Drive Suite 410 Ottawa ON K2H 8S9
Telephone No.:	613 828-7800
Fax No. :	613 828-2600
E-mail Address:	andrewb@jp2g.com

Save As		**Print Form**

Appendix B - Monitoring and Screening Checklist

Attachment 1

Monitoring Station	B	% exceedance	Total P	% exceedance	Fe	% exceedance	Phenols	% exceedance
PWQO	0.2		0.03		0.3		0.001	
SW-3								
May-23			0.034	13	0.58	93		
May-24			0.068	127	1.14	280		
SW-3A								
May-23			0.038	27	0.57	90		
May-24			0.067	123	1.04	247		
SW-5								
May-23			0.038	27	0.48	60		
May-24	0.63	215	0.171	470	0.51	70		
SW-20								
May-23			0.041	37	0.47	57		
May-24	0.22	633	0.086	187	0.59	97		

Notes:

All concentration values in mg/L and all quantified exceedance values in percent

CWQO for Boron is 1.5 mg/L

Appendix C

MECP Correspondence

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

April 21, 2020

TO: Thandeka Ponalo
Sr. Environmental Officer
Ottawa District Office
Eastern Region

FROM: Dana Cruikshank
Surface Water Scientist
Water Resources Group
Eastern Region

RE: 2018 Annual Report; Westmeath WDS
Westmeath Landfill Site Closure Plan
Twp. of Whitewater Region
C of A # A413602
IDS Ref #: 0020-BFXRXP

I have reviewed the above report prepared by Jp2g Consultants dated March 2019 with respect to surface water concerns only.

Report Overview:

For 2018 Jp2g reports;

- Site is closed, final cover in 2008 and owned by Twp. Of Whitewater Region.
- Leachate strength is perceived to be low, shallow groundwater is north/northwest
- Leachate indicator parameters are chloride, sulphate, sodium, potassium, boron, alkalinity, conductivity and TDS.
- Surface water features include a drainage ditch that parallels the eastern edge of the sire, A low lying area north of the site catches ponded water, Monitoring of this was ceased in 2014.
- A small eastern drainage ditch originates south of CR 12 and is characterized by low flow velocities. Four monitoring stations are located on this drainage ditch.
- Four surface water stations were sampled only in May 2012 due to dry conditions.
- Background is determined by SW3 and SW3A. SW3A is on the downstream side of County Rd 12.
- SW5 is downstream of waste mound and the confluence of former sampling stations SW-15 and SW16.
- SW20 is 220 metres downstream of waste mound.
- The swale flows to the north side of the WDS and discharges to Bellows Bay in the Ottawa River.

- Discharge measurements taken in April of 2017 and 2018 ranged from 3.8 to 20.6 L/s. Higher discharge occurred in 2017 a wet year while 2018 was more dry. SW20 shows significantly higher flow discharges than the other stations.
- PWQO exceedances for iron and Total phosphorus (TP) were found at background.
- PWQO exceedances of boron and TP were found at SW5 and PWQO exceedances for iron, TP and copper were found at SW20.
- Calcium, potassium, manganese and boron concentrations exceeded the trigger value at SW5. Since concentrations were below CWQG guidelines no action was taken.
- Jp2g concludes that while leachate from the WDS has impaired water quality in the swale that any negative impacts to water quality are reduced within a short distance of the waste mound and most certainly in the Ottawa River.
- Post closure monitoring is proposed to sample 4 stations (SW3, SW3A, SW5 and SW20) once per year using a trigger system.

Reviewer's Comments:

The reviewer calculated average concentrations at each station from 2001 to 2018 so all the stations were comparable over a similar time period. Percentage differences between upstream and downstream stations were calculated and where the downstream station average concentrations were greater than 25% (deemed significant) the corresponding cell was highlighted yellow. Where average concentrations exceeded PWQO the cells were highlighted orange.

Leachate indicator parameters as determined by Jp2g are in red and other parameters noted by Mr. Shawn Kinney in his March 2014 memo that could be leachate indicators are in blue.

Station SW3a is at the downstream end of the culvert from SW3. SW3a has many parameters whose average concentrations exceed 25% and many of these are leachate indicator parameters. SW3a appears to be upgradient of the landfill and one wouldn't expect such a difference in water quality in a road culvert. The site diagram doesn't show any other sources to SW3a unless there are stormwater ditches on the east side of CR 12.

SW5 when compared to SW3a shows significant increases in average concentrations for most monitored parameters, most of whom are leachate indicators. Some differences such as those for sulphate, calcium, boron, potassium, strontium and hardness suggest a significant leachate source. The difference in hardness indicates a totally different water source at SW5 compared to upstream.

SW20 when compared to background also shows the same significant differences as those at SW5 but water quality improves further downstream at SW20. Flow data from 2017 and 2018 indicate that discharge flows at SW20 are 2 to 4 times greater than upstream but again the site diagram shows no sources to account for the increased flows.

Time trend analysis shows that concentrations of the parameters showing the greatest increase in concentrations at SW5 shows no significant trend in concentrations over the 17 year record except for 2012 and 2013 which at peak concentrations.

Table 1 Average Concentrations and Percentage Differences Westmeath Closed Landfill 20001-2018.

Parameters	Ave SW3	Ave SW3A	Average SW5	Ave SW20		3 vs 3A	3A vs 5	3A vs 20	5 vs 20
Chloride	40.0	89.0	69.3	53.1		-123	22	40	23
N -NO2 (Nitrite)	0.10	0.10	0.12	0.10		-1	-16	1	15
N-NO3 (Nitrate)	0.32	0.31	0.19	0.14		3	39	56	27
Sulphate	9.79	13.82	60.58	37.83		-41	-338	-174	38
Calcium	21.33	28.85	71.95	52.67		-35	-149	-83	27
Magnesium	6.81	6.87	39.17	27.40		-1	-471	-299	30
Sodium	28.45	30.45	45.66	34.56		-7	-50	-13	24
Potassium	1.02	1.20	5.19	3.48		-18	-332	-190	33
Arsenic	0.0008	0.0008	0.0008	0.0008		-6	-3	3	6
Barium	0.024	0.038	0.055	0.037		-60	-44	3	33
Boron	0.011	0.017	0.515	0.296		-52	-3018	-1696	42
Cadmium	0.0001	0.0001	0.0001	0.0001		14	0	-2	-3
Chromium	0.0015	0.0023	0.0021	0.0015		-56	11	33	25
Conductivity (microS	312.1	513.5	758.0	530.4		-65	-48	-3	30
Copper	0.002	0.002	0.002	0.002		-8	1	-6	-7
Iron	0.63	0.55	0.90	0.81		13	-66	-49	10
Lead	0.0007	0.0010	0.0008	0.0007		-29	20	28	10
Manganese	0.31	0.16	0.37	0.20		50	-133	-26	46
Mercury	0.0016	0.0013	0.0016	0.0017		18	-22	-31	-8
Total Phosphorus	0.04	0.05	0.13	0.07		-37	-158	-31	49
Strontium	0.14	0.10	1.60	1.04		27	-1470	-919	35
Zinc	0.01	0.01	0.01	0.01		-14	20	19	0
Hardness (as CaCO	22	27	236	85		-23	-774	-215	64
Alkalinity as CaCO3	84.79	104.21	247.42	174.39		-23	-137	-67	30
TKN	0.61	0.64	1.10	0.82		-4	-72	-28	26
N-NH3 (Ammonia)	0.051	0.037	0.079	0.033		27	-112	11	58
Organic Nitrogen	0.563	0.564	1.157	0.802		0	-105	-42	31
Phenols	0.001	0.001	0.001	0.001		0	0	0	0
BOD	2.0	1.6	3.5	2.3		19	-118	-38	36
COD	30.4	33.5	52.5	48.4		-10	-57	-44	8
TDS (Cond - Calc)	198.1	322.7	490.2	349.6		-63	-52	-8	29
Total Sus. Solids	9.5	16.8	24.6	7.3		-78	-46	57	71
Un-ionized Ammonia	0.02	0.02	0.02	0.02		0	0	0	0
pH	7.27	7.52	7.89	7.72		-3	-5	-3	2
DOC	12.13	11.20	10.97	12.23		8	2	-9	-12
Field Temp	9.16	8.84	9.64	7.94		3	-9	10	18
Field Cond	303.29	468.77	758.04	525.87		-55	-62	-12	31
pH	7.39	7.80	7.60	7.58		-6	3	3	0
Field DO	6.87	8.27	6.09	7.57		-20	26	8	-24
Flow (L/Sec)	4.67	2.63	2.72	6.20		44	-3	-136	-128

None of the PWQO exceedances or elevated concentrations of other parameters are at concentrations that may likely impair aquatic life in the wetland area of Bellows Bay in the Ottawa River.

Jp2g had proposed a trigger mechanism to reduce surface water sampling to once per annum. Due to dry conditions in the swale that seems to predominate most of the year one or two samples per year has been the norm anyway. The reviewer had agreed to this sampling frequency and with the trigger location of SW-5.

However, the trigger mechanism is inadequate and needs to be refined as it was triggered in 2018 for several parameters but the contingency wasn't implemted because all values were below guideline values. There is no value in a trigger mechanism that is triggered but action isn't taken. The trigger should be based on a percentile of background at SW3a and if exceeded triggers contingency measures.

Summary

Westmeath LFS is having a negative water quality impact at downstream stations. Currently, it is unlikely that the concentrations found at SW5 and SW20 are negatively impacting aquatic life in Bellows Bay of the Ottawa River. In addition, the swale is described as being dry most of the year so little flow inputs to the River in any given year.

Recommendations:

1. SW3a appears to be upgradient of the landfill and one wouldn't expect such a difference in water quality in a road culvert from SW3. Do other sources impact SW3a?

2. The trigger mechanism requires an overhaul so it can trigger contingencies should surface water deteriorate at the site.

3. The monitoring list of parameters for Westmeath can be reduced as many parameter concentrations have remained unchanged. The list could be limited to leachate indicator parameters as designated by Jp2g and Mr. Kinney's assessment in 2014 and a couple of conservative non-leachate parameters.

4. Some explanation for the elevated concentrations at SW5 should be forthcoming.

If you have any questions regarding the above comments or recommendations, I would be pleased to discuss them with you.

Dana Cruikshank

Cc Shawn Kinney
File SW- RE-WH-03-06 (Westmeath WDS)
File SW-07-02-13-01-02-01 (unnamed swale to Ottawa River)

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Ontario

September 23, 2014

BY E-MAIL

Steven Hodson
Environmental Services Manager
Township of Whitewater Region
P.O. Box 40
Cobden ON K0L 1K0

Dear Mr. Hodson:

Re: Proposed Changes to Monitoring Program
Westmeath Waste Disposal Site, ECA A413602
1597 Westmeath Road, Township of Whitewater Region, Ontario

This letter is in response to the request to amend the groundwater and surface water monitoring programs at the closed Westmeath Waste Disposal Site as outlined in the 2012 Annual Report.

The groundwater and surface water units of the Ministry's Eastern Region Technical Support Section completed their review of your request. Based on Technical Support's recommendations, in accordance with Condition 50 of ECA A413602, I accept the proposed changes to the groundwater and surface water monitoring programs as outlined in Section 9.0 of the 2012 Annual Report, with the following exceptions:

1. the trigger mechanism parameters in the surface water monitoring program should include calcium, potassium, iron, manganese and boron; and
2. the trigger concentrations be set based on background concentrations at surface water station SW-A.

The request to reduce the frequency of reporting from annual to once every two years is also acceptable.

If you have any questions, please contact me at 613-521-3450 extension 224 or Emily Tieu at extension 235.

Yours truly,

Steve Burns
Ottawa District Manager

SB/ET:jdv

cc : Christine FitzSimons, CAO/Clerk, Township of Whitewater Region
Kevin Mooder, Jp2g Consultants Inc.
Shawn Kinney, Hydrogeologist, MOECC, Eastern Region
Dana Cruikshank, Surface Water Scientist, MOECC, Eastern Region

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M E M O R A N D U M

July 22, 2014

TO: Lance Larkin
Sr. Environmental Officer
Ottawa District Office
Eastern Region

FROM: Dana Cruikshank
Surface Water Scientist
Water Resources Group
Eastern Region

RE: 2012 Annual Report; Westmeath WDS
Westmeath Landfill Site Closure Plan
Township of Whitewater Region
C of A # A413602
IDS Ref #: 2613-9F5N45

I have reviewed the above report prepared by Jp2g Consultants with respect to surface water concerns only.

Report Overview

For 2012 Jp2g reports:

- Site is closed, final cover in 2008 and owned by Township of Whitewater Region.
- Leachate strength is perceived to be low, shallow groundwater is north/northwest.
- Leachate indicator parameters are chloride, sulphate, sodium, potassium, boron, strontium, alkalinity, conductivity, COD, TDS and manganese.
- Four surface water stations were sampled only in May 2012 due to dry conditions.
- Background is determined by SW3 and SW3A. SW3A is on the downstream side of County Road 12.
- SW5 is downstream of waste mound and the confluence of stations SW-15 and SW16.
- SW20 is 220 metres downstream of waste mound.

- The swale flows to the north side of the WDS and discharges to Bellows Bay in the Ottawa River.

- PWQO exceedances for iron and Total phosphorus (TP) were found in 2012.

- Flow measurements in the spring indicated flows from 1.0 (upstream) to 1.65 (downstream) L/s.

- Jp2g concludes that while leachate from the WDS has impaired water quality in the swale that any negative impacts to water quality are reduced within a short distance of the waste mound and most certainly in the Ottawa River.

- Post closure monitoring is proposed to sample 4 stations (SW3, SW3A, SW5 and SW20) once per year using a trigger system.

Reviewer's Comments

Table 33 of the report shows a comparison of upstream water quality at SW-3 and SW-3A with downstream at SW-20. Downstream water quality was impaired compared to background for chloride, sulphate, boron, strontium, alkalinity, conductivity, TDS, iron and TP. Many of these are landfill leachate indicator parameters. This indicates that Westmeath LFS is likely having a negative impact to downstream water quality.

None of the PWQO exceedances or elevated concentrations of other parameters are at concentrations that may likely impair aquatic life. The reviewer is also in agreement that downstream water quality at SW-20 is better than that found at SW5 which is just downstream of the landfill.

A concern is that time trend analysis at SW-5 shows a trend of increasing concentrations for calcium, potassium, boron, iron, manganese, TKN and alkalinity. Upstream SW-3 also shows a time trend of increasing concentrations for some of these same parameters.

J2Pg proposes a trigger mechanism to reduce surface water sampling to once per annum. Due to dry conditions in the swale that seems to predominate most of the year one or two samples per year has been the norm anyway. The reviewer agrees with the trigger location of SW-5.

The reviewer is not in agreement with the list of trigger parameters. The four parameters with the exception of boron have not been identified as leachate parameters and therefore have little bearing on downstream impacts as a result of the landfill that would trigger additional landfill monitoring. More appropriate parameters would be calcium, potassium, iron, manganese and boron which are showing increasing trends of downstream concentrations not related to SW-3. Trigger concentrations should be set based on background concentrations at SW3-A.

Summary

Westmeath LFS is having a negative water quality impact at downstream stations. Currently it is unlikely that the concentrations found at SW-5 are negatively impacting aquatic life. For this reason as well as the fact that the swale is described as being dry most of the year the reviewer agrees to sampling surface water once per year when a satisfactory trigger mechanism is agreed to.

Recommendations

1. The proposal to reduce the sampling frequency to once per year is acceptable to the reviewer if the proposed trigger mechanism is modified for parameters and appropriate trigger concentrations based on SW-3A.

2. The proposed monitoring list of parameters from Column 3 of Schedule 5 is acceptable.

If you have any questions regarding the above comments or recommendations I would be pleased to discuss them with you.



Dana Cruikshank
DC/gl

c: Shawn Kinney
Tara MacDonald
File SW- RE-WH-03-06 (Westmeath WDS)
File SW-07-02-13-01-02-01 (unnamed swale to Ottawa River)

Ministry of the Environment

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M E M O R A N D U M 26 March 2014

TO: Emily Tieu
Senior Environmental Officer
Ottawa District Office
Eastern Region

FROM: Shawn Kinney
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Westmeath Waste Disposal Site A413602, 2012 Annual Monitoring Report

---

I have reviewed the hydrogeologic aspects of the following documents entitled:

- *"Westmeath Landfill Site, Township of Whitewater Region, Certificate No. A413602, 2011 Annual Report"* Jp2g Consultants Inc., March 2012.
- *"Westmeath Landfill Site, Township of Whitewater Region, ECA No. A413602, 2012 Annual Report"* Jp2g Consultants Inc., March 2013.

Based upon the information contained in the above-captioned documents, I submit the following comments for your consideration.

Summary

1. The site satisfies the intent of Reasonable Use Guideline B-7. The affected off-site wetland lies below the Ottawa River regulatory flood line and will not be used for domestic groundwater supply.

2. The horizontal extent of the leachate plume is sufficiently delineated.

3. The primary pathway for the migration of leachate is northwest towards the floodplain of the Ottawa River.

4. The potential exists for surface water impacts to occur to a seasonal pond. Additionally, a drainage feature approaches within 20 metres of the fill area, connects to the ponded area, and flows to Bellowes Bay on the Ottawa River.

5. The proposed amendments to the groundwater monitoring and reporting program are satisfactory.

Certificate of Approval

The Westmeath Waste Disposal Site is a closed site governed under ECA A413602 issued March 20, 2008. The site was previously licensed for the use and operation of a 1.26 hectare disposal area within a total site area of 7.07 hectares. The site was licensed to receive domestic, commercial and non-hazardous solid industrial waste.

The area landfill method was used. The landfill is a naturally attenuating site. Section 1.3, page 3 of the 2012 report states that final cover was applied in 2008.

Geology

Section 4.1 page 6 of the report provides a description of site geology. Appendix D provides Cross Section Drawing D-1 and 15 borehole logs. I note the following:

Overburden:

- Silt; up to 3 metres thick
- Silty Clay; up to 10 metres thick
- Total overburden thickness >14 metres

Bedrock:

None of the boreholes penetrate bedrock. Local bedrock is shale and limestone (Bobcaygeon formation) inferred to be karst (characterized by sinkholes, caves, and caverns).

Groundwater Flow Direction and Velocity

Hydraulic Conductivity

Hydraulic conductivity is the capacity of a porous material to transmit water at a given pressure. Table 2, page 9 of the 2012 report provides hydraulic conductivity values from monitoring wells 13, 14 and 15 which are screened in silt and silty clay. I note the following:

- Maximum: 7.60×10^{-6} $m^3/m^2/s$
- Geometric Mean: 3.96×10^{-7} $m^3/m^2/s$
- Minimum: 1.90×10^{-8} $m^3/m^2/s$

These values are consistent with the published mid-range values for silt.

Horizontal and Vertical Hydraulic Gradients

The hydraulic gradient indicates the magnitude of the hydraulic pressure driving water flow through porous materials. Appendix E of the 2012 report provides water elevation data collected as recently as August 2012. I note the following:

- *Horizontal Hydraulic Gradient*:
    - 0.009 m/m from southeast to northwest between monitor BH1A and monitor BH7A, which have similar screened elevations. This is a gradual hydraulic gradient.
- *Vertical Hydraulic Gradients:*
    - Downward pressure gradients indicative of water recharge existed in the eastern, upper part of the site between County Road 12 and the fill area.
    - Upward pressure gradients indicative of groundwater discharge generally existed in the western part of the site adjacent to the Ottawa River floodway boundary.

Groundwater Flow Velocity

Darcy's Law permits estimates of groundwater flow velocity if the hydraulic conductivity and hydraulic gradient are known. Based on the data contained in the reports, I estimate the following maximum groundwater flow velocity:

- 2.74×10^{-7} m/s or approximately 9 metres per year from southeast to northwest.

Conceptual Model

The primary flow path for leachate will be from the fill area in a north-west direction via the shallow silty sand, with eventual discharge to the seasonally ponded area adjacent to the Ottawa River.

Background Water Quality

Appendix F of the 2012 monitoring report presents the most recent groundwater quality data for the site. I have examined the data and conclude that the historical data compiled for monitor BH-1B best represents natural shallow groundwater quality. BH-1B is located 20 metres southeast and upgradient of the fill area. The borehole record for this monitor depicts it as being screened 3.5 metres to 5.0 metres below ground surface in silty clay.

I have compared the median historical groundwater quality at BH-1B to the Ontario Drinking Water Standards and Objectives, or ODWS/O's for the protection of drinking water quality. In view of the site's proximity to the Ottawa River, I have additionally compared background groundwater quality to the Provincial Water Quality Objectives, or PWQO's for the protection of surface water quality.

Natural groundwater conformed to the ODWS/O's and PWQO's for all measured parameters except the following:

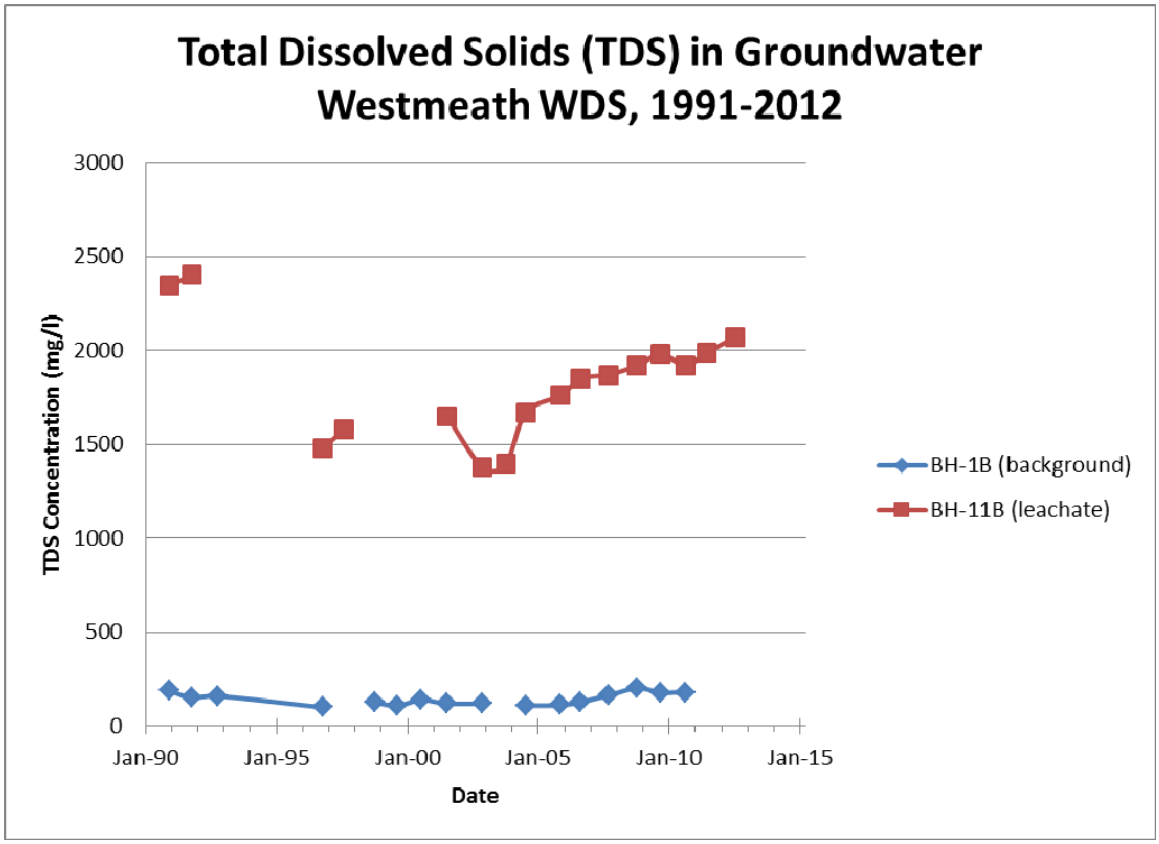
Parameter	ODWS/O (mg/l)	Median BH-1B (mg/l)	Excess Factor
Organic Nitrogen	0.15	0.15	1 x

The elevated organic nitrogen levels may be related to the location of the site within an agricultural area. Under Reasonable Use Guideline B-7, Procedure B-7-1, no increase in organic nitrogen above this level is allowable at the downgradient property boundary.

Leachate Water Quality

Monitor BH-11B is located at the downgradient toe of the fill area and is screened in silty clay 0.5 metres to 2.0 metres below ground surface. Samples from this monitor typically have the greatest concentrations of Total Dissolved Solids, of TDS. I conclude that these samples are the closest available analogue of maximum strength leachate.

The graph below shows that TDS concentrations at BH-11B have steadily increased to a level more than 10 times greater than background since final cover was emplaced in 2008. This indicates that leachate strength has not declined during the post-closure period.



Leachate Indicator Parameters

Chemical constituents elevated more than 10 times greater in leachate than background groundwater may be promising leachate indicators. I have compared the most recent water quality data of leachate monitor BH-11B to that of background monitor BH-1B. I note the following:

Parameter	Background Conc. (mg/l)	Leachate Conc. (mg/l)	Excess Factor
Ammonia	<0.02	31.7	>1585 x
Manganese	<0.01	4.79	> 479 x
Boron	0.01	3.9	390 x
Total Kjeldahl Nitrogen	<0.10	32.7	327 x
Total Phosphorus	0.09	2.14	24 x
Alkalinity	55	1240	23 x
Potassium	3	58	19 x
Barium	0.02	0.33	17 x
Calcium	18	302	17 x
Dissolved Organic Carbon	1.6	24.6	15 x
Sodium	15	205	14 x
Magnesium	8	103	13 x
Total Dissolved Solids	181	2070	11 x

Significantly elevated concentrations of these chemical parameters in groundwater downgradient of the fill area may be useful indicators of leachate impacts. I further note the presence of the following volatile organic compounds in leachate:

- Monochlorobenzene: 1.8 ug/l
- 1,4-dichlorobenzene: 1.6 ug/l
- 1,1-dichloroethane: 1.1 ug/l

These compounds are not naturally occurring and would clearly indicate man-made contamination.

Contaminants of Concern: Drinking Water

Chemical constituents present in leachate at concentrations that exceed the ODWS/O's are potential contaminants of concern for drinking water quality. I have compared the most recent data reported for leachate monitor BH-11B to the ODWS/O's. I note the following potential contaminants of concern for drinking water.

Parameter	ODWS/O (mg/l)	Leachate Conc. (mg/l)	Excess Factor
Manganese	0.05	4.79	96 x
Organic Nitrogen	0.15	1.00	7 x
Dissolved Organic Carbon	5	24.6	5 x
Total Dissolved Solids	500	2070	4 x
Alkalinity	500	1240	2 x
Chloride	250	344	1 x
Sodium	200	205	1 x

Contaminants of Concern: Surface Water

Chemical constituents present in leachate in concentrations that exceed the PWQO's are potential contaminants of concern for surface water quality. I have compared the most recent

data reported for leachate monitor BH-11B to the PWQO's. I note the following potential contaminants of concern for surface water.

Parameter	PWQO (mg/l)	Leachate Conc. (mg/l)	Excess Factor
Ammonia	0.02	31.7	pH/temp variable
Boron	0.2	3.9	20 x
Total phosphorus	0.3	2.14	7 x
Cadmium	0.0002	0.0006	3 x
Chromium	0.009	0.009	1 x
Copper	0.005	0.006	1 x

Downgradient Water Quality

Monitor BH-7B is located approximately 100 metres west of the fill area at the western property boundary. The monitor is screened in sandy silt 1.7 metres to 2.7 metres below ground surface.

The most recent samples from this monitor had the greatest concentrations of total dissolved solids of the boundary monitors (812 mg/l or 4 times the background level). Groundwater samples from this location also had significantly elevated concentrations of all of the site-specific leachate indicator parameters.

The data lead me to conclude that a leachate plume has migrated westward beyond the western property boundary and the existing groundwater monitoring network. The impacted area lies within the Ottawa River regulatory flood line and approaches the Ottawa River floodway boundary as depicted in Figure 2 of the 2012 monitoring report. The impacted area may include the eastern boundary of Westmeath Provincial Park.

GW/SW Interaction

The leachate plume discharges to swamp designated as the Bellow's Bay Wetland, a provincially evaluated wetland. A potential for surface water impacts exists. The Surface Water Scientist will comment on this aspect under separate cover.

Guideline B-7

The Westmeath Waste Disposal Site is licenced under an ECA and closed after 1982. Reasonable Use Guideline B-7 applies.

Leachate ultimately discharges to a wetland feature located within the Ottawa River regulatory flood line. There will be no human inhabitants using groundwater within the impacted zone. This satisfies the intent of Guideline B-7.

Groundwater Monitoring Program and Reporting

Section 9.1, Page 48 and Table 34, page 49 of the 2012 Monitoring Report describe a proposed reduction in the number of sampling locations. I note the following:

Monitoring Locations:

The consultant proposes a reduction in the number of groundwater monitoring locations. The monitors recommended for retention are 1B, 4A/4B, 7A/7B, 8A/8B, 11B and 14. These locations are highlighted in report figure 5.

The retained monitoring wells will enable effective monitoring of background levels, maximum strength leachate and downgradient impacts at the property / wetland boundary. The consultant's proposal is satisfactory.

Monitoring Frequency:

The consultant proposes a once-per-year monitoring frequency, specifically during the summer. This is satisfactory.

Analytical Parameters:

The consultant proposes to maintain groundwater elevation monitoring at all existing monitoring wells. This is satisfactory.

The consultant proposes analysing groundwater samples for the parameters listed in Column 1, Schedule 5 of the 1998 MOE document entitled, "*Landfill Standards, A Guide on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites".* This is also satisfactory.

Reporting Frequency:

On the bottom of page 51, the consultant suggests that the reporting frequency be reduced from annually to biennially. I do not object to this proposal.

Shawn Kinney, P.Geo
SK/gl

c: Dana Cruikshank (Surface Water Unit)
GW 01-03 RE WH Westmeath WDS A413602, Lot 30, Con North Front A, Westmeath
SK #1238-8W3L3P / SK#6114979KBS

ec: Gillian Dagg-Foster (Water Resources Unit)
Peter Taylor (Technical Support Section)
Tara MacDonald (Ottawa District Office)

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

December 24, 2013

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Lance Larkin

Re: Westmeath Closed WDS
ECA No. A413602
Township of Whitewater Region
Our Project No. 2006048N

Dear Lance:

Upon receiving TSS reviews of Annual Reports in 2007/2008 both the Surface Water Unit and Groundwater Unit have agreed to reduce the extent of monitoring pending resolution of 'site closure' activities. Upon file review we believe all conditions have been addressed and we are aware that TSS and you have attended the site to obtain a better understanding of the hydrogeological setting. We respectfully submit that the 2012 Annual Report summarizes all MOE correspondence and presents a reasonable post-closure monitoring program for a site that has been closed since March 2006.

The Township's proposed changes to the monitoring program and reporting under ECA Condition 50 requires written consent of the District Manager

Trusting your office will favourably consider this request and we can implement in 2014, which will result in a significant reduced cost to the municipality.

Yours very truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers



Kevin Mooder, MCIP, RPP
Project Manager

KJM/dr

c.c. S. Hodson

Ministry of the Environment

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

M E M O R A N D U M

March 5, 2013

TO: Emily Tieu
Sr. Environmental Officer
Ottawa District Office
Eastern Region

FROM: Dana Cruikshank
Surface Water Scientist
Water Resources Unit
Technical Support Section
Eastern Region

RE: 2011 Annual Report; Westmeath Waste Disposal Site
Westmeath Landfill Site Closure Plan
Township of Whitewater Region
Certificate of Approval #A413602
IDS Ref #: 5528-8W3L3X

I have reviewed the above report prepared by Jp2g Consultants with respect to surface water concerns only. A review of groundwater and air concerns will be forwarded to you under separate cover.

Report Overview

For 2011 Jp2g reports:

- Site is closed, final cover in 2008 and owned by Township of Whitewater Region.
- Minor leachate impacts were detected in groundwater monitors downgradient of the site.
- Leachate strength is perceived to be low, shallow groundwater is north/northwest.
- Leachate indicator parameters are chloride, sulphate, sodium, potassium, boron, strontium, alkalinity, conductivity, COD, TDS and manganese.
- Four surface water stations were sampled in May, July and November of 2011. SW5 and SW20 downstream of the site were dry in November.
- Background is determined by SW3 and SW3A. SW3A is on the downstream side of County Road 12.
- SW5 is downstream of waste mound.
- SW20 is 220 metres downstream of waste mound.
- The swale flows to the north side of the waste disposal site (WDS) and discharges to Bellows Bay in the Ottawa River.

- Provincial Water Quality Objective exceedances for iron and total phosphorus (TP) were found at all stations including background.
- Flow measurements in the spring indicated flows from 2.7 to 4.4 L/s and during summer 0.2 to 0.8 L/s and in the fall 0.1 m at SW3 and SW3A and it was dry at the downstream stations.
- Jp2g concludes that while leachate from the WDS has impaired water quality in the swale that any negative impacts to water quality are reduced within a short distance of the waste mound and most certainly in the Ottawa River.
- Post closure monitoring is proposed to sample four (4) stations (SW3, SW3A, SW5 and SW20) once per year for parameters listed in Table 37 of the 2011 report.

Reviewer's Comments

I averaged all the data for each station over the historical record and SW5 is the most impacted station. This is not a surprise as it was spatially close to SW16 which previously was the surface station that was most impacted. SW20 which is further downstream has on average better water quality than SW5 with the exception of cadmium.

I also compared SW3 and SW3A. SW3A which is further downstream has around two thirds of the parameters at higher concentrations than SW3 indicating that water quality is influenced in the creek before it travels through the edge of the landfill.

There were no samples in 2010 due to dry conditions. The data for 2011 shows a decrease in concentrations for iron and copper compared to pre-2008 data. This indicates that final cover at Westmeath is helping with water quality in the creek.

Average flows increased as you move downstream as expected. There was an increase of 29% in flows from SW3A to SW5. However similar increases were seen in adjacent stations (SW3 vs SW3A and SW5 vs SW20). Therefore one cannot say that the landfill is contributing more to flows in the creek than other runoff or groundwater flows.

In Table 1 I averaged the concentrations of SW3 and SW3A together to represent background water quality and compared the average background concentrations to SW20 which is the off-site downstream station. Negative values represent the percentage difference where downstream concentrations were greater than background. The hatched cells indicate leachate parameters. The analysis shows that downstream water quality has been negatively impacted for most analyzed parameters and particularly for leachate indicator parameters.

However as indicated previously since final cover has been applied, concentrations have decreased and are unlikely to result in harm to aquatic life at their current levels.

Table 1: Average Background versus Downstream Concentrations at Westmeath WDS.

Parameters	AveSW3+	Ave SW2(	% Differenc	Paramete	AveSW3+	Ave SW2(	% Differer
Chloride	62.16667	54.1	13	Manganes	0.21397	0.178889	16
N -NO2 (Nitrite)	0.10125	0.1	1	Mercury	0.00011	0.000125	-14
N-NO3 (Nitrate)	0.26446	0.116842	56	Total Pho	0.035417	0.04	-13
Total Phosphorus	0.058462	0.077059	-32	Strontium	0.099188	0.957111	-865
Sulphate	14.91667	44.45	-198	Zinc	0.010781	0.010278	5
Calcium	27.40368	52.66667	-92	Alkalinity	106.3125	193.15	-82
Magnesium	7.431624	28	-277	TKN	0.653267	0.858421	-31
Sodium	27.00427	34.11111	-26	N-NH3 (A	0.062585	0.034737	44
Potassium	1.264957	3.222222	-155	Organic N	0.53088	0.833125	-57
Arsenic	0.001	0.001	0	Phenols	0.001	0.001	0
Barium	0.040893	0.042	-3	COD	28.96875	48.3	-67
Boron	0.01925	0.315263	-1538	TDS	275.6979	379.25	-38
Cadmium	0.000103	0.000265	-156	TSS	12.1	14.5	-20
Chromium	0.005167	0.008	-55	Un-ionize	0.018417	0.02	-9
Conductivity (micro	523.131	592.3077	-13	pH	7.67675	7.8875	-3
Copper	0.002881	0.002842	1	Flow (L/S	1.196667	2.221765	-86
Iron	0.712604	0.8695	-22	Lead	0.001	0.001	0
	Leachate Indicators						

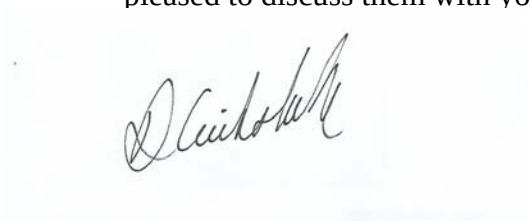
The proposal to reduce the sampling frequency to once per year is acceptable to the reviewer if a trigger mechanism is proposed that would trigger additional rounds of sampling should current conditions change at the site.

Recommendations

1. The proposal to reduce the sampling frequency to once per year is acceptable to the reviewer at this time if recommendation 2 is completed and accepted by the Ministry.

2. A trigger mechanism should be proposed that would trigger additional rounds of sampling should current conditions change at the site.

If you have any questions regarding the above comments or recommendations I would be pleased to discuss them with you.



Dana Cruikshank
DRC/sh

c: Shawn Kinney
Tara MacDonald
File SW RE WH 03 06 (Westmeath WDS)
File SW 07 02 13 01 02 01 (Unnamed Swale to Ottawa River)

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

February 21, 2013

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Emily Tieu
Sr. Environmental Officer

Re: Westmeath Closed WDS
ECA No. A413602
Township of Whitewater Region
Our Project No. 2006048N

Dear Emily:

Further to your submission of the Site Inspection Report dated September 2010 regarding the request for compliance with Conditions 2.1 and 2.2 concerning registration of a Certificate of Requirement we advise as follows:

- Accompanying a letter to Lance Larkin dated May 8, 2012 we provided the Certificate of Prohibition for the Site described as Part 1-4 49R-13661 registered September 13, 2000.
- As required under Condition 15 of the ECA the 30m buffer was acquired by the Township described as Part 1 49R-14882 in 2002. Enclosed find the Certificate of Requirement which was registered on February 13, 2013.

Trusting this is satisfactory.

Yours very truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers



Kevin Mooder, MCIP, RPP
Project Manager

KJM/jlp

c.c. S. Hodson

Properties

PIN 57194 - 0143 LT ☑ Redescription

Description PT LT 30, NORTH FRONT A, WESTMEATH, PT 1, 49R14882; WESTMEATH NOW TOWNSHIP OF WHITEWATER REGION

Address WESTMEATH

Party From(s)

Name MINISTRY OF THE ENVIRONMENT

Address for Service 2 St. Clair Avenue West
Floor 12A
Toronto, Ontario
M4V 1L5

I, Tesfaye Gebrezghi, Director Appointed Under Section 5 Environmental Protection Act, have the authority to bind the corporation.

This document is not authorized under Power of Attorney by this party.

Party To(s) *Capacity* *Share*

Name THE CORPORATION OF THE TOWNSHIP OF WHITEWATER REGION

Address for Service P.O. Box 40
44 Main Street
Cobden, Ontario
K0J 1K0

Statements

Schedule: See Schedules

Signed By

Michael William Instance	284 Pembroke St. E. P.O. Box 487 Pembroke K8A 6X7	acting for Party From(s)	Signed	2013 02 13

Tel 6137352341

Fax 6137350920

I have the authority to sign and register the document on behalf of the Party From(s).

Submitted By

HUCKABONE O'BRIEN INSTANCE BRADLEY LYLE	284 Pembroke St. E. P.O. Box 487 Pembroke K8A 6X7	2013 02 13

Tel 6137352341

Fax 6137350920

Fees/Taxes/Payment

Statutory Registration Fee $60.00

Total Paid $60.00

File Number

Party To Client File Number : 69427

CERTIFICATE OF REQUIREMENT

s. 197(3) Environmental Protection Act

This is to certify that pursuant to a Provisional Certificate Of Approval Number A413602 issued by the Ministry Of Environment dated March 24, 1980 as amended on July 7, 1990, August 29, 2000, January 2, 2001, October 30, 2002, March 8, 2005 and March 20, 2008 with respect to a Waste Disposal Site on Part Lot 30, North Front "A", Westmeath, being Part 1, Plan 49R-14882, Westmeath now in the Township of Whitewater Region, in the County Of Renfrew, Being All of PIN 57194-0143 (LT), the following persons,

The Corporation Of The Township of Whitewater Region

and any other persons having an interest in Part Lot 30, North Front "A", Westmeath, being Part 1, Plan 49R-14882, Westmeath now in the Township of Whitewater Region, in the County Of Renfrew, Being All of PIN 57194-0143 (LT), are required, before dealing with the land in any way, to give a copy of the Provisional Certificate Of Approval, including all amendments that may be made thereto to every person who will acquire an interest in the land as a result of the dealing.

Under Section 197(3) of the Environmental Protection Act, this requirement applies to each person who subsequent to the registration of the Certificate, acquires an interest in the land.

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

December 20, 2012

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Emily Tieu
Sr. Environmental Officer

Re: Westmeath Closed WDS
ECA No. A413602
Township of Whitewater Region
Our Project No. 2006048M

Dear Emily:

We acknowledge receipt of the Site Inspection Report dated September 10, 2012 in your email correspondence dated September 11, 2012 to the Township of Whitewater Region. As requested we provide the following response to the two (2) Actions Required citied in Section 5.0.

1. By October 31, 2012 complete the work that is necessary to ensure compliance with ECA No. 413602, Notice 6 Condition 44 (Site Closure) including items 9 to 13 of Schedule "A", and Condition 46 (Final Cover). By the same date provide a detailed report including updated drawings that outline how compliance with Conditions 44 and 46 were achieved.

As noted in our letter of November 12, 2012 the Township and our survey crew had just completed the site works in order to provide the required drawings accompanying this letter report.

Condition 44 – Items 9 to 13 of Schedule "A" of Notice No. 6 dated March 20, 2008 are documents related to the site closure and the Technical Support Section (TSS) review comments on the water quality monitoring program. The application form and Site Closure Plan dated January 2005 prepared by the Township detailed the proposed phased closure and capping of the site. The report included discussion of site clean-up, signage and fencing requirements which were implemented in March 2006 when the site ceased receiving waste. The application of final earth cover over the waste mound at a minimum thickness of 600mm was completed in 2008. The Township stockpiled over 180 loads of clean fill on site to be used as the third and final application of cover. The cover material consisted of roadside ditching excavation soils rich in organic content. In the fall of 2009 this material was spread over the waste mound as the topsoil equivalent as reported in the 2009 Annual Report.

In a Site Inspection Report November 2011, the MOE requested that the Township provide confirmation the final cover reflects the Closure Plan design. The remaining issue was to establish a 2:1 slope along the westerly side of the landfilling area. In November 2012 the Township placed a stockpile of clean fill on this slope.

Through the MOE review of Annual Reports since 2008, the Township has requested approval for a revised monitoring program. The monitoring program adopted under the 2008 amended Certificate does not reflect a reasonable post-closure water quality sampling procedure for a site in compliance with Guideline B-7 and having no significant impact on surface water resources. Through the TSS review process, the Township has proposed changes in the program under Condition 50 requesting written consent of the District Manager.

Condition 46 – The enclosed drawings Figure 1: Final Closure Plan and Figure 2: Cross Sections A and B reflect the Final Cover design requirements. Although the final top design contours may not have been exactly reached we would confirm the following as required of Condition 46:

(i) Over 600mm of soil applied over the waste mound in 2006/2008, the 150mm application of top soil equivalent was applied in 2012.

(ii) The source of all final cover soil was from municipal excavation projects.

(iii) No seeding was required as the final cover material naturally generated thick vegetative growth.

(iv) Top slope not less than 5%.

2. By December 1, 2012 demonstrate compliance with Conditions 2.1 and 2.2 concerning registration of a Certificate of Prohibition/Requirement on Title to the Site.

The Township solicitor has filed the required documents to the Director for signature. Upon receipt, they will be registered and a copy sent back to the Director and a copy for your files.

Trusting this is satisfactory.

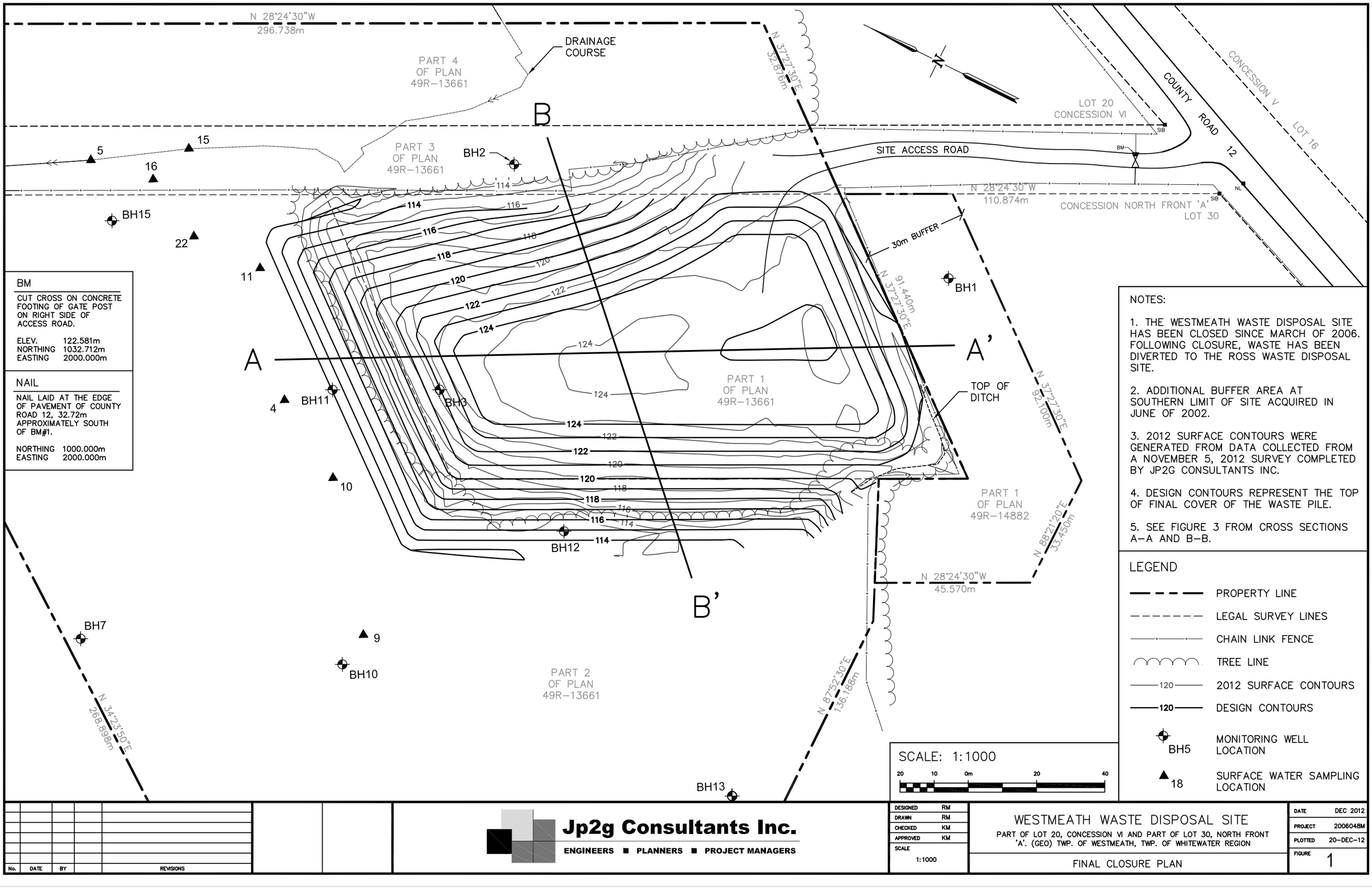
Yours very truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers



Kevin Mooder, MCIP, RPP
Project Manager

KJM/jlp

c.c. Steven Hodson
William Instance



BM

CUT CROSS ON CONCRETE FOOTING OF GATE POST ON RIGHT SIDE OF ACCESS ROAD.

ELEV. 122.581m
NORTHING 1032.712m
EASTING 2000.000m

NAIL

NAIL LAID AT THE EDGE OF PAVEMENT OF COUNTY ROAD 12, 32.72m APPROXIMATELY SOUTH OF BM#1.

NORTHING 1000.000m
EASTING 2000.000m

NOTES:

1. THE WESTMEATH WASTE DISPOSAL SITE HAS BEEN CLOSED SINCE MARCH OF 2006. FOLLOWING CLOSURE, WASTE HAS BEEN DIVERTED TO THE ROSS WASTE DISPOSAL SITE.

2. ADDITIONAL BUFFER AREA AT SOUTHERN LIMIT OF SITE ACQUIRED IN JUNE OF 2002.

3. 2012 SURFACE CONTOURS WERE GENERATED FROM DATA COLLECTED FROM A NOVEMBER 5, 2012 SURVEY COMPLETED BY JP2G CONSULTANTS INC.

4. DESIGN CONTOURS REPRESENT THE TOP OF FINAL COVER OF THE WASTE PILE.

5. SEE FIGURE 3 FROM CROSS SECTIONS A–A AND B–B.

LEGEND

- PROPERTY LINE
- LEGAL SURVEY LINES
- CHAIN LINK FENCE
- TREE LINE
- 120 — 2012 SURFACE CONTOURS
- 120 — DESIGN CONTOURS
- BH5 — MONITORING WELL LOCATION
- 18 — SURFACE WATER SAMPLING LOCATION

SCALE: 1:1000

20 10 0m 20 40

No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

DESIGNED	RM
DRAWN	RM
CHECKED	KM
APPROVED	KM
SCALE	1:1000

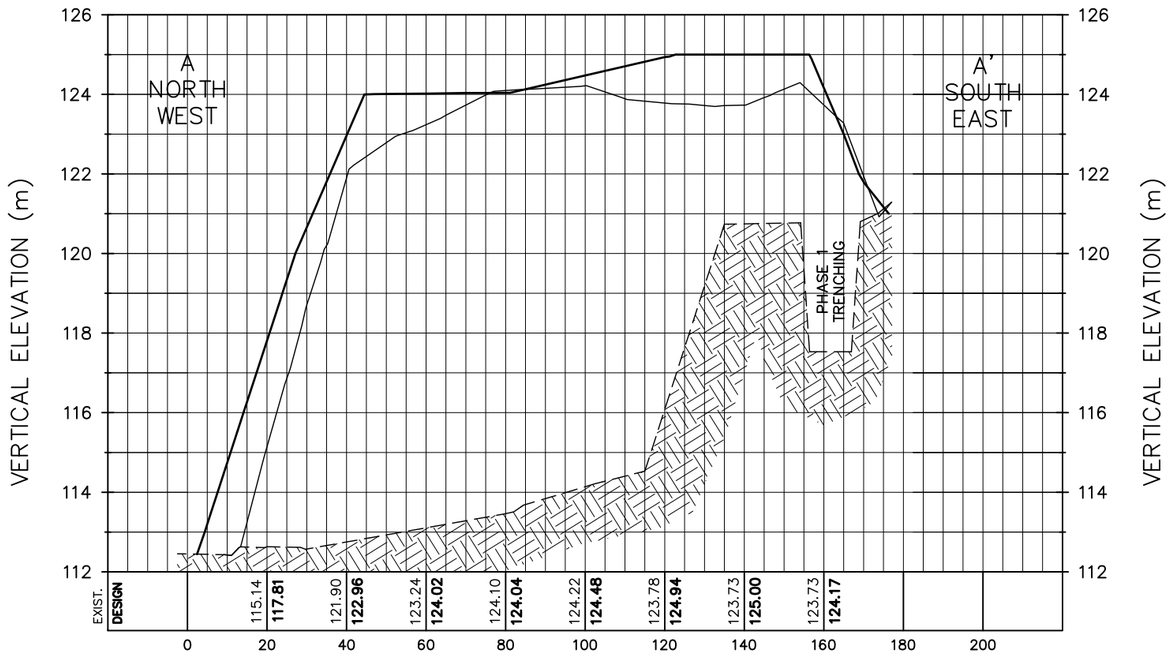
WESTMEATH WASTE DISPOSAL SITE

PART OF LOT 20, CONCESSION VI AND PART OF LOT 30, NORTH FRONT 'A'. (GEO) TWP. OF WESTMEATH, TWP. OF WHITEWATER REGION

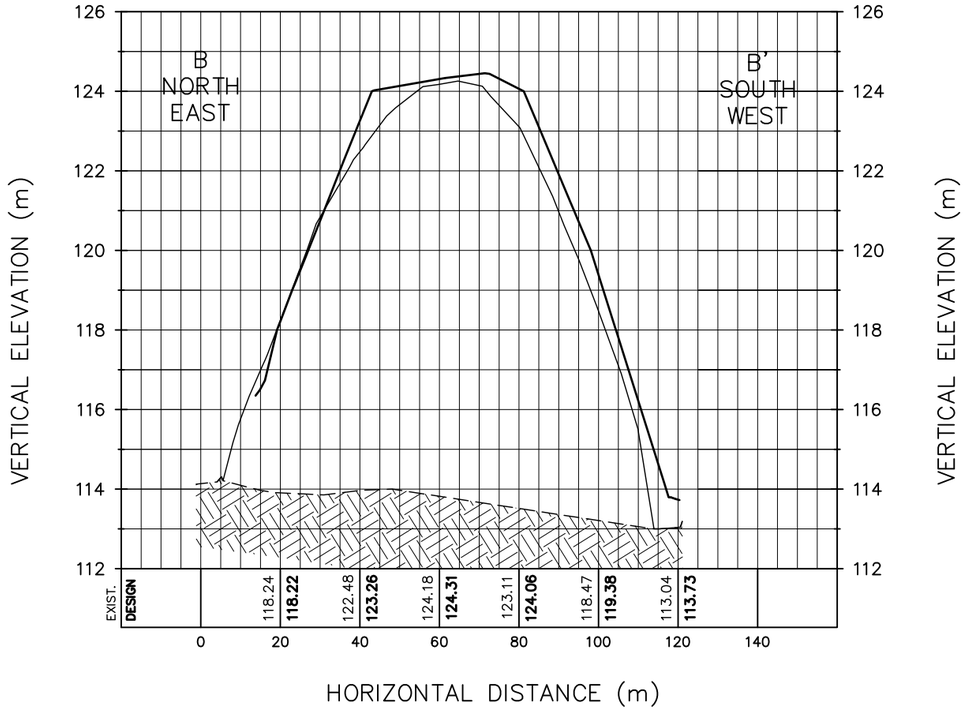
FINAL CLOSURE PLAN

DATE	DEC 2012
PROJECT	2006048M
PLOTTED	20–DEC–12
FIGURE	1

CROSS SECTION A–A'



CROSS SECTION B–B'

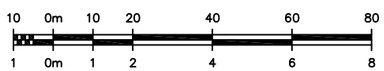


LEGEND

- ORIGINAL DESIGN CONTOURS
- 2012 SURFACE CONTOURS
- ESTIMATED ORIGINAL GROUND CONTOURS

SCALE

HOR–1:1500
VER–1:150



NOTES

1. THE ORIGINAL GROUND LEVEL CONTOURS WERE ESTIMATED BASED ON THE ORIGINAL GROUND LEVEL CONTOURS AROUND THE PERIMETER OF THE WASTE MOUND.

2. DESIGN CONTOURS AND THE 2012 SURFACE CONTOURS BOTH INCLUDE FINAL COVER IN THEIR ELEVATION.

3. 2012 SURFACE CONTOURS ARE BASED ON A NOVEMBER 5, 2012 LAND SURVEY COMPLETED BY JP2G CONSULTANTS INC.

No.	DATE	BY		REVISIONS

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

DESIGNED	RM
DRAWN	RM
CHECKED	KM
APPROVED	KM
SCALE	AS NOTED

WESTMEATH WASTE DISPOSAL SITE
PART OF LOT 20, CONCESSION VI AND PART OF LOT 30, NORTH FRONT 'A'. (GEO) TWP. OF WESTMEATH, TWP. OF WHITEWATER REGION

CROSS SECTIONS A AND B

DATE	DEC 2012
PROJECT	2006048M
PLOTTED	20–DEC–12
FIGURE	2

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

November 12, 2012

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

By e-mail

Attention: Emily Tieu
Sr. Environmental Officer

Re: Westmeath Closed WDS
Certificate No. A413602
Township of Whitewater Region
Our Project No. 2006048M

Dear Emily:

We acknowledge receipt of the following documents filed with the Township on September 11, 2012 by e-mail.

- May 2012 Site Inspection Report
- Certificate of Requirement Schedule A
- Acknowledgement and Direction template
- TSS surface water review November 25, 2012
- Figure 5 2011 Annual Report

In reference to Section 5.0 of the Site Inspection Report we wish to advise as follows on the two (2) Actions Required (reproduced for convenience).

1. By October 31, 2012 complete the work that is necessary to ensure compliance with ECA No. 413602, Notice 6 Condition 44 (Site Closure) including items 9 to 13 of Schedule "A", and Condition 46 (Final Cover). By the same date provide a detailed report including updated drawings that outline how compliance with Conditions 44 and 46 were achieved.

   As discussed with Mr. Steve Hodson the Township has completed the final application of cover to achieve a 3:1 grade along the westerly slope of the waste mound. Jp2g completed a field survey on November 5, 2012. A detailed report will be filed by December 31, 2012.

2. By December 1, 2012 demonstrate compliance with Conditions 2.1 and 2.2 concerning registration of a Certificate of Prohibition/Requirement on Title to the Site.

   In consultation with the Township's Solicitor we filed a letter dated May 8, 2012 to Lance Larkin intended to address these conditions. Please confirm that this has been received, and what further documentation is required i.e. Certificate of Prohibition on Part 1, Plan 49R-14882.

The Westmeath Waste Disposal Site has been closed since 2006 in accordance with an Application filed February 19, 2005 and supporting documentation. The monitoring program provided in Schedule "B" of Amended Certificate A413602 Notice No. 6 dated March 20, 2008 does not reflect that of a closed site with no significant environmental impact beyond its municipal boundaries. As per Condition 50 we request District approval to amend the monitoring program as per the 2011 Annual Report.

Yours very truly,

Jp2g Consultants Inc.

Engineers • Planners • Project Managers



Kevin Mooder, MCIP, RPP
Project Manager

KJM/jlp

c.c. Steven Hodson

Ontario

Ministry of the Environment
Ministère de l'Environnement

Closed Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Whitewater Region Mailing Address: PO Box 40, Cobden, Ontario, Canada, K0J 1K0 Physical Address: 1 Astrolabe Rd, Whitewater Region, Township, County of Renfrew, Ontario, Canada Telephone: (613)646-2282, email: dsimmons@whitewaterregion.ca Client #: 1185-5UDMEF, Client Type: Municipal Government, NAICS: 92411		
Inspection Site Address:	Westmeath Landfill Site Address: 1597 Westmeath Rd, Whitewater Region, Township, County of Renfrew, K0J 2L0 District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 18, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 353071, UTM Northing: 5073044, UTM Location Description: Entrance gate to landfill site., LIO GeoReference: Zone: 18, UTM Easting: 352869.25, UTM Northing: 5073206.0, Latitude: 45.79673, Longitude: -76.89321		
Contact Name:	Dean Sauriol	**Title:**	CAO
Contact Telephone:	(613)646-2282 **ext**	**Contact Fax:**	(613)646-2283
Last Inspection Date:	2011/11/15		
Inspection Start Date:	2012/05/01	**Inspection Finish Date:**	2012/05/01
Region:	Eastern		

1.0 INTRODUCTION

The Westmeath Waste Disposal Site was for the use and operation of a 1.26 hectare fill area on a 7.07 hectare site for disposal of domestic, commercial and nonhazardous solid industrial waste in the Township of Whitewater Region. The Site has been closed to the public since April 1, 2006. Landfilling within the municipality resumes at 990 Kohlsmith Road ("Ross Landfill").

During summer and fall of 2008, 180 loads of organic material was applied to Westmeath landfill. This was the third application of cover since the summer of 2006 following site closure. During the May 1, 2012 inspection, relatively fresh soil and sod piles were observed at the Site. Based on Site observations and review of the 2011 Annual Report it is understood that the Township is still in the process of applying final cover to achieve a 3:1 slope.

Land title registration requirements under Conditions 2.1 and 2.2 could not be verified based on the information provided by the Township's consultant.

To ensure the Township complies with closure requirements including final cover placement and land title registration requirements pursuant to the Certificate, the Township should pay particular attention to sections 2.9 and 5.0 below.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
A413602

2.1 FINANCIAL ASSURANCE

Not required for municipally operated landfill sites.

2.2 CLOSURE PLAN

The closure plan forms part of Schedule A of the Approval and is approved under Notice No. 6.

Condition 44 of the Certificate (Notice No.6) states that "The Township of Whitewater Region shall close the Westmeath Landfill Site in accordance with the Items 9 to 13 of Schedule "A" and no more waste shall be received at the Westmeath Landfill Site.

See section 2.4 below regarding final cover.

2.3 ACCESS CONTROL

Site is controlled by locked gate.

2.4 FINAL COVER

During the November 15, 2011 inspection the Ministry noticed several loads of fill material including, soil, gravel, sod deposited at the top of the landfill. The material was not evenly spread out. The Ministry directed the Township to provide a statement that would address the status of the final cover in the 2011 annual report.

The 2011 Annual Report noted that a 3:1 slope may not have been achieved.

ACTION ITEM: The Township must complete the necessary work to ensure compliance with Conditions 44 (re. Closure) and 46 (re. Final Cover).

2.5 LEACHATE CONTROL SYSTEM

The Site is a natural attenuation landfill. No leachate control system required.

2.6 METHANE GAS CONTROL SYSTEM

No methane gas control system required.

2.7 MONITORING PROGRAMS:

Groundwater program and sampling is ongoing. The parameter list and sampling frequency is required under Certificate No. A413602, Notice 8, Schedule "B".

There is an ongoing surface water monitoring program. The Township has reported that most of the sampling locations are dry and has requested a reduced surface water sampling program of once yearly. Based on the latest Ministry technical support review, reducing the sampling frequency to once per year is not acceptable at this time.

In the last inspection report, dated November 15, 2011, the Ministry requested that the Township should arrange to have the undersigned Provincial Officer present during the spring surface water sampling event. The field visit was arranged by the Township's consultant and on May 1, 2012, the undersigned observed that the surfacewater course that was depicted in Figure 5 of the 2011 Annual Report, located just south west of BH6 was not flowing towards the landfill. Instead, the flow of water was oriented in a more direct pathway towards the Ottawa River. As such, based on the hydraulic conditions the particular surface water course essentially by-passed the landfill site. A flow of 1 Litre per second was observed. In addition, the Ministry witnessed the consultant grab surface water samples at the upgradient location by the culvert that passes under County Road 12.

2.8 GROUND WATER/SURFACE WATER IMPACTS

GROUND WATER:

Subject to priority setting of ministry resources, the next groundwater review for this Site is scheduled for completion in 2012.

SURFACE WATER:

The latest Ministry surface water review was completed for the 2009 Annual Report. See attached.

2.9 Registration On Title:

In the last inspection report, the Ministry required the Township to demonstrate that the waste disposal site was registered on title by including supporting documentation in the 2011 annual report. The 2011 Annual Report noted that the Certificate of Requirement was found in Appendix H, however it was not included. Page i of the 2011 Annual Report stated that upon acquisition of the 30m buffer zone (Part 1 Plan 49R-14882) as required by Condition 15, this

property and the Site Parts 1-4 (Plan 13661) were registered as per Condition 2.1 and 2.2. It is understood that these Reference Plans were updated with respect to Site ownership for the Site however, the statement does not demonstrate that the Municipality has taken steps to Register a Certificate of Prohibition/Requirement.

REGISTRATION REQUIREMENTS AS PER A413602:

Conditions 2.1 and 2.2 fall under the Certificate that was issued on July 7, 2000. Condition 2.1 states that the Owner shall within 60 days of the date of this Certificate submit to the Director for the Director's signature two copies of a complete Certificate of Prohibition containing a registerable description of the Site, in accordance with Form 1 of O.Reg. 14/92.

Condition 2.2 sates that within 10 calendar days of receiving the Certificate of Prohibition signed by the Director, register the Certificate of Prohibition in the appropriate Land Registry Office on title to the Site and submit to the Director immediately following registration the duplicate registered copy.

The subsequent amendments to Certificate A413602 do not list a duplicate registered copy of the Certificate of Prohibition. As such, it appears that the above two conditions have not been complied with.

ACTION ITEM:

The township must demonstrate compliance with Conditions 2.1 and 2.2. See section 5.0 below.

STEPS TO REGISTER CERTIFICATE OF PROHIBITION/REQUIREMENT :

Please note that after 2001 the Ministry stopped using the term "Certificate of Prohibition" and replaced it with the term "Certificate of Requirement" for newly issued Certificates.

STEP 1 - A blank Certificate of Requirement form and Schedule "A" form is attached to this inspection report. The township must fill out the forms and then mail them (including a registerable description of the Site) and a cover letter to the Ministry's Approval's Branch for the Director's signature. The cover letter should note that the purpose of the letter is to fulfil registration requirements pursuant to Conditions 2.1 and 2.2, under Certificate A413602 that was issued on July 7, 2000. Please note that since this requirement is quite dated, the Branch may initiate a consolidation of previously issued Notices into one Environmental Compliance Approval which may result in a slight change to the following steps.

STEP 2 - Once reviewed by the Branch, the forms will be signed by the Director and mailed back to the Township. The Township will then register the signed Certificate of Requirement, including Schedule "A" in the appropriate Land Registry Office on title to the Site.

STEP 3 - The township will then submit to the Director of Approval's Branch immediately following registration, the duplicate registered copy of the documents noted in step 2. The township should note in its cover letter that they are updating the Director pursuant to Condition 2.2. The Branch will then add the duplicate registered copy of the documents to the Certificate through the issuance of a Notice.

Should the municipality have any questions about this process, they should contact the Ministry at 1-800-461-6290 and ask to speak to a waste reviewer or contact Provincial Officer Emily Tieu at 613-521-3450, ext. 235.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The last inspection report noted that "surface water sampling and frequency as per Schedule "B" is not being respected. Potential for environmental impairment is unknown." On May 1, 2012, the Ministry confirmed during the inspection that not all surface water samples could be collected since parts of the creek are intermittently flowing.

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:

N/A

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

No

Specifics:

N/A

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 ?

Yes

Specifics:

The Township has not demonstrated compliance with Conditions 2.1, 2.2, 44 and 46 of the Environmental Compliance Approval No. A413602. No human health impacts are anticipated.

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

No

Specifics:

N/A

Was there any indication of minor administrative non-compliance?

No

Specifics:

N/A

5.0 ACTION(S) REQUIRED

1. By October 31, 2012, complete the work that is necessary to ensure compliance with Environmental Compliance Approval No. A413602, Notice 6, Condition 44 (Site Closure), including Items 9 to 13 of Schedule "A" and Condition 46 (Final Cover). By the same date provide the undersigned with a detailed report including updated drawings that outline how compliance with Conditions 44 and 46 were achieved.

2. By December 1, 2012, demonstrate compliance with Conditions 2.1 and 2.2 concerning registration of a Certificate of Prohibition/Requirement on title to the Site.

6.0 OTHER INSPECTION FINDINGS

No other inspection findings.

7.0 INCIDENT REPORT

Applicable

2482-8NNPEA

8.0 ATTACHMENTS

Acknowledgement_and_Direction_template_-_Jan[1]._14,_2010.doc; certif_req_sched_a.doc; Figure 5 2011 Westmeath Water Quality Report Compiled.pdf; SW Review 2009 AMR dated Nov 25 2010 Surface Water Review.pdf

PREPARED BY:

Environmental Officer:

Name: **Lance Larkin**

District Office: **Ottawa District Office**

Date: **2012/09/10**

Signature



REVIEWED BY:
District Supervisor:
Name: **Tracy Hart**
District Office: **Cornwall Area Office**
Date: **2012/09/10**

Signature:



File Storage Number: SI RE WE WE 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"

Jp2g Consultants Inc.

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

May 8, 2012

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Mr. Lance Larkin, Sr. Environmental Officer

Re: Westmeath Closed Landfill Site
Certificate No. A413602
Township of Whitewater Region
Our Project No. 2006048M

Dear Lance:

Further to your November 2011 Site Inspection Report and upon filing the 2011 Annual Report with an accompanying letter dated March 30, 2012 we note as follows:

Actions Required

1. You attended the site on May 1, 2012 for the spring surface water sampling event. I trust you can be of some assistance in obtaining favourable TSS comments on the municipality`s request to modify the monitoring program.

2. Final cover details were provided in Appendix H of the 2011 Annual Report based on the 2006 field survey as reported in the 2006 Annual Report. Subsequent reports detailed the final cover applications in the 2007 and 2008 Annual Reports. We would confirm, in consultation with the Township, that the Public Works Department has recently stockpiled approximately 100 loads of earth material on site. The Township intends to use this material as needed for local municipal projects, as no additional cover material is required. If you require additional documentation please advise.

Other Inspection Findings

1. Enclosed find copies of the following legal documentation for the site described as Parts 1, 2, 3 and 4 Plan 49R-13661 and a buffer as Part 1 Plan 49R-14882.

   - Under Instrument No. R203817 the Certificate No. A413602 dated March 24, 1980 was registered
   - Under Instrument No. LT18878 a Certificate of Prohibition was registered
   - Under Instrument No. LT21963 the Certificate No. A413602 as amended Aug. 29/00 was registered
   - Under Instrument No. LT40407 the buffer was registered.

Please advise if this is satisfactory.

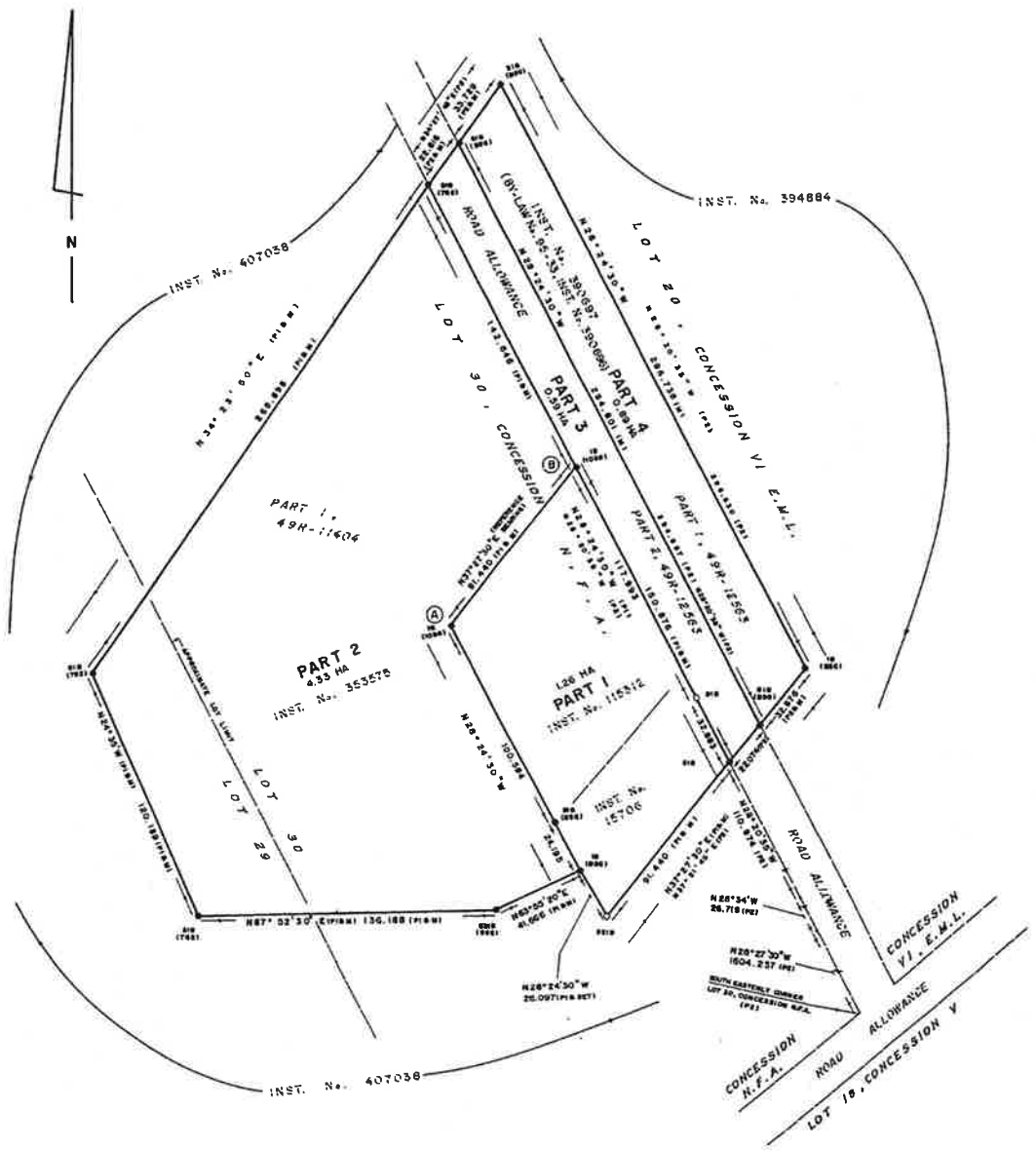
Yours very truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers



Kevin Mooder, MCIP, RPP
Project Manager

KJM/dr
Encl.
c.c. Steven Hodson
Dean Sauriol

49R13661



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE REGISTRY ACT.

OCTOBER 23, 1997
DATE

DOUGLAS W. PATTERSON
ONTARIO LAND SURVEYOR

PLAN 49R-13661
RECEIVED AND DEPOSITED

Feb. 17, 1998
DATE

LAND REGISTRAR FOR THE REGISTRY DIVISION OF RENFREW No.

PLAN OF SURVEY

OF PART OF LOT 20, CONCESSION VI EAST OF MUSKRAT LAKE AND PART OF THE ROAD ALLOWANCE BETWEEN CONCESSION VI, EAST OF MUSKRAT LAKE AND CONCESSION NORTH FRONT A AND PART OF LOTS 29 AND 30

CONCESSION NORTH FRONT "A"

TOWNSHIP OF WESTMEATH

COUNTY OF RENFREW

DOUGLAS W. PATTERSON, O.L.S.

SCALE: 1: 1000

1997

BEARINGS ARE ASTRONOMIC, DERIVED FROM THE LINE Ⓐ - Ⓑ BEING N57°27'30"E AS SHOWN ON PLAN 49R-11404.

SCHEDULE

Part	Lot	Concession	Inst. No.
1	PT. OF 30	N.F.A.	115312 AND 15706
2	PT. OF 29 & 30	N.F.A.	353575
3	PT. OF THE ROAD ALLOWANCE BETWEEN CONCESSION VI E.W.L. AND CONCESSION N.F.A.		
4	PT. OF 20	VI, E.W.L.	390697

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE REGISTRY ACT AND THE REGULATIONS MADE UNDER THESE.
2. THE SURVEY WAS COMPLETED ON THE 24th DAY OF SEPTEMBER 1997.

OCTOBER 23, 1997
DATE

DOUGLAS W. PATTERSON
ONTARIO LAND SURVEYOR

METRIC NOTE

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

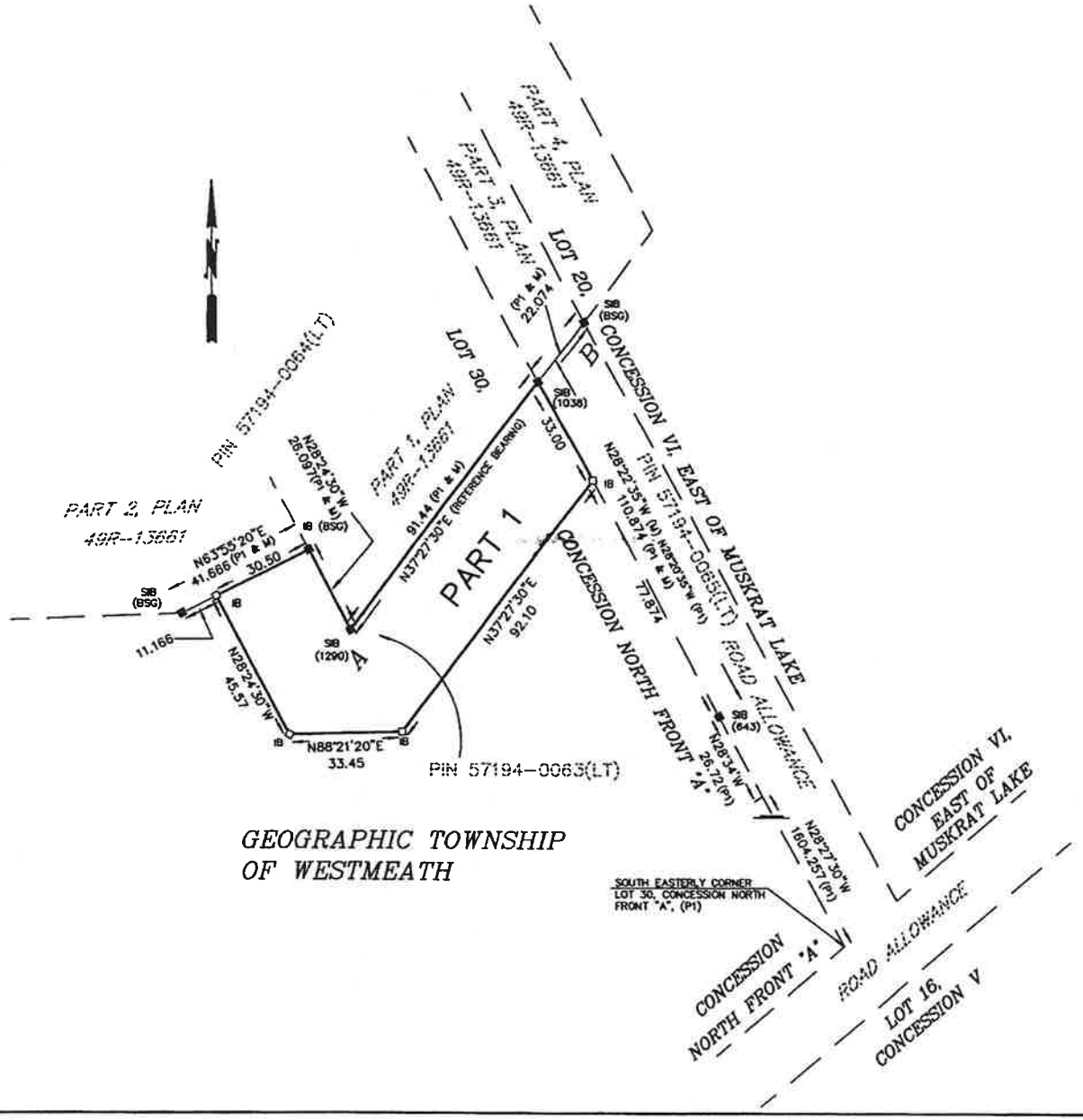
LEGEND

- ● = FOUND
- □ = PLANTED
- IB = IRON BAR
- IBG = IRON BAR (GROUND)
- SIB = STANDARD IRON BAR
- SSIB = SHORT STANDARD IRON BAR
- WIT. = WITNESS
- CM = CONCRETE MONUMENT
- CP = CONCRETE PIN
- MM = MONUMENT
- M.T.O. = MINISTRY OF TRANSPORTATION OF ONTARIO
- — = FENCE
- (540) = C.S. TAYLOR, O.L.S.
- (7788) = A.C. BROWNE, O.L.S.
- (10255) = A.J. SIMPSON, O.L.S.
- (12206) = D.W. PATTERSON, O.L.S.
- (1057) = DURY, SHAW AND MACPHERSON LTD.
- (5867) = SOUESME, HOBSON & BOLTE.
- (PT) = PLAN 49R-11404
- (PT) = PLAN 49R-12565
- N.F.A. = NORTH FRONT A
- E.W.L. = EAST OF MUSKRAT LAKE

DOUGLAS W. PATTERSON LTD.
ONTARIO LAND SURVEYOR
PEMBROKE, ONTARIO.

97-248

49R14882



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

MARCH 14, 2002
DATE

DOUGLAS W. PATTERSON
ONTARIO LAND SURVEYOR

PLAN 49R- 14882
RECEIVED AND DEPOSITED

17 APR 2002
DATE

LAND REGISTRAR FOR THE LAND TITLES DIVISION OF RENFREW 49.

PLAN OF SURVEY

OF PART OF

LOT 30
CONCESSION NORTH FRONT "A"
GEOGRAPHIC TOWNSHIP
OF WESTMEATH
TOWNSHIP OF WHITEWATER REGION
COUNTY OF RENFREW

DOUGLAS W. PATTERSON O.L.S.

SCALE: 1: 1000

0 10 30 100

BEARINGS ARE ASTRONOMIC. DERIVED FROM THE LINE A – B BEING N 37°27'30"E AS SHOWN ON PLAN 49R-13661.

SCHEDULE

PART	LOT	CONCESSION	AREA	PIN
1	PART OF LOT 30	NORTH FRONT "A"	4356.60 sq m 0.436 ha	PART OF PIN 57194-0063(LT)

SURVEYOR'S CERTIFICATE:

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM
2. THE SURVEY WAS COMPLETED ON THE 8th DAY OF MARCH, 2002

MARCH 14, 2002
DATE

DOUGLAS W. PATTERSON
ONTARIO LAND SURVEYOR

LEGEND:

■	= FOUND	(P1)	= PLAN 49R-13661
□	= PLANTED	(BSG)	= BOURNE, SIMPSON & GOLTZ, OLS
WIT.	= WITNESS		
IBW	= IRON BAR ROUND		
IB	= IRON BAR		
SIB	= STANDARD IRON BAR		
SSIB	= SHORT STANDARD IRON BAR		
(643)	= C.G. TAYLOR, O.L.S.		
(782)	= A.C. BOURNE, O.L.S.		
(1038)	= A.J. SIMPSON, O.L.S.		
(1290)	= D.W. PATTERSON, O.L.S.		
(M)	= MEASURED		

METRIC NOTE: DISTANCE SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DOUGLAS W. PATTERSON LTD.
ONTARIO LAND SURVEYOR
PEMBROKE, ONTARIO.

2002-30

203817

PROVINCE OF ONTARIO)
COUNTY OF RENFREW)
TO WIT:)

IN THE MATTER OF THE PROVISIONAL CERTIFICATE OF APPROVAL WASTE DISPOSAL SITE ON BEHALF OF THE CORPORATION OF THE TOWNSHIP OF WESTMEATH PURSUANT TO Section 23 (1) (e) OF THE REGISTRY ACT CHAPTER 409 R.S.O. 1970

I, DELBERT A. O'BRIEN of the Township of Westmeath in the County of Renfrew, DO DECLARE AND SAY AS FOLLOWS:

1. THAT I am the solicitor for the Corporation of the Township of Westmeath, a party to the Provisional Certificate of Approval Waste Disposal Site attached hereto;

2. THAT the Provisional Certificate of Approval Waste Disposal Site together with the notice attached thereto affects the land within the Registry Division and more particularly applies to Schedule "A" attached hereto being part of Lot 30, Concession North Front A, Township of Westmeath;

AND I make this declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of The Canada Evidence Act.

DECLARED before me at the City of Pembroke in the County of Renfrew, this 9th day of May A.D. 1980.

Paul Kenny
A Commissioner, etc.

PAUL KENNY, A Commissioner etc., Province of Ontario, for Huckabone, O'Brien & Radley-Walters, Barristers. Expires Jan. 10, 1981. Commission No. 7220.

Province of Ontario

Document General

Form 4 — Land Registration Reform Act

ABS.

SoftDocs® 3.11

D

FOR OFFICE USE ONLY

018878

CERTIFICATE OF RECEIPT
CERTIFICAT DE RECEPISSE
RENFREW (49) PEMBROKE

'00 SEP 13 PM 2 50

LAND REGISTRAR/REGISTRATEUR

(1) Registry ☐ Land Titles ☒ (2) Page 1 of 2 pages CCB

(3) Property Identifier(s) Block 57194-0064(LT) Property 57194-0067(LT) 57194-0065(LT)(PT) Additional: See Schedule ☐

(4) Nature of Document
CERTIFICATE OF PROHIBITION

(5) Consideration
Dollars $

(6) Description

Part of Lot 20 Concession 6, East of Muskrat Lake and Part of Road Allowance between Concessions 6 East of Muskrat Lake and Concession North Front A and Part of Lots 29 and 30 Concession North Front A, Township of Westmeath, County of Renfrew Parts 1, 2, 3, 4 49R-13661

New Property Identifiers Additional: See Schedule ☐

Executions Additional: See Schedule ☐

(7) This Document Contains: (a) Redescription New Easement Plan/Sketch ☐ (b) Schedule for: Description ☐ Additional Parties ☐ Other ☒

(8) This Document provides as follows:

Continued on Schedule ☐

(9) This Document relates to Instrument number(s)

(10) Party(ies) (Set out Status or Interest)

Name(s)	Signature(s)	Date of Signature Y M D
DOMINSKI, Andrzej		2000 09 11
Director - Appointed under s 5		
Environmental Protection Act		

(11) Address for Service 2 St. Clair Avenue West, Floor 12A Toronto On M4V 1L5

(12) Party(ies) (Set out Status or Interest)

Name(s)	Signature(s)	Date of Signature Y M D
CORPORATION OF THE TOWNSHIP OF WESTMEATH		
(OWNER)		

(13) Address for Service

(14) Municipal Address of Property
NOT AVAILABLE

(15) Document Prepared by:
D.A. O'BRIEN
HUCKABONE, SHAW, O'BRIEN
RADLEY-WALTERS & REIMER
Post Office Box 487
Pembroke, Ontario K8A 6X7

FOR OFFICE USE ONLY

Fees and Tax	
Registration Fee	50.00
Total	

stylus corporation SoftDocs® 3.11 / TORONTO • CANADA

Province of Ontario

Document General

Form 4 — Land Registration Reform Act

SoftDocs® 3.11 / Produced by Do Process Software Ltd.

D

FOR OFFICE USE ONLY

LT 021963

CERTIFICATE OF RECEIPT
CERTIFICAT DE RECEPISSE
RENFREW (49) PEMBROKE

'00 DEC 11 AM 11 25

LAND REGISTRAR/REGISTRATEUR

New Property Identifiers — Additional: See Schedule ☐

Executions — Additional: See Schedule ☐

(1) Registry ☐ Land Titles ☒ (2) Page 1 of 13 pages

(3) Property Identifier(s) — Block / Property
57194-0065 (LT) 57194-0067 (LT)
57194-0064 (LT)
Additional: See Schedule ☐

(4) Nature of Document
Application to Enter a Notice of a Certificate of Approval under Section 197 of the Environmental Protection Act

(5) Consideration
Dollars $

(6) Description
Part of Lot 20, Concession 6, East of Muskrat Lake and Part of Road Allowance between Concession 6 East of Muskrat Lake and Concession North Front A and Part of Lots 29 and 30 Concession North Front A, Township of Westmeath, County of Renfrew being Parts 1, 2, 3 and 4, 49R-13661.

See schedule

(7) This Document Contains: (a) Redescription New Easement Plan/Sketch ☐ (b) Schedule for: Description ☐ Additional Parties ☐ Other ☒

(8) This Document provides as follows:
I, Andrzej Dominski, a Director appointed under Section 5 of the Environmental Protection Act, hereby apply to have the attached Certificate of Approval entered against the title to the lands described herein.

Continued on Schedule ☐

(9) This Document relates to instrument number(s)

(10) Party(ies) (Set out Status or Interest)
Name(s) — Signature(s) — Date of Signature Y M D

DOMINSKI, Andrzej — 2000 09 26

Director appointed under Section 5 Environmental Protection Act

(11) Address for Service **2 St. Clair Avenue West, Floor 12A, Toronto, Ontario M4V 1L5**

(12) Party(ies) (Set out Status or Interest)
Name(s) — Signature(s) — Date of Signature Y M D

Corporation of the Township of Westmeath (owner)

(13) Address for Service **Westmeath, Ontario K0J 2L0**

(14) Municipal Address of Property

(15) Document Prepared by:
D. A. O'Brien
HUCKABONE, SHAW, O'BRIEN, RADLEY-WALTERS & REIMER
284 Pembroke Street East
Pembroke, Ontario, K8A 6X7

FOR OFFICE USE ONLY

Fees and Tax	
Registration Fee	50.00
Total	

Province of Ontario

Document General

Form 4 — Land Registration Reform Act

D

(1) Registry ☐ Land Titles ☒ (2) Page 1 of 2 pages

(3) Property Identifier(s) Block: Pt Property: 57194-0063 (LT) Additional: See Schedule ☐

(4) Nature of Document
APPLICATION TO REGISTER BY-LAW
(Section 75 of Land Titles Act)

(5) Consideration
Dollars $

(6) Description
Part Lot 30 Concession North Front A Geographic Township of Westmeath designated as Part 1 Plan 49R-14882, Township of Whitewater Region, County of Renfrew

being Part PIN 57194-0063 (LT)

FOR OFFICE USE ONLY

LT 040407

CERTIFICATE OF RECEIPT
CERTIFICAT DE RECEPISSE
RENFREW (49)

'02 JUN 27 PM 3 16

DEPUTY LAND REGISTRAR
LAND REGISTRAR / REGISTRATEUR

New Property Identifiers Additional: See Schedule ☐

Executions Additional: See Schedule ☐

(7) This Document Contains: (a) Redescription New Easement Plan/Sketch ☐ (b) Schedule for: Description ☐ Additional Parties ☐ Other ☒

(8) This Document provides as follows:

To: The Land Register for the Land Titles Division of Renfrew (No. 49)

We, the Corporation of the Township of Whitewater Region, having a legal interest in the lands described in Box 6 above hereby apply under Section 75 of the Land Titles Act to have the register for the said parcels amended by registration of By-Law No. 02-06-71

Continued on Schedule ☐

(9) This Document relates to instrument number(s)

(10) Party(ies) (Set out Status or Interest)

Name(s)	Signature(s)	Date of Signature Y M D
CORPORATION OF THE TOWNSHIP OF WHITEWATER REGION		2002 06 25
by its solicitor, Delbert A. O'Brien		

(11) Address for Service c/o 284 Pembroke Street East, Pembroke, Ontario

(12) Party(ies) (Set out Status or Interest)

Name(s)	Signature(s)	Date of Signature Y M D

(13) Address for Service

(14) Municipal Address of Property
not available

(15) Document Prepared by:
D.A. O'BRIEN
HUCKABONE, SHAW, O'BRIEN
RADLEY-WALTERS & REIMER
Post Office Box 487
Pembroke, Ontario K8A 6X7
54-016

FOR OFFICE USE ONLY

Fees and Tax	
Registration Fee	60.00
Total	

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

May 3, 2012

Ministry of the Environment
Ottawa District Office
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Mr. Lance Larkin
Sr. Environmental Officer

Re: Westmeath Closed Landfill Site
Certificate No. A413602
Township of Whitewater Region
Our Project No. 2006048M

Dear Lance:

Further to your November 2011 Site Inspection Report and upon filing the 2011 Annual Report with an accompanying letter dated March 30, 2012 we note as follows:

1. You attended the site on May 1, 2012 for the spring surface water sampling event. I trust you can be of some assistance in obtaining favourable TSS comments on the municipality`s request to modify the monitoring program.
2. Final cover details were provided in Appendix H of the 2011 Annual Report. We would confirm, in consultation with the Township, that the Public Works Department has stockpiled approximately 100 loads of earth material on site. The Township intends to use this material as needed for local municipal projects. If you require additional documentation please advise.
3. Once we receive copies of the legal documentation they will be filed with your office.

Yours very truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers



Kevin Mooder, MCIP, RPP
Project Manager

KJM/dr

Encl.

c.c. Steven Hodson
Andrew Buzza

Patrick Judge

From: Larkin, Lance (ENE) <Lance.Larkin@ontario.ca>
Sent: Wednesday, November 30, 2011 1:51 PM
To: Kevin Mooder; Steven - Environmental Services
Cc: Dean; andrewb@jp2g.com; Perry Larochelle; Cruikshank, Dana (ENE); Crossley, Frank (ENE)
Subject: RE: Nov 15, 2011 Inspection Closed Westmeath WDS

Dear Kevin and Steven,

Thanks for the update. Should any previous technical support memorandum's request raw data, or if it was noted that raw data was missing, please ensure to provide that data in future reports.

The groundwater parameter list and sampling frequency is required under Certificate No. A413602, Notice 8, Schedule "B".

I have forwarded on the Township's request to our technical support section for their consideration back in April 2010 and November 2011.

Our technical support section is scheduled to review the 2011 annual report including the request to alter the groundwater monitoring program in March/April 2012.

In addition, today, I've made a request to have the groundwater monitoring proposal evaluated in December 2011.

Lance Larkin

Senior Environmental Officer
Ministry of the Environment. Ottawa District Office
2430 Don Reid Drive. Ottawa. ON K1H 1E1
tel: 613-521-3450 ext. 229. fax: 613-521-5437
toll free: 1 800-860-219

Agent principal de l'environnement
Ministère de l'Environnement. District d'Ottawa
2430. promenade Don Reid. Ottawa (Ontario) K1H 1E1
tél. : 613-521-3450 poste 229, téléc. : 613-521-5437
sans frais. : 1-800-860-2195

From: Kevin Mooder [mailto:kmooder@jp2g.com]
Sent: November 30, 2011 11:27 AM
To: Larkin, Lance (ENE); 'Steven - Environmental Services'
Cc: 'Dean'; andrewb@jp2g.com; Perry Larochelle
Subject: RE: Nov 15, 2011 Inspection Closed Westmeath WDS

Lance
We acknowledge the Ministry's concerns with compliance of the surface water sampling program, and I would hope that the 2010 Annual Report has addressed the comments of the recent MOE review of the 2009 Report which we received in November 2010. Please advise Dana Cruikshank (TSS surface water scientist) that he is welcome to contact Andrew Buzza directly if he requires our raw data, spread sheets etc to assist in his review. Furthermore we would be pleased to schedule our spring 2012 monitoring event to allow you to attend if necessary.

That being said, on behalf of the municipality under Condition 50 of the CofA last amended March 20, 2008 we have requested approval for an amendment to the groundwater monitoring program. See letter to Marc-Etienne LeSieur dated September 2, 2009 and letter to you dated January 22, 2010 and the 2 last Annual Reports dated March 2010 and 2011. If you do not have copies of these letters in your file, or the District Manager needs something else please advise.

Kevin J. Mooder, MCIP, RPP
Senior Planner, Vice-President
Environmental Services

Jp2g Consultants Inc.
1150 Morrison Drive, Suite 410
Ottawa, ON K2H 8S9
Tel: (613) 828-7800
Fax: (613) 828-2600
E-mail: kmooder@jp2g.com

From: Larkin, Lance (ENE) [mailto:Lance.Larkin@ontario.ca]
Sent: Tuesday, November 29, 2011 8:50 AM
To: Steven - Environmental Services
Cc: Dean; Kevin Mooder
Subject: RE: Nov 15, 2011 Inspection Closed Westmeath WDS

Thank you for the update Steven. I can appreciate the attempts you made to collect the samples. I will update our records to show that no water was present.

Regards,

Lance Larkin

Senior Environmental Officer
Ministry of the Environment, Ottawa District Office
2430 Don Reid Drive, Ottawa, ON K1H 1E1
tel: 613-521-3450 ext. 229, fax: 613-521-5437
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tél. : 613-521-3450 poste 229, téléc. : 613-521-5437
sans frais. : 1-800-860-2195

From: Steven - Environmental Services [mailto:shodson@whitewaterregion.ca]
Sent: November 29, 2011 8:27 AM
To: Larkin, Lance (ENE)
Cc: Dean; Kevin Mooder
Subject: Re: Nov 15, 2011 Inspection Closed Westmeath WDS

Thanks Lance,

I acknowledge your comments and actions required. I will forward this on to Kevin Mooder at Jp2g as they have now taken over the sampling programs (beginning 2011) as I don't have time anymore.

Non-conformances / not respecting the Surface Water Program for 2010 which you have identified are a result of my sampling scheduling and the lack of surface water present (identified in my previous e-mail). I did indeed respect the frequency and requirements of the Program and even made a few extra trips out in an attempt to draw a sample at the four (4) stations during the Spring, Summer and Fall sessions. There was simply no water. Circumstantial, but I respect your comments and understand the Ministry's requirements.

All loads of cover material were indeed spread out as I remember. Our Public Works Department has perhaps used the site to stockpile some material recently. I had given them permission to do this in the past while we were working on establishing the cover application. I will contact them.

Cheers,

Steven

From: Larkin, Lance (ENE)

Sent: Monday, November 28, 2011 7:42 AM
To: shodson@whitewaterregion.ca
Cc: dsauriol@whitewaterregion.ca
Subject: Nov 15, 2011 Inspection Closed Westmeath WDS

Hello Steve,

Please review the attached.

Regards,

Lance Larkin

Senior Environmental Officer
Ministry of the Environment. Ottawa District Office
2430 Don Reid Drive, Ottawa. ON K1H 1E1
tel: 613-521-3450 ext. 229. fax: 613-521-5437
toll free: 1 800-860-219

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sans frais. : 1-800-860-2195

Ontario

Ministry of the Environment
Ministère de l'Environnement

Closed Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Whitewater Region Mailing Address: PO Box 40, Cobden, Ontario, Canada, K0J 1K0 Physical Address: 1 Astrolabe Rd, Whitewater Region, Township, County of Renfrew, Ontario, Canada Telephone: (613)646-2282, email: dsimmons@whitewaterregion.ca Client #: 1185-5UDMEF, Client Type: Municipal Government, NAICS: 92411		
Inspection Site Address:	Westmeath Landfill Site Address: 1597 Westmeath Rd, Whitewater Region, Township, County of Renfrew, K0J 2L0 District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 18, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 353071, UTM Northing: 5073044, UTM Location Description: Entrance gate to landfill site., LIO GeoReference: Zone: 18, UTM Easting: 352869.25, UTM Northing: 5073206.0, Latitude: 45.79673, Longitude: -76.89321		
Contact Name:	Dean Sauriol	**Title:**	CAO
Contact Telephone:	(613)646-2282 **ext**	**Contact Fax:**	(613)646-2283
Last Inspection Date:	2010/11/01		
Inspection Start Date:	2011/11/15	**Inspection Finish Date:**	2011/11/15
Region:	Eastern		

1.0 INTRODUCTION

The Site was for the use and operation of a 1.26 hectare fill area on a 7.07 hectare site for disposal of domestic, commercial and nonhazardous

solid industrial waste. This landfill site is closed. During summer and fall of 2008, 180 loads of organic material was applied to Westmeath. This was the third and final application of cover since the summer of 2006 following site closure. The sign at the locked gate on 1597 Westmeath Road states that the site is closed effective April 1st, 2006. The sign also indicates that the landfill moved to 990 Kohlsmith Road ("Ross Landfill").

The ministry's review of the 2009 Annual report for groundwater aspects is pending. Non-compliance has been identified. The Township should pay particular attention to sections 5.0 and 6.0 below.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
A413602

2.1 FINANCIAL ASSURANCE
No Financial Assurance required for municipalities.

2.2 CLOSURE PLAN
The closure plan forms part of Schedule A of the Approval.

2.3 ACCESS CONTROL
Site is controlled by locked gate.

2.4 FINAL COVER

During the summer of 2008, 180 loads of organic material was applied to Westmeath.

As per the 2010 Annual Report, Page 2, section 4.0 - Final Cover, the side slopes were regraded in 2009. Inspection and monitoring including a topographic survey and preparation of as built drawings for the landfill was scheduled for 2011. Status of this was not known during this inspection.

During this inspection the Ministry noticed several loads of fill material including, soil, gravel, sod deposited at the top of the landfill. The material was not evenly spread out.

The Township is responsible for ensuring that the final cover is in accordance with the final design plan specifications. The Township should provide a statement that addresses status of the final cover in the 2011 annual report.

2.5 LEACHATE CONTROL SYSTEM

No leachate control system in place.

2.6 METHANE GAS CONTROL SYSTEM

No methane gas control system in place.

2.7 MONITORING PROGRAMS:

Groundwater program and sampling is ongoing. The parameter list and sampling frequency is required under Certificate No. A413602, Notice 8, Schedule "B".

There is an ongoing surface water monitoring program. The Township has reported that most of the sampling locations are dry and has requested a reduced surface water sampling program of once yearly. At this time, reducing the sampling frequency to once per year is not acceptable to the Ministry surface water reviewer. The parameter list and sampling frequency is required under Certificate No. A413602, Notice 8, Schedule "B".

Page 4 of the 2010 Annual report shows that the Township is not respecting the sampling frequency details of sampling in April, August, and November as per Schedule "B". As per section 156 of the Environmental Protection Act, the Township should arrange to have the undersigned Provincial Officer present during the 2012 surface water sampling event to be conducted in April 2012. Not respecting the approved sampling program represents non-compliance with a term or condition of a Certificate of Approval, as per section 186(3) of the Environmental Protection Act.

2.8 GROUND WATER/SURFACE WATER IMPACTS

No obvious leachate springs observed. Review of 2010 Annual Report is pending.

2.9 Registration On Title:

The Township should demonstrate that the waste disposal site is registered on title. Supporting documentation should be provided in the 2011 annual report.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues.

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 ?
Yes
Specifics:
Surface water sampling and frequency as per Schedule "B" is not being respected. Potential for environmental impairment is unknown.

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

1. By April 1, 2012, arrange to have Provincial Officer Lance Larkin present during the April 2012 surface water sampling event. The Township should provide the officer with at least two weeks notice of the scheduled sampling event.

2. By April 1, 2012, the Township must provide a status update in the 2011 Annual Report regarding landfill final cover as it pertains to the design specifications in the closure plan.

6.0 OTHER INSPECTION FINDINGS

1. The township should include supporting documentation in the 2011 annual report that demonstrates that the site is registered on title as a closed waste disposal site.
2. In the 2010 Annual Report, Appendix "D", photographs for Borehole #1 and Borehole #2 are identical. The Township should ensure that future annual monitoring reports include updated photographs including the date the photographs were taken.

7.0 INCIDENT REPORT

Applicable
2482-8NNPEA

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Lance Larkin**
District Office: **Ottawa District Office**
Date: **2011/11/16**
Signature



REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**
Date: **2011/11/17**

Signature: 

File Storage Number: SI RE WE CNFA 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"

Ministry of the Environment

P.O. Box 22032
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613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement

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Kingston (Ontario)
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613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

M E M O R A N D U M

November 25, 2010

TO: Lance Larkin
Sr. Environmental Officer
Ottawa District Office
Eastern Region

FROM: Dana Cruikshank
Surface Water Scientist
Water Resources Group
Eastern Region

RE: 2009 Annual Report; Westmeath Waste Disposal Site
Westmeath Landfill Site Closure Plan
Township of Whitewater Region
C of A # A413602
IDS Ref #: 6434-84PQZV

I have reviewed the above report prepared by Jp2g Consultants with respect to surface water concerns only. A review of groundwater and air concerns will be forwarded to you under separate cover.

Report Overview

For 2009 Jp2g reports:

- During summer and fall of 2008 180 loads of organic material was applied to Westmeath. This is the third and final application of cover since the summer of 2006 following site closure.

- Minor leachate impacts were detected in groundwater monitors downgradient of the site.

- Leachate strength is perceived to be low, shallow groundwater is north/northwest.

- Leachate indicator parameters are chloride, sulphate, sodium, potassium, boron, strontium, alkalinity, conductivity, COD, TDS and manganese.

- Four surface water stations were sampled in June and October of 2009. During the August sampling event and Seep 2 in April.

- Background is determined by SW3 and SW3A. SW3A is on the downstream side of County Road 12.

- SW5 is downstream of waste mound.

- SW20 is 220 metres downstream of waste mound.

- The swale flows to the north side of the WDS and discharges to Bellows Bay in the Ottawa River.

- PWQO exceedances for iron and Total phosphorus (TP) were found at all stations including background and for copper at SW5 during June only.

- Jp2g concludes that while leachate from the WDS has impaired water quality in the swale that any negative impacts to water quality are reduced within a short distance of the waste mound and most certainly in the Ottawa River.

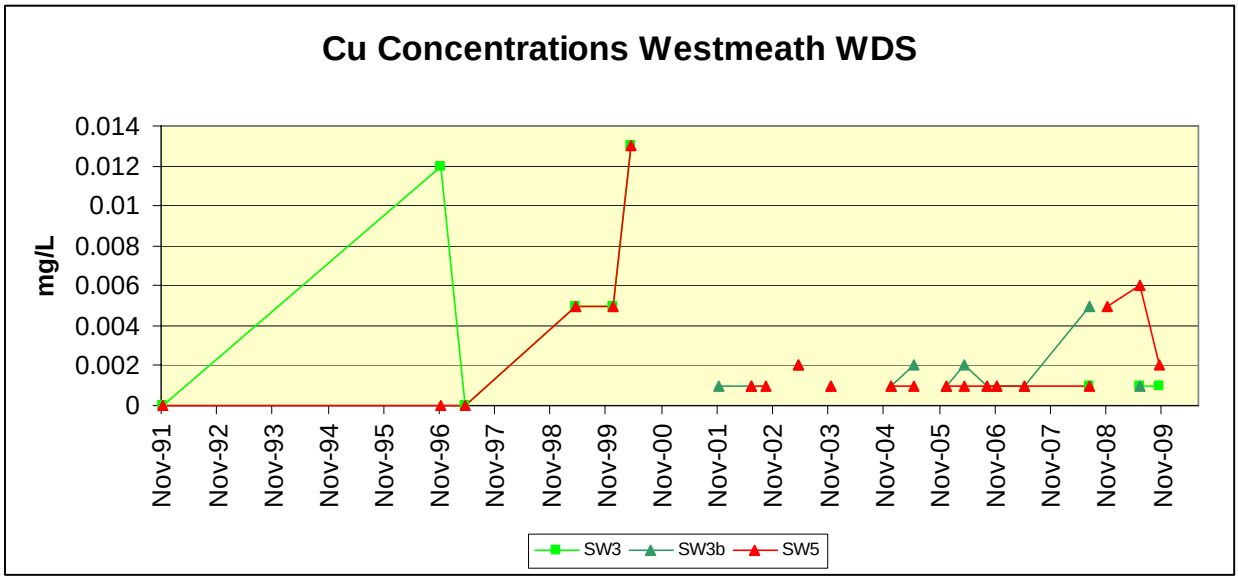
- Post closure monitoring is proposed to sample 4 stations (SW3, SW3A, SW5 and SW20) once per year for parameters listed in Table 31 of the 2009 report.

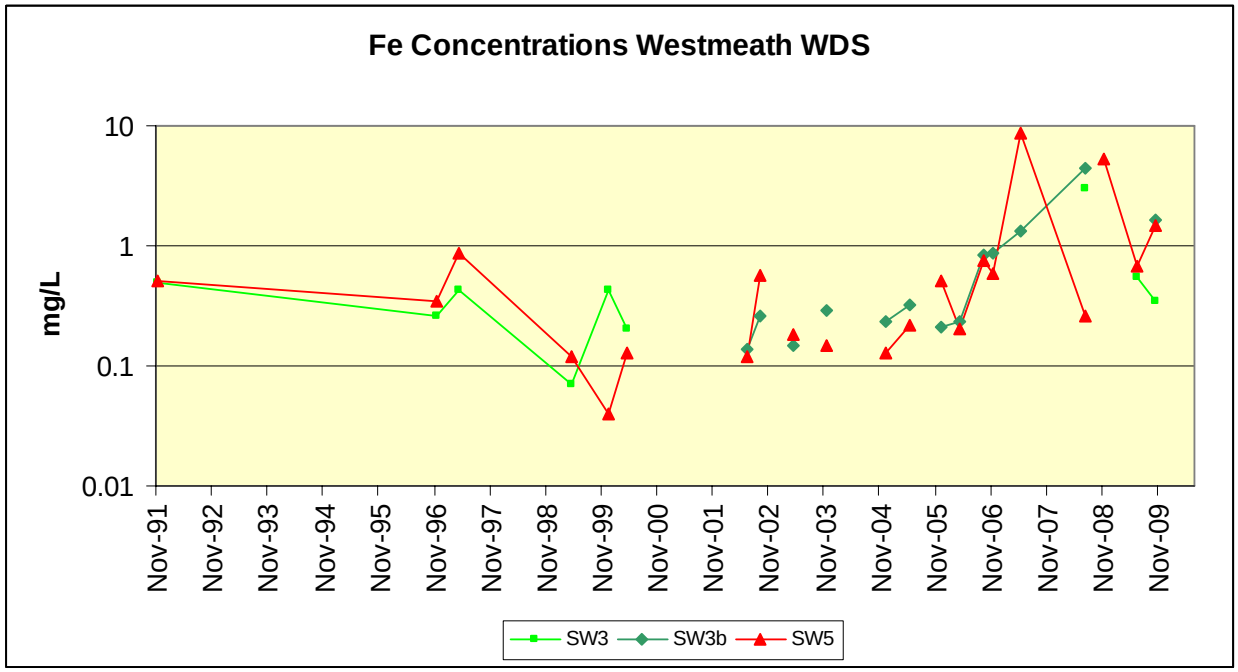
Reviewer's Comments

The reviewer is in agreement that SW5 is the most impacted station. This is not a surprise as it was spatially close to SW16 which previously was the surface station that was most impacted. However the main concern is that as seen in the figures below, iron and copper concentrations are tending to increase over the last two years. Some of this increase is due to influences on the two upstream (background) stations which would indicate something is occurring upstream that is resulting in the increase concentration of these two metals.

Unfortunately, Jp2g did not include a CD/DVD in the report with the historical and current chemistry data so that a comparison can be made with other parameters as previously recommended to determine if the background stations are compromised or whether there is some other new source upstream.

In addition, in my previous memo there was a recommendation to **"***The consultant should evaluate all the flow data to determine if the increased flow rate at the site is real or an artifact of several different flow measurement methodologies and report their findings in the next report."* As I had not been asked to review the 2007 or 2008 annual reports I do not know if this had been addressed. The 2009 report has no discussion on flows at all. No flow measurements have been taken since 2006.





The reviewer felt this was important because flow measurements at SW5 compared to SW3/3A indicated that the landfill contributed on average, 35% of the flow measured at SW5. Given that water quality, at least for copper and iron, appears to be deteriorating at both the upstream and downstream stations the last two years the reviewer was wondering if this was because there are low flows and there is a concentration effect or if flows had continued to increase. Increased flows as the trend suggested would mean that there would be an increased loading to the Ottawa River. Even though the flows in the swale are insignificant to flows in the Ottawa River we should not buy in to the "dilution is the solution" strategy if some mitigation can be accomplished at the site.

The proposal to reduce the sampling frequency to once per year is not acceptable to the reviewer at this time given the trend of increasing concentrations in 2008 and 2009 and the lack of flow data.

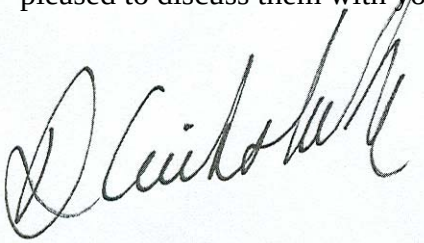
Recommendations:

1. The proposal to reduce the sampling frequency to once per year is not acceptable to the reviewer at this time.

2. Future reports should include all water quality data to date in spreadsheet format so that a more detailed assessment can be made of the data if required.

3. Flow data should be taken at all surface water stations at the time of water chemistry sampling.

If you have any questions regarding the above comments or recommendations I would be pleased to discuss them with you.



Dana Cruikshank
DC/gl

c: Shawn Kinney
Paul Kehoe
File SW-05-04 WHIT (Westmeath WDS)
File SW-13-01-02-01 (unnamed swale to Ottawa River)

Ontario

Ministry of the Environment
Ministère de l'Environnement

Solid Non-Hazardous Waste Disposal Site Inspection Report

Client:	The Corporation of the Township of Whitewater Region Mailing Address: 44 Main St, Post Office Box, 40, Cobden, Ontario, Canada, K0J 1K0 Physical Address: 44 Main St P.O. Box 40, Cobden, Whitewater Region, Township, County of Renfrew, Ontario, Canada, K0J 1K0 Telephone: (613)646-2282, FAX: (613)646-2283, email: dsauriol@whitewaterregion.ca Client #: 0415-4RYKP5, Client Type: Municipal Government, NAICS: 92119 Additional Address Info: P.O. Box 40, Cobden		
Inspection Site Address:	Westmeath Landfill Site Address: 1597 Westmeath Rd, Whitewater Region, Township, County of Renfrew, K0J 2L0 District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 18, Accuracy Estimate: 1-10 metres eg. Good Quality GPS, Method: GPS, UTM Easting: 353071, UTM Northing: 5073044, UTM Location Description: Entrance gate to landfill site.,		
Contact Name:	Dean Sauriol	**Title:**	CAO
Contact Telephone:	(613)646-2282 **ext**	**Contact Fax:**	(613)646-2283
Last Inspection Date:			
Inspection Start Date:	2010/11/01	**Inspection Finish Date:**	2010/11/01
Region:	Eastern		

1.0 INTRODUCTION

This landfill site is closed. During summer and fall of 2008, 180 loads of organic material was applied to Westmeath. This was the third and final application of cover since the summer of 2006 following site
closure. The sign at the locked gate on 1597 Westmeath Road states that the site is closed effective April 1st, 2006. The sign also indicates that the landfill moved to 990 Kohlsmith Road ("Ross Landfill").

The ministry's review of the 2009 Annual report for groundwater aspects is pending. The recommendations outlined in the attached memorandum concerning surface water aspects should be addressed by the Township as soon as practicable.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s):

A413602

2.1 FINANCIAL ASSURANCE:

No financial assurance required for municipalities.

2.2 APPROVED AREA OF THE SITE:

N/A - The site is currently closed.

2.3 APPROVED CAPACITY:

Final contours have been reached.

2.4 ACCESS CONTROL:
Site is secured by locked gate.

2.5 COVER MATERIAL:
Landfill is closed. Relatively dense, waist high vegetation was observed on the landfill site.

2.6 WASTE BURNING:
N/A

2.7 GROUNDWATER/SURFACEWATER IMPACT:

GROUNDWATER:

On October 5, 2010, Kevin Mooder from Jp2g requested that the ministry review the 2009 Annual report for Westmeath closed waste disposal site, A413602. As per Mr. Mooder, the report represents a reasonable post-closure program and requested that the report to be considered as the basis of requesting the District Manager to modify the monitoring program.

A groundwater review of the 2009 Annual Report is Pending. (Internal: Tech Support Reference No. 3707-84PQVM).

SURFACE WATER:

Please review Technical Support Review dated November 25, 2010 (attached). Three recommendations were made with respect to sampling and water quality data reporting:

1. The proposal to reduce the sampling frequency to once per year is not acceptable to the reviewer at this time.

2. Future reports should include all water quality data to date in spreadsheet format so that a more detailed assessment can be made of the data if required.

3. Flow data should be taken at all surface water stations at the time of water chemistry sampling.



Nov 25 2010 fdc-ll-Westmeath WDS - 2009 AR.pdf

2.8 LEACHATE CONTROL SYSTEM:
No leachate control system in place.

2.9 METHANE GAS CONTROL SYSTEM:
No methane gas control system in place.

2.10 OTHER WASTES:
N/A - closed landfill. Site is secured by locked gate.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No outstanding non-compliance issues noted.

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

See section (6.0) below.

6.0 OTHER INSPECTION FINDINGS

1. Implement the ministry's three surface water recommendations as per section 2.7 above.

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

DSCN0042.JPG; DSCN0043.JPG

PREPARED BY:
Environmental Officer:

Name: **Lance Larkin**
District Office: **Ottawa District Office**
Date: **2010/11/29**
Signature



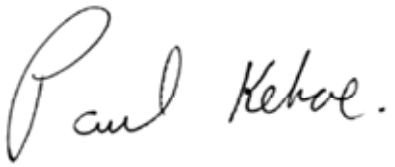
REVIEWED BY:
District Supervisor:

Name: **Paul Kehoe**

District Office: **Ottawa District Office**

Date: **2010/11/30**

Signature:



File Storage Number: SI RE WE CNFA 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"

Jp2g Consultants Inc.
ENGINEERS ▪ PLANNERS ▪ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

October 5, 2010

Ministry of the Environment
2430 Don Reid Drive
Ottawa, ON
K1H 1E1

Attention: Mr. Lance Larkin
Senior Environmental Officer

Re: Westmeath Closed Landfill Site
Township of Whitewater Region
Certificate No. A413602
Our Project No. 2006048K

Dear Lance:

On behalf of the Township of Whitewater Region please accept this submission as a request to amend the groundwater monitoring program under Condition 50 of the Certificate. Providing some background for this request attached find our September 2, 2009 letter to Marc Etienne LeSieur.

Since 2008, Jp2g Consultants Inc. has been providing the analysis and reporting of the environmental monitoring completed by the municipality. The amendment to the Certificate as Notice No. 6 dated March 20, 2008 included as Schedule "B" the monitoring program. Based on our records this schedule was compiled based on a review of the Gartner Lee 2006 Groundwater and Surface Water Monitoring Results by D. Cruikshank dated November 9, 2007 and S. Kinney dated March 3, 2008 without input from either Gartner Lee or our Firm. This resulted in an increase in the number of groundwater monitoring locations in comparison to the 1998 approved program (Certificate dated July 7, 2000) when the site was operational.

It is suggested that the municipality has conducted the enhanced monitoring program over the past three (3) years and the Jp2g 2009 Water Quality Monitoring Report found in the 2009 Annual Report dated March 2010 presents a comprehensive analysis and a reasonable post-closure program.

Please advise if TSS has conducted any reviews since the 2006 Annual Report, and if not we would ask that the 2009 Annual Report be considered as the basis of this request to the District Manager to modify the monitoring program.

Yours truly,
Jp2g Consultants Inc.
Engineers ▪ Planners ▪ Project Managers



Kevin J. Mooder, MCIP, RPP
Sr. Project Planner

KJM/dr

c.c.: - Steve Hodson

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

J.M. Janota, P.Eng., M.Sc.
J.E. Hunton, MCIP, RPP

September 2, 2009 By E-mail

Ministry of the Environment
2430 Don Reid Drive
Ottawa, ON K1H 1E1

Attention: Mr. Marc-Etienne LeSieur

Re: Westmeath Landfill Site
Certificate No. A413602
Township of Whitewater Region
Our Project No. 2006048J

Dear Marc:

Further to the submssion of the 2008 Annual Report March, 2009 the municipality is intending to conduct a compliance inspection and upgrade program for the monitoring wells.

Prior to the Amended Certificate Notice No. 6 dated March 20, 2008 the monitoring program was conducted as per the Gartner Lee 1997 recommendations (item 3 of Schedule "A"): Sampling 10 monitors once a year and groundwater levels spring and fall, 3 deep monitors were to be sampled every 3 years. Upon receipt of the Amended Certificate and in 2007 the Township sampled 25 monitoring locations in all 14 operational montioring wells as per Schedule "B" of the Certificate.

As presented in the 2008 Annual Report we have proposed a modified monitoring program to reflect the results of the sampling to date and to minimize cost for monitoring a closed landfill site. In consultation with TSS we wish eliminate all deep monitors as proposed in the 2007 Annual Report (which was prepared without the benefit of MOE review comments) and various other monitoring wells installed as part of the sites initial investigation. Based on our files it is understood Shawn Kinney conducted a review of the 2006 Annual Report prepared by Gartner Lee and Landfill Site Closure Plan January 2005 resulting in the Amended Certificate.

Trusting our recent submissions support a modification to the monitoring program, and approval can be obtained under Condition 50 through written consent of the District Manager. In this regard protective casings and well improvements will only be conducted on monitoring wells which form the basis of the long term post-closure program. The other wells will be properly decommissioned as required by regulation.

Yours truly,
Jp2g Consultants Inc.
Engineers • Planners • Project Managers



K.J. Mooder
Sr. Project Planner

KJM/jlp

c.c. Steve Hodson
Parry Larochelle

Ministry of the Environment

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Fax: 613/548-6908

Ministère de l'Environnement

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Fax: 613/548-6908

Ontario

M E M O R A N D U M 03 March 2008

TO: Marc Etienne LeSieur
Senior Environmental Officer
Ottawa District Office
Eastern Region

FROM: Shawn Kinney
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Westmeath Waste Disposal Site A413602
2006 Annual Monitoring Report

I have reviewed the hydrogeologic aspects of the following document entitled:

- *"Westmeath Waste Disposal Site, Township of Whitewater Region, Certificate No. A413602, 2006 Annual Report"* Jp2g Consultants Inc., March 2007, including:
    - *Part 2: Westmeath Township Landfill Site-2006 Groundwater and Surface Water Monitoring Results" Gartner* Lee Limited, March 2007.
- *"Township of Whitewater Region, Westmeath Landfill Site Closure Plan, Certificate of Approval #A413602"* Township of Whitewater Region Waste Management Department, January 2005 (Received October 23, 2007).

Based upon the information provided in the above-captioned documents, I submit the following comments for your consideration.

Summary

1. The site is not in compliance with Guideline B-7; however the affected off-site lands reportedly lie below the Ottawa River regulatory flood line and are unlikely to be used for domestic groundwater supply.

2. The horizontal extent of the leachate plume is delineated.

3. The primary pathway for the migration of leachate is northwest towards the floodplain of the Ottawa River.

4. The potential exists for surface water impacts to occur to a seasonal pond. Additionally, a drainage feature approaches within 20 metres of the fill area, connects to the ponded area, and flows to Bellowes Bay on the Ottawa River.

5. The proposed groundwater monitoring program cannot be endorsed in its present form and should be amended.

6. Future monitoring reports should provide more detailed subsurface information and a complete historical groundwater quality data set.

7. The final cover thickness is inadequate for a closed site.

Certificate of Approval

The Westmeath Waste Disposal Site operates under Certificate of Approval A413602. The site is licensed for the use and operation of a 1.26 hectare disposal area within a total site area of 7.07 hectares. The site is licensed to receive domestic, commercial and non-hazardous solid industrial waste. The area landfill method was used. The landfill is a naturally attenuating site.

Geology

Section 3.1, page 3 of the appended Gartner Lee report refers to the existence of silty sand overlying silty clay. Depth to bedrock and bedrock type are not described. I am unable to confirm the site geology with the information provided. I recommend that future monitoring reports describe sit geology and provide confirmatory borehole logs.

Hydrogeologic Conditions

Section 3.1, page 3 of the Gartner Lee report states that the hydraulic conductivity of the silty clay is much lower than the surficial sand and silt. The documents do not appear to include site-specific hydraulic conductivity data. I recommend that future monitoring reports describe the magnitude and distribution of hydraulic conductivity at this site.

Groundwater elevation data is provided in Table A1 of Appendix A in the Gartner Lee report. The provided reports do not quantify the horizontal or vertical hydraulic gradients. I recommend that future monitoring reports provide this information.

I have examined the water elevation data for the September and November 2006 measurement events. The highest observed groundwater elevations of 119.68 and 119.67 masl occurred at monitor 1C. The lowest elevations of 110.82 and 110.87 masl occurred at monitor 7B.

Figure 1 of the Gartner Lee report infers that the horizontal distance between monitors 1C and 7B is approximately 270 metres. This equates to a horizontal hydraulic gradient of approximately 0.03 m/m. This preliminary value may over-estimate the gradient because reported groundwater elevations at monitors 1A, 1B, and 1C differ by approximately 7 metres.

As mentioned above, notable groundwater elevation differences exist between monitors 1A, 1B, and 1C. I am unable to verify either the magnitude or direction of the vertical hydraulic gradient without well screen elevation data. As discussed previously, I recommend that future monitoring reports provide borehole log and monitoring well construction details.

Section 3.1, page 3 of the Gartner Lee report states that the shallow groundwater flow direction is to the north/northwest. The provided groundwater level data appears to confirm this assessment.

As discussed in the Geology section above, the Gartner Lee report states that silty sand overlies much less permeable clay at the site. This suggests that the silty sand performs as a shallow aquifer unit, while the clay functions as an aquitard. The report is silent regarding the thickness and continuity of these features. The report is also silent regarding other potential aquifers such as the underlying bedrock. I recommend that future monitoring reports more thoroughly describe the various hydrogeologic units at the site.

Section 3.1, page 3 of the Gartner Lee report states that groundwater originating beneath the landfill will discharge to seasonally ponded water northwest of the site.

Background Water Quality

The consultant has assessed background groundwater quality at monitor 1B, located approximately 20 metres west of the estimated limit of fill. Specific details regarding the screened interval of this monitor are not reported.

Table B1 of Appendix B of the Gartner Lee document provides groundwater quality results for selected on-site wells. I have examined these water quality data. I conclude that monitor 1B is an appropriate background monitor. I have compared the median value of the five most recent sampling results to the provincial drinking water criteria. These values conformed to the criteria for all measured parameters with the following exception:

- The median background organic nitrogen concentration was calculated to range from 0.19 mg/l to 0.21 mg/l. This is 1.2 to 1.4 times greater than the 0.15 mg/l drinking water criterion.

I note that the analytical list for the site includes few metals and organic parameters. I am unable to advise you as to the background concentrations of these substances.

Leachate Water Quality

The historical leachate monitoring well at this site, 3B, was reportedly destroyed prior to November 1996. I have examined the provided data set and conclude that monitor 11B, located 20 metres northwest of the fill area, is the most severely impacted monitor for which data are provided.

I note that groundwater quality data are not reported for approximately 60% of the existing groundwater monitors. I cannot discount the existence of more severely impacted groundwater monitors at this time.

I have compared the results of the most recent September 2006 sampling event at 11B to the provincial drinking water criteria. I note the following potential contaminants of concern:

- The manganese concentration was 3.47 mg/l. This is approximately 70 times greater than the 0.05 mg/l drinking water criterion.

- The organic nitrogen concentration was 1.59 mg/l. This is approximately 11 times greater than the 0.15 mg/l drinking water criterion.

- The total dissolved solids concentration was 1850 mg/l. This is approximately 4 times greater than the drinking water criterion.

- The alkalinity concentration was 1250 mg/l. This is approximately 3 times greater than the 500 mg/l drinking water criterion.

I note that the analytical list for groundwater does not include several common leachate quality parameters. I am unable to advise you regarding levels of several leachate parameters such as lead, zinc, hardness, dissolved organic carbon, or volatile organic compounds.

Downgradient Water Quality

I have examined the groundwater quality data provided for monitors BH4, BH5, BH7, BH8 and BH14. These wells are located near the northwestern site boundary, approximately 120 metres to 220 metres west and northwest of the fill area. The locations are depicted in Figure 1 of the Gartner Lee report.

I am satisfied that the horizontal extent of the plume has been determined. Groundwater quality is only measured at one elevation at each monitoring point. I therefore cannot similarly verify that the vertical extent of the plume has also been determined.

GW/SW Interaction

A proportion of the groundwater originating at the fill area reportedly discharges to a 'Seasonally Ponded Water" feature. The feature is depicted approximately 30 metres down-gradient of the fill in Figure 1 of the Gartner Lee report. Additionally, a drainage feature approaches within 20 metres of the fill area, connects to the ponded area, and flows to Bellowes Bay on the Ottawa River. A potential for surface water impacts exists.

Guideline B-7

The Certificate of Approval does not appear to have been amended to reflect the permanent closure of the site. Additionally, the 0.3 metre cover is much thinner than to the 0.75 metre final cover described in Section 3.2, page 4 of the January 2005 Closure Plan. Based on this information, the Westmeath Waste Disposal Site is deemed "operational" and Guideline B-7 applies.

Guideline B-7 criteria can be calculated for 12 water quality parameters using the median of the 5 most recently observed concentrations at background monitor BH 1B. I have compared the groundwater quality data provided for monitors BH4, BH5, BH7, BH8 and BH14 to these criteria. The following parameters are interpreted as exceeding the site-specific B-7 criteria at the downgradient site boundary:

- Manganese exceeded the 0.03 mg/l B-7 criteria at 5 of 5 monitors. The greatest concentration of 1.00 mg/l was observed at monitor BH 7B. This value was 33 times greater than the B-7 limit.

- Iron exceeded the 0.17 mg/l B-7 criteria at 5 of 5 monitors. The greatest concentration was of 3.56 mg/l observed at monitor BH 8B. This value was 21 times greater than the B-7 limit.

- Total Dissolved Solids exceeded the 310 mg/l B-7 criteria at 4 of 5 monitors. The greatest concentration of 825 mg/l was observed at monitor BH 7B. This value is almost 3 times greater than the B-7 limit.

- Organic Nitrogen exceeded the 0.20 mg/l B-7 criteria at 4 of 5 monitors. The greatest concentration of 0.41 mg/l was observed at monitor BH 4B. This value was twice as great as the B-7 limit.

The Westmeath Waste Disposal Site does not conform to Reasonable Use Guideline B-7. I cannot discount the possibility of exceedences by additional un-analyzed substances and in locations not included in the monitoring program.

The site is somewhat unique in that the affected off-site lands reportedly lie below the Ottawa River regulatory flood line. Section 4, page 16 of the Gartner Lee report states that the Township has municipal control over any potential groundwater uses in this area. Figure 1 of the Gartner Lee report depicts the location of this feature.

Groundwater Monitoring Program and Reporting

Proposed groundwater monitoring programs are described in Section 4 of the 2005 site closure plan and Section 6 of the Gartner Lee Report.

The closure plan is silent with respect to analytical parameters. The Water Resources Unit endorses a monitoring program based upon Column 1 of the "Landfill Standards" Guideline Schedule 5.

Volatile Organic Compounds, or VOC analyses should be undertaken at the leachate source monitoring well BH 11B and at the two most severely impacted boundary wells BH 7B and BH 8B.

The Gartner Lee report proposes to monitor 23%, or 6 of the 26 existing monitors at this site. I am not prepared to endorse such an abbreviated monitoring network at this time for a number of reasons. First, I do not know the groundwater quality in any of the "A" or "C" level monitoring wells, as these are not reported. Secondly, to my knowledge the 0.75 metre final cover has not yet been installed, and the C of A does not appear to have been amended to permanently close the site.

I consider it premature to remove any monitors from the program or relax B-7 requirements until the site is legally closed and the groundwater quality in all of the monitors can be examined.

Other Issues: Closure Plan

I have examined the closure plan which was prepared by the Township of Whitewater Region Waste Management Department.

Section 2.3, page 3 of the closure plan states that the final slopes of the fill area will be 4:1 on the flanks and 5% on the top. This is satisfactory.

Section 3.2 of the closure plan states that the final cover will consist of 0.6 metres of permeable fill/common borrow materials covered by 0.15 metres of topsoil. A vegetated final soil cover having a minimum thickness of 0.75 metres is considered satisfactory.

Section 4.1 of the closure plan proposes an annual groundwater monitoring program. Section 4.2, page 7 of the closure plan infers that all existing groundwater monitors will be included in the program. This is satisfactory.

The closure plan is silent with respect to analytical parameters. The Water Resources Unit endorses a monitoring program based upon Column 1 of the "Landfill Standards" Guideline Schedule 5.

Section 8, page 9 of the Closure Plan recommends the continued application of Reasonable Use Guideline B-7 during the post-closure period. I do not object to this proposal.

Shawn Kinney, P.Geo
SK/gl

c: Peter Taylor (Water Unit Supervisor, A)
Paul Kehoe (Ottawa District Office)
Dana Cruikshank (Surface Water Unit)
GW 03-03 WHIT Westmeath WDS A413602, Fmr Township of Westmeath
SK #1508-72RS9H

Ministry of the Environment

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Ministère de l'Environnement

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Ontario

M E M O R A N D U M

November 9, 2007

TO: Marc Etienne LeSieur
Sr. Environmental Officer
Ottawa District Office
Eastern Region

FROM: Dana Cruikshank
Surface Water Scientist
Water Resources Group
Eastern Region

RE: 2006 Annual Report; Westmeath Waste Disposal Site
Westmeath Landfill Site Closure Plan
Township of Whitewater Region
C of A # A413602

I have reviewed the above report prepared by Jp2g Consultants and Gartner Lee Ltd. (GLL) with respect to surface water concerns only. A review of groundwater and air concerns will be forwarded to you under separate cover.

Report Overview

For 2006 GLL reports:

- Minor leachate impacts were detected in groundwater monitors downgradient of the site.
- Leachate strength is perceived to be low, shallow groundwater is north/northwest.
- Leachate indicator parameters are chloride, sulphate, sodium, potassium, boron, strontium, alkalinity, conductivity, COD, TDS and manganese.
- Six surface water stations were sampled in April, September and November of 2006 and Seep 2 in April.
- Background is determined by SW3 and SW3A. SW3A is on the downstream side of County Road 12.

- The swale flows to the north side of the WDS and discharges to Bellows Bay in the Ottawa River.

- Due to low flows during all sampling events a flow meter could not be used.

- Leachate impacts were also found in the drainage swale east of the site during all three sampling events. PWQO exceedances for iron were found at all stations including background.

- Greatest impacts were observed at SW16.

- GLL concludes that while leachate from the WDS has impaired water quality in the swale that any negatively impacts to water quality in the Ottawa River will be mitigated by dilution and vegetative uptake.

- For 2007 GLL proposes only sampling 3 stations (SW3A, SW5 and SW20).

- No mitigative measures except to recover the exposed seep area are recommended.

Reviewer's Comments

Sampling Stations and Frequency

Given that the site is now closed and final cover has been applied, GLL has recommended the removal of 3 surface water stations (SW15, SW16, SW 23) from the sampling program. SW15 and SW16 (which shows the most impact) are located in close proximity to SW5 and therefore the reviewer agrees with their removal. SW23 is near the swale's outfall with the Ottawa River and is subject to other influences and therefore the reviewer agrees to its removal from the monitoring plan.

Water Quality

Figure 1 (attached) plots the historical data for 5 leachate indicators. The 2006 data indicates that concentrations of these selected leachate parameters with the exception of COD in 2006 show a decreasing trend at SW5 and SW20. This indicates that the application of final cover and closure of the site is likely having some positive impact on water quality in the receiving swale. If these trends continue in 2007 and beyond then it is likely that aside from site maintenance as outlined in the closure report that no further work (mitigation) as indicated by GLL will be required at this site.

Flows

GLL indicated flows were too low to use a flowmeter in 2006. Estimated flows using a volume fill-time method produced values indicating that some of the highest flows occurred in the swale during 2006. The chart in Figure 1 shows that flows at all stations are showing a trend of increased flows over time. Flow measurements at SW5 compared to SW3/3A indicate that the landfill contributes on average 35% of the flow measured at SW5. Even though there appears in 2006 to be a trend to improved water quality the trend in increased flows means that loading to the Ottawa River is likely the same and may increase if flows increase and water quality remains the same.

Before assessing whether this is potentially a problem I would like the consultant to evaluate all the flow data to determine if they can with some confidence determine whether this trend is real or an artifact of several different flow measurement methodologies.

Final Cover

The permeability of the 0.6 m application of final cover is usually site specific and is tied into the landfill design and site location. Therefore permeability can range from none to low to high depending on what the engineered closure is designed to achieve with respect to waste degradation versus leachate production. You may wish to discuss this with your District Engineer as to whether the application of permeable cover at this site was appropriate.

Recommendations

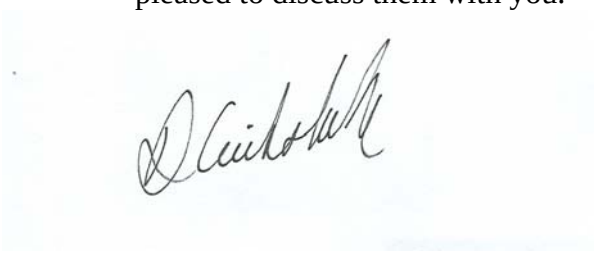
1. SW15, SW16, SW 23 can be removed from the surface water monitoring program.

2. Future reports should include all water quality data to date in spreadsheet format so that a more detailed assessment can be made of the data if required.

3. The consultant should evaluate all the flow data to determine if the increased flow rate at the site is real or an artifact of several different flow measurement methodologies and report their findings in the next report.

4. Appropriateness of the application of 0.6 m of permeable cover should be discussed with the District Engineer or a waste engineer specialist in Toronto.

If you have any questions regarding the above comments or recommendations I would be pleased to discuss them with you.

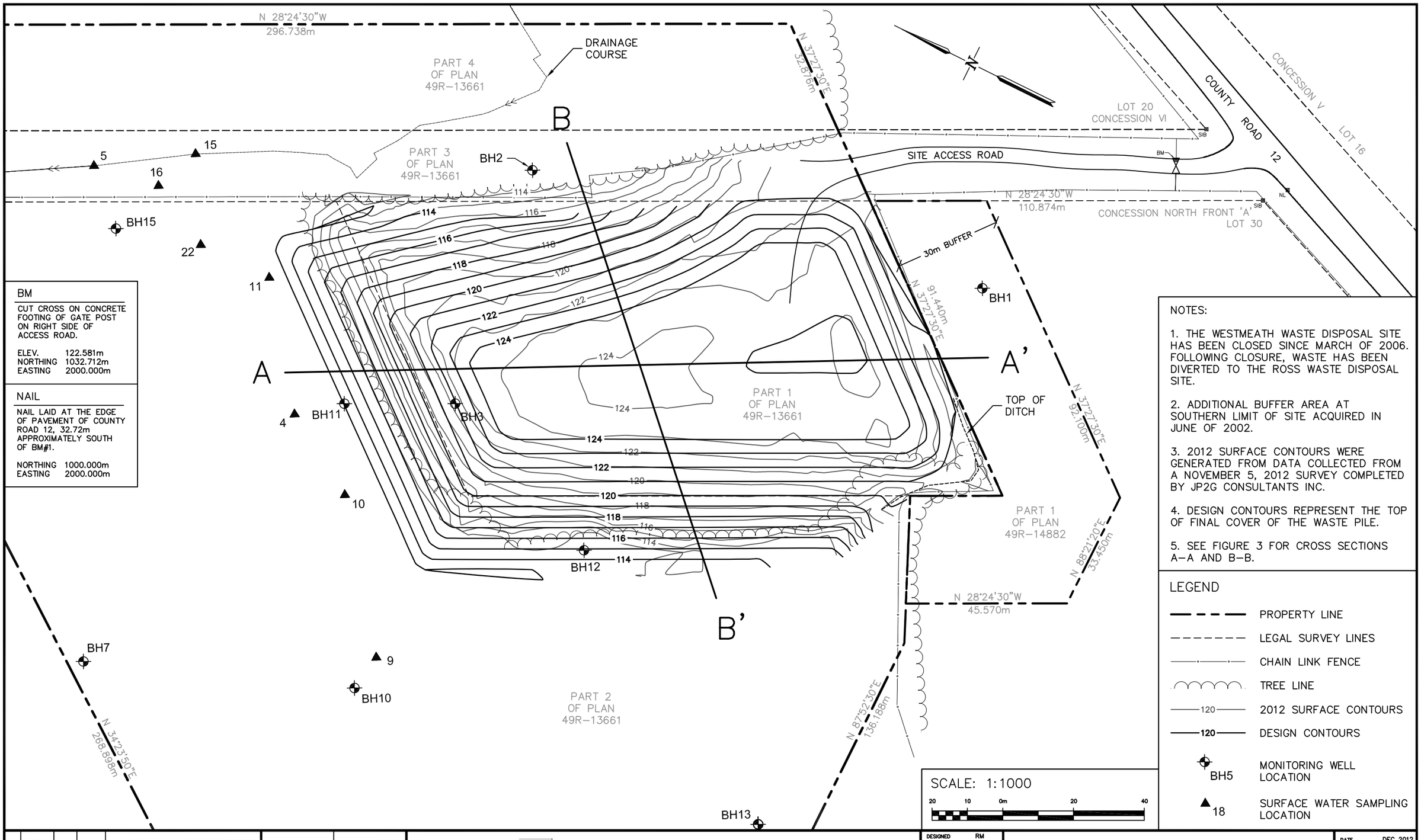


Dana Cruikshank
DC/gl

c: Dana Cruikshank
Shawn Kinney
Peter Taylor
Paul Kehoe
File SW-05-04 WHIT (Westmeath WDS)
File SW-13-01-02-01 (unnamed swale to Ottawa River)

Appendix D

Site Closure / CAZ Documentation



BM

CUT CROSS ON CONCRETE FOOTING OF GATE POST ON RIGHT SIDE OF ACCESS ROAD.

ELEV. 122.581m
NORTHING 1032.712m
EASTING 2000.000m

NAIL

NAIL LAID AT THE EDGE OF PAVEMENT OF COUNTY ROAD 12, 32.72m APPROXIMATELY SOUTH OF BM#1.

NORTHING 1000.000m
EASTING 2000.000m

NOTES:

1. THE WESTMEATH WASTE DISPOSAL SITE HAS BEEN CLOSED SINCE MARCH OF 2006. FOLLOWING CLOSURE, WASTE HAS BEEN DIVERTED TO THE ROSS WASTE DISPOSAL SITE.

2. ADDITIONAL BUFFER AREA AT SOUTHERN LIMIT OF SITE ACQUIRED IN JUNE OF 2002.

3. 2012 SURFACE CONTOURS WERE GENERATED FROM DATA COLLECTED FROM A NOVEMBER 5, 2012 SURVEY COMPLETED BY JP2G CONSULTANTS INC.

4. DESIGN CONTOURS REPRESENT THE TOP OF FINAL COVER OF THE WASTE PILE.

5. SEE FIGURE 3 FOR CROSS SECTIONS A–A AND B–B.

LEGEND

- PROPERTY LINE
- LEGAL SURVEY LINES
- CHAIN LINK FENCE
- TREE LINE
- 120 — 2012 SURFACE CONTOURS
- 120 — DESIGN CONTOURS
- BH5 — MONITORING WELL LOCATION
- 18 — SURFACE WATER SAMPLING LOCATION

SCALE: 1:1000

20 10 0m 20 40

No.	DATE	BY	REVISIONS

Jp2g Consultants Inc.

ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

DESIGNED	RM
DRAWN	RM
CHECKED	KM
APPROVED	KM
SCALE	1:1000

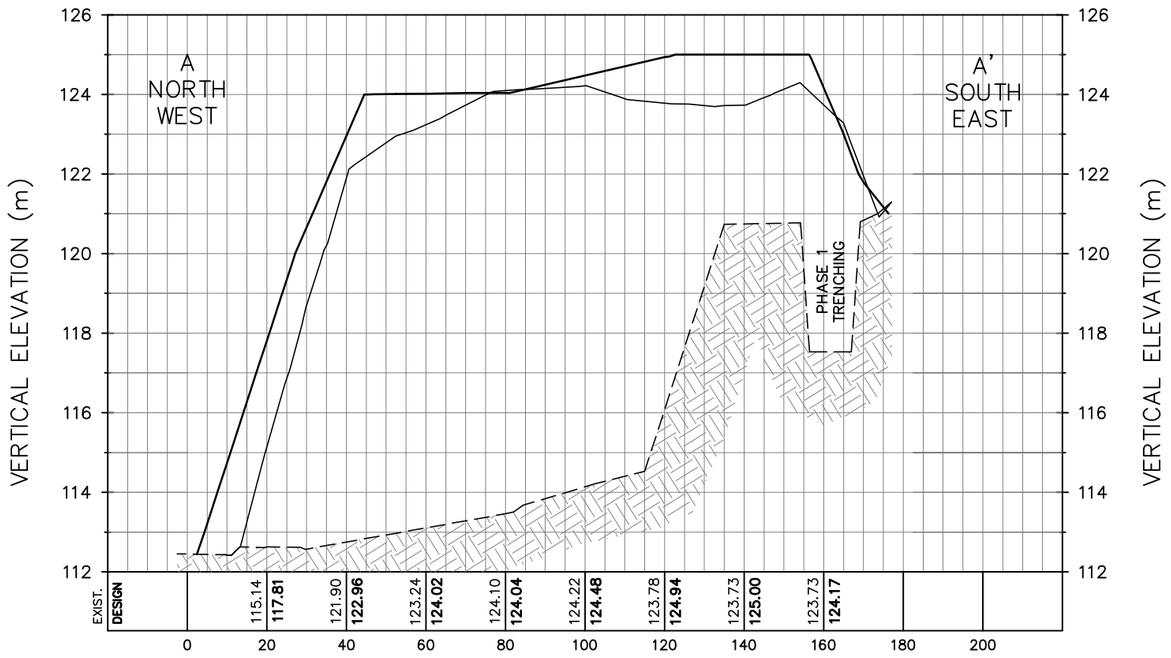
WESTMEATH WASTE DISPOSAL SITE

PART OF LOT 20, CONCESSION VI AND PART OF LOT 30, NORTH FRONT 'A'. (GEO) TWP. OF WESTMEATH, TWP. OF WHITEWATER REGION

FINAL CLOSURE PLAN

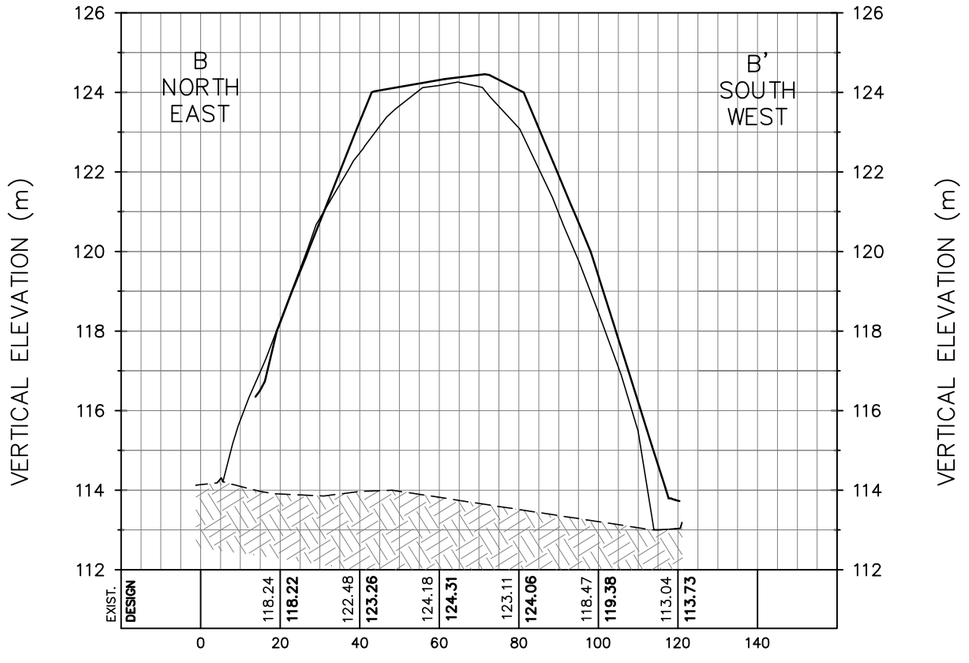
DATE	DEC 2012
PROJECT	2006048N
PLOTTED	15–FEB–13
FIGURE	D1

CROSS SECTION A–A'



HORIZONTAL DISTANCE (m)

CROSS SECTION B–B'



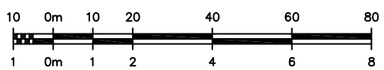
HORIZONTAL DISTANCE (m)

LEGEND

- ORIGINAL DESIGN CONTOURS
- 2012 SURFACE CONTOURS
- ESTIMATED ORIGINAL GROUND CONTOURS

SCALE

HOR–1:1500
VER–1:150



NOTES

1. THE ORIGINAL GROUND LEVEL CONTOURS WERE ESTIMATED BASED ON THE ORIGINAL GROUND LEVEL CONTOURS AROUND THE PERIMETER OF THE WASTE MOUND.

2. DESIGN CONTOURS AND THE 2012 SURFACE CONTOURS BOTH INCLUDE FINAL COVER IN THEIR ELEVATION.

3. 2012 SURFACE CONTOURS ARE BASED ON A NOVEMBER 5, 2012 LAND SURVEY COMPLETED BY JP2G CONSULTANTS INC.

No.	DATE	BY		REVISIONS

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

DESIGNED	RM
DRAWN	RM
CHECKED	KM
APPROVED	KM
SCALE	AS NOTED

WESTMEATH WASTE DISPOSAL SITE

PART OF LOT 20, CONCESSION VI AND PART OF LOT 30, NORTH FRONT 'A'. (GEO) TWP. OF WESTMEATH, TWP. OF WHITEWATER REGION

CROSS SECTIONS A AND B

DATE	DEC 2012
PROJECT	2006048N
PLOTTED	15–FEB–13
FIGURE	D2

Appendix E

Geological Cross Section and Borehole Logs

PROJECT: 901-2847

RECORD OF BOREHOLE 1

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Sept.10,13,1990

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	GAS CONCENTRATION ⊕ ( ) % LEL □	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl 20 40 60 80	INSTALLATIONS
0	Power Auger 200mm Diam (Hollow Stem)	Ground Surface		121.69								
		Loose brown fine to medium faintly stratified SAND, some silt		0.00	1	50 DO	6		MH			
1				120.17								
		Red brown mottled SILTY CLAY, occasional fine sand seams (Weathered Crust)		1.52								
2				1.67	2	50 DO	9					
		Loose to compact grey to brown mottled SILT, trace to some clay			3	50 DO	12		MH			
3					4	50 DO	5					
				117.88								
4				3.81	5	50 DO	2					
		Red brown mottled SILTY CLAY, occasional sand seams (Weathered Crust)			6	50 DO	1		MH			
5				116.36								
				5.33	7	50 DO	PM					
6					8	50 DO	PM					
7					9	50 DO	PM					
		Grey SILTY CLAY, occasional fine sand seams, some shell fragments, sand and gravel layer between 10.67m and 10.97m depth			10	50 DO	PM		MH			
8												
9					11	50 DO	PM					
10												
11					12	50 DO	PM					
				109.50								
12		Loose grey SILTY fine SAND, some gravel		12.19	13	50 DO	PM					
				109.05								
		Grey SILTY CLAY, occasional sand seams		12.64								
13				107.96								
		Compact grey fine to coarse SAND and GRAVEL, trace silt		13.71	14	50 DO	20		MH			
14				107.37								
		End of Hole		14.32								
15												

INSTALLATIONS: A, B, C

Bentonite Seal

Native Backfill

51mm PVC Riser Pipe

Bentonite Seal

Granular Filter

51mm PVC #10 Slot Screen

MH

W.L. in Screen A at elev. 112.38m
Screen B at elev. 118.18m
Screen C at elev. 119.37m
Dec. 17, 1990

DATA INPUT: DISK, S. STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 2

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Sept. 11, 1990

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
0	Power Auger 200mm Diam (Hollow Stem)	Ground Surface		113.32					
		TOPSOIL		0.00					
		Brown fine SAND, some silt		0.10 / 112.72					
		Red brown mottled SILTY CLAY, occasional fine sand seams (Weathered Crust)		0.60 / 111.50	1	50 DO	8		
		Loose grey to brown SILT, trace clay		1.82 / 111.19	2	50 DO	PM		
		Grey SILTY CLAY, occasional sand seams up to 13mm thick, some shell fragments		2.13 / 103.42	3	50 DO	PM		
					4	50 DO	PM		
					5	50 DO	1		
					6	50 DO	PM		
					7	50 DO	PM		
					8	50 DO	PM		
					9	50 DO	PM		
					10	50 DO	PM		
					11	50 DO	PM		
					12	50 DO	PM		
		Loose grey SILTY fine SAND, with silty clay seams		9.90 / 102.66	13	50 DO	PM		
		Grey SILTY CLAY, occasional sand seams		10.66 / 102.35	14	50 DO	PM		MH
		Loose to compact grey sandy silt with gravel, trace clay (GLACIAL TILL)		10.97 / 102.05					
		End of Hole		11.27					

GAS CONCENTRATION ⊕ ( ) — % LEL □

HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT — Wp W Wl — 20 40 60 80

INSTALLATIONS

A	B
Bentonite Seal	
Native Backfill	
51mm PVC Riser Pipe	
Bentonite Seal	
Granular Filter	
51mm PVC #10 Slot Screen	
Bentonite Seal	
Native Backfill	
Bentonite Seal	
Native Backfill	
Bentonite Seal	
Native Backfill	MH

W.L. in Screen A at elev. 112.93m
Screen B was frozen

Dec. 17, 1990

DATA INPUT: DISK, S. STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 3

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Sept.11,12,1990

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
0	Power Auger 200mm Diam (Hollow Stem)	Ground Surface		112.80					
		TOPSOIL		0.00					
		Brown fine SAND, some silt		0.20 112.04					
1		Red brown mottled SILTY CLAY, trace sand (Weathered Crust)		0.76	1	50 DO	4		
2					2	50 DO	1		MH
				110.52					
		Loose grey to brown mottled SILT, trace to some clay		2.28 110.06	3	50 DO	5		
3				2.74					
					4	50 DO	PM		
4		Grey SILTY CLAY, occasional thin sand seams							
5					5	50 DO	1		MH
6					6	50 DO	PM		
				106.10					
7		End of Hole		6.70					

GAS CONCENTRATION ⊕ ( )

% LEL □

HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT

Wp W Wl

20 40 60 80

INSTALLATIONS

A B

Bentonite Seal

Native Backfill

51mm PVC Riser Pipe

Bentonite Seal

Granular Filter

51mm PVC #10 Slot Screen

MH

MH

W.L. in Screen A at elev. 112.42m
Screen B at elev. 112.58m
Dec. 17, 1990

DATA INPUT: DISK, S, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 4

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Sept.12,1990

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	SAMPLES RECOVERY %	SAMPLES LAB. TESTING
0	Power Auger 200mm Diam (Hollow Stem)	Ground Surface		111.28					
		TOPSOIL		0.00					
		Loose brown fine to medium SAND, some silt		0.25 / 110.37					
1		Loose grey to brown SANDY SILT, trace clay		0.91 / 109.76	1	50 DO	9		
		Grey SILTY CLAY, occasional fine sand seams		1.52	2	50 DO	1		
2									
					3	50 DO	PM		
3									
				107.93	4	50 DO	3		
		Loose grey CLAYEY SILT		3.35 / 107.62					
4				3.66					
		Grey SILTY CLAY, occasional silty fine sand seams			5	50 DO	PM		
5									
					6	50 DO	PM		
6									
					7	50 DO	1		
7									
				103.06					
8		End of Hole		8.22					
9									
10									
11									
12									
13									
14									
15									

GAS CONCENTRATION ⊕ ( )

% LEL □

HYDRAULIC CONDUCTIVITY, k, cm/s

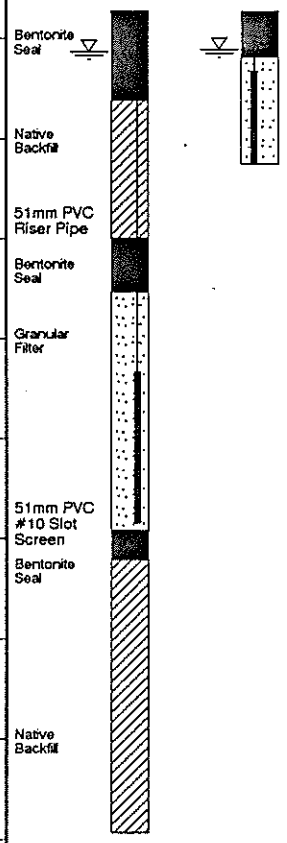
WATER CONTENT, PERCENT

Wp W Wl

20 40 60 80

INSTALLATIONS

A -B



W.L. in Screen A at elev. 110.89m
Screen B at elev. 110.92m
Dec. 17, 1990

DATA INPUT: DISK. S. STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 5

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Sept.13,1990

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
0	Power Auger 200mm Diam (Hollow Stem)	Ground Surface		111.75					
		TOPSOIL		0.00					
		Brown fine SAND, some silt		0.26 / 110.99					
1		Loose to compact grey to brown SANDY SILT, trace clay		0.76	1	50 DO	10		
					2	50 DO	10		MH
2				109.77					
		Grey to brown mottled SILTY CLAY, occasional fine sand and silty fine sand seams (Weathered Crust)		1.98	3	50 DO	PM		
3					4	50 DO	PM		
4				107.79 / 3.96					
5		Grey SILTY CLAY, occasional fine sand seams, trace gravel			5	50 DO	1		
6					6	50 DO	1		
7									
8				103.53	7	50 DO	PM		
		End of Hole		8.22					
9									
10									
11									
12									
13									
14									
15									

GAS CONCENTRATION ⊕ ( )

% LEL □

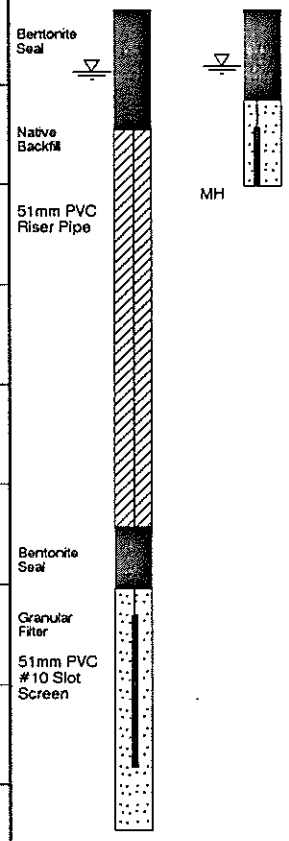
HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT

Wp ⊢ w ⊣ Wl

20 40 60 80

INSTALLATIONS



W.L. in Screen A at elev. 111.15m
Screen B at elev. 111.21m
Dec. 17, 1990

DATA INPUT: DISK, S. STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 6

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.24,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5 kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	GAS CONCENTRATION ⊕ ( ) / % LEL □	HYDRAULIC CONDUCTIVITY, K, cm/s / WATER CONTENT, PERCENT Wp W Wl (20 40 60 80)	INSTALLATIONS
0	Hand Auger, N Casing	Ground Surface		113.20								A: Bentonite Seal; Granular Filter; 38mm PVC Riser Pipe
		TOPSOIL		0.09								B
		Loose brown fine to medium SAND, trace to some silt, occasional gravel		112.51	1	50 DO	4					
1		Red brown mottled SILTY CLAY, occasional thin fine sand seams (Weathered Crust)		0.69	2	50 DO	6					
					3	50 DO	2					
2				111.12								
		Loose grey to brown SILT, trace clay		2.08								
				110.64	4	50 DO	4					
3	B Casing	Grey SILTY CLAY, occasional fine sand and silt seams		2.56	5	50 DO	5					A: Bentonite Seal; Granular Filter; 38mm PVC #10 Slot Screen
4					6	50 DO	PM					
					7	50 DO	PM					
5				108.02								
		End of Hole		5.18								W.L. in Screen A & B frozen Dec. 17, 1990
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

DATA INPUT: Disk 5, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 7

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.27&28,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
0	Hand Auger, N Casing	Ground Surface		111.66					
		TOPSOIL		0.00					
		Loose brown fine to medium SAND, some silt		0.13 / 110.99	1	50 DO	13		
1		Loose to compact brown to grey SANDY SILT		0.67	2	50 DO	11		
2				109.57	3	50 DO	5		
		Grey SILTY CLAY, occasional sand and silt seams		2.09	4	50 DO	4		
3				108.08	5	50 DO	6		
		Loose grey SILT		3.58					
4	B Casing	Grey SILTY CLAY, occasional fine sand and silt seams		3.66	6	50 DO	4		
					7	50 DO	6		
5				106.48					
		End of Hole		5.18					
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

GAS CONCENTRATION ( ) ⊕

% LEL □

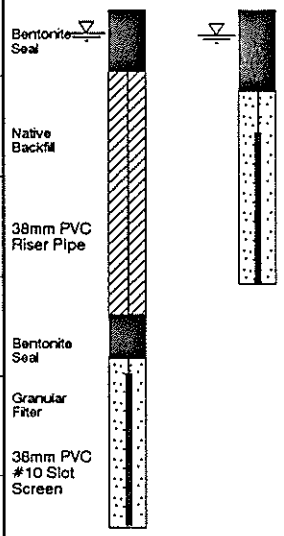
HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT

Wp W Wl

20 40 60 80

INSTALLATIONS



W.L. in Screen A at elev. 111.45m
Screen B at elev. 111.43m
Dec. 17, 1990

DATA INPUT: Disk 5, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 8

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.26,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	GAS CONCENTRATION ⊕ ( ) % LEL □	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl 20 40 60 80	INSTALLATIONS
0	Hand Auger / N Casing	Ground Surface		111.45								A: Bentonite Seal; Native Backfill; 38mm PVC Riser Pipe
		TOPSOIL		0.00								
		Loose grey to brown fine SAND, trace to some silt, trace clay		0.12	1	50 DO	3					
				110.69								
1		Loose grey to brown SANDY SILT, trace clay		0.76	2	50 DO	7					
					3	50 DO	5		MH			B: MH
2												
					4	50 DO	3					
3				108.23								
		Loose grey SILT		3.22	5	50 DO	4					A: Bentonite Seal; Granular Filter; 38mm PVC #10 Slot Screen
	B Casing	Grey mottled SILTY CLAY, occasional fine sand and silt seams		3.43								
4					6	50 DO	4					
				106.94								
		Loose grey SILT		106.73	7	50 DO	3					
		Grey SILTY CLAY with fine sand to silt seam between 4.57m and 4.72m depth		4.72								
5				105.87								
		End of Hole		5.58								
6												W.L. in Screen A at elev. 111.41m Screen B at elev. 111.36m Dec. 17, 1990
7												
8												
9												
10												
11												
12												
13												
14												
15												

DATA INPUT: Disk 5, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED: KAM

PROJECT: 901-2847

RECORD OF BOREHOLE 9

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.26&27,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE - METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
0	Hand Auger, N Casing	Ground Surface		112.52					
		TOPSOIL		0.00 / 0.09	1	50 DO	3		
		Loose brown fine SAND, some silt							
1				111.36	2	50 DO	5		
		Grey to brown SILTY CLAY (Weathered Crust)		1.16 / 1.31					
		Loose grey to brown SILT		110.69 / 1.83	3	50 DO	7		
2		Grey to brown SILTY CLAY, occasional fine sand and silt seams (Weathered Crust)							
					4	50 DO	3		
3				109.62 / 2.90					
	B Casing				5	50 DO	4		
4		Grey SILTY CLAY, some fine to coarse sand seams below 5.16m depth			6	50 DO	5		
5					7	50 DO	5		
					8	50 DO	8		
6				108.42					
		End of Hole		6.10					
7									
8									
9									
10									
11									
12									
13									
14									
15									

GAS CONCENTRATION ⊕ ( )

% LEL □

HYDRAULIC CONDUCTIVITY, k, cm/s

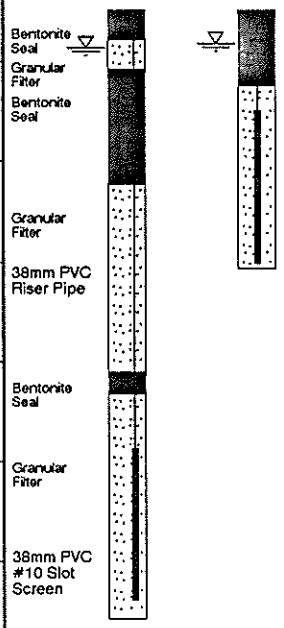
WATER CONTENT, PERCENT

Wp — W — Wl

20 40 60 80

INSTALLATIONS

A B



W.L. in Screen A at elev. 112.16m
Screen B at elev. 112.20m
Dec. 17, 1990

DATA INPUT: Disk 5, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED:

PROJECT: 901-2847

RECORD OF BOREHOLE 10

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.28,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
0	Hand Auger, N Casing	Ground Surface		112.55					
		Red brown PEAT with abundant wood fragments		0.00 / 112.10	1	DO	50 PM		
1		Loose brown SANDY SILT, trace clay		0.45 / 111.56	2	DO	50 5		
		Grey to brown SILTY CLAY, occasional fine sand to silt seams (Weathered Crust)		0.99	3	DO	50 2		
2				110.11	4	DO	50 8		
		Loose grey SILT, trace to some clay		2.44 / 109.59	5	DO	50 4		
3		Grey to brown SILTY CLAY, occasional silt seams (Weathered Crust)		2.96 / 109.20 / 3.35	6	DO	50 5		
4	B Casing	Grey SILTY CLAY, occasional silt seams, some organic mottling			7	DO	50 6		
5				107.06					
		End of Hole		5.49					
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

GAS CONCENTRATION ⊕ ( )

% LEL □

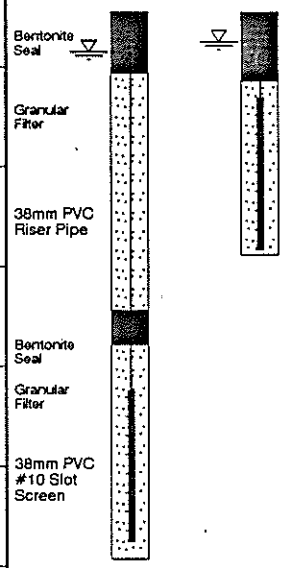
HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT

Wp W Wl

20 40 60 80

INSTALLATIONS



W.L. in Screen A at elev. 112.17m
Screen B at elev. 112.27m
Dec. 17, 1990

DATA INPUT: Disk S. STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED:

PROJECT: 901-2847

RECORD OF BOREHOLE 11

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.23,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING
		Ground Surface		112.25					
0	Hand Auger / N Casing	TOPSOIL		0.00					
		Grey brown mottled SILTY CLAY, trace fine sand (Weathered crust)		0.21	1	50 DO	3		
				111.27					
1		Red brown mottled SILTY CLAY, occasional silt nodule (Weathered Crust)		0.98	2	50 DO	6		
2					3	50 DO	2		
				109.58	4	50 DO	8		
		Loose grey SILT		2.67 / 109.28					
3	B Casing	Grey SILTY CLAY, occasional silt nodule		2.97	5	50 DO	3		
4					6	50 DO	5		
5				107.07	7	50 DO	6		
		End of Hole		5.18					
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

GAS CONCENTRATION ⊕ ( )

% LEL □

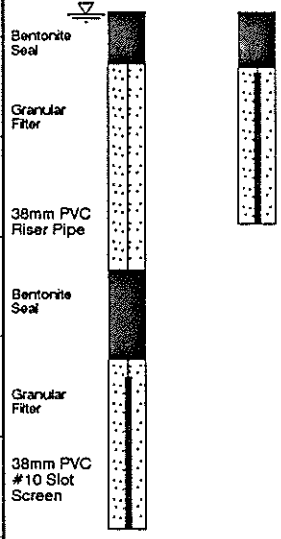
HYDRAULIC CONDUCTIVITY, k, cm/s

WATER CONTENT, PERCENT

Wp W Wl

20 40 60 80

INSTALLATIONS



W.L. in Screen A at elev. 112.24m
Screen B frozen Dec. 17, 1990

DATA INPUT: Dsk 5, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED:

PROJECT: 901-2847

RECORD OF BOREHOLE 12

SHEET 1 OF 1

LOCATION: See Figure 2

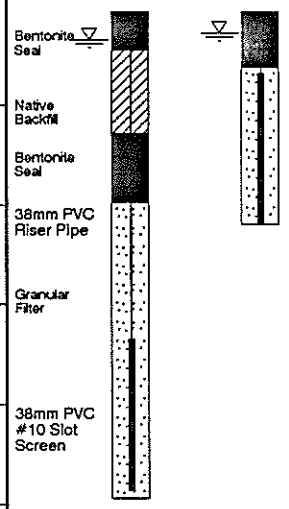
BORING DATE: Nov.23,1990

DATUM: GEODETIC

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	GAS CONCENTRATION ⊕ ( ) % LEL □	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl 20 40 60 80	INSTALLATIONS A B
0	B Casing	Ground Surface		112.93								
		TOPSOIL		0.00								
		Loose brown fine SAND, trace to some silt and clay, occasional gravel		0.12	1	DO	3					
				111.99	2	DO	3					
1				0.94								
	Hand Auger	Grey to brown SILTY CLAY (Weathered Crust)			3	DO	2					
2					4	DO	3					
				110.34								
	Open Hole			2.59								
3					5	DO	3					
		Grey SILTY CLAY, occasional silt nodule and fine to coarse sand seams			6	DO	3					
4												
					7	DO	4					
				108.05								
5		End of Hole		4.88								
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												



W.L. in Screen A at elev. 112.67m
Screen B at elev. 112.74m
Dec. 17, 1990

DATA INPUT: Disk 5, STEVER

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: S.Leighton

CHECKED:

PROJECT: 911-2888

LOCATION: See Figure 2

DIP:

RECORD OF BOREHOLE 13

BORING DATE: Nov.4,1991

SHEET 1 OF 1

DATUM: Geodetic

SAMPLER HAMMER, 63.5kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	ORGANIC VAPOUR ( ) ⊕ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl 20 40 60 80	INSTALLATIONS
0	Hand Auger Uncased	Ground Surface		112.92								
		TOPSOIL		0.13								
		Loose brown fine SAND, some silt		112.46	1	DO	50 4					
				0.46								
1		Grey to brown mottled SILTY CLAY, occasional fine sand seam (Weathered Crust)			2	DO	50 6					
					3	DO	50 2					
2				110.79								
		End of Hole		2.13								
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

INSTALLATIONS



W.L in Screen at Elev.112.33 Nov. 14, 1991

DATA INPUT: Disk 10, Steyer

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: K.A.M

CHECKED: KAM

PROJECT: 911-2888

RECORD OF BOREHOLE 14

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.5,1991

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	ORGANIC VAPOUR ( ) ⊕ 20 40 60 80	HYDRAULIC CONDUCTIVITY, K, cm/s / WATER CONTENT, PERCENT Wp W Wl 20 40 60 80	INSTALLATIONS
0	Hand Auger, N Casing	Ground Surface		111.97								
		Peaty TOPSOIL		0.00								
		Loose brown fine SAND, some silt		0.15 / 111.51	1	50 DO	3					Bentonite Seal
				0.46								
1		Grey to brown mottled SILTY CLAY, occasional silty sand seam (Weathered Crust)			2	50 DO	4					Granular Filter
2					3	50 DO	2					38mm PVC #10 Slot Screen
		End of Hole		109.69 / 2.28								W.L in Screen at Elev. 111.91 Nov. 14, 1991
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

DATA INPUT: Disk 10, Stever

DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: K.A.M

CHECKED: KAM

PROJECT: 911-2888

RECORD OF BOREHOLE 15

SHEET 1 OF 1

LOCATION: See Figure 2

BORING DATE: Nov.4,1991

DATUM: Geodetic

DIP:

SAMPLER HAMMER, 63.5kg; DROP, 760 mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	LAB. TESTING	ORGANIC VAPOUR ( ) ⊕ 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT, PERCENT Wp W Wl 20 40 60 80	INSTALLATIONS
0	Hand Auger Uncased	Ground Surface		112.35								
		Peaty TOPSOIL		0.00								
		Loose brown to orangish brown, fine SAND, occasional thin silty clay seam		0.15 / 111.59	1	50 DO	3					Bentonite Seal
1		Loose brown SILT, some clay		0.76 / 111.13	2	50 DO	8					Granular Filter
		Grey to brown SILTY CLAY, occasional sand seam (Weathered Crust)		1.22 / 110.15	3	50 DO	3					38mm PVC #10 Slot Screen
2		End of Hole		2.20								W.L. in Screen at Elev.112.19 Nov. 14, 1991
3												
4												
5												
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DATA INPUT: Disk 10, Stever

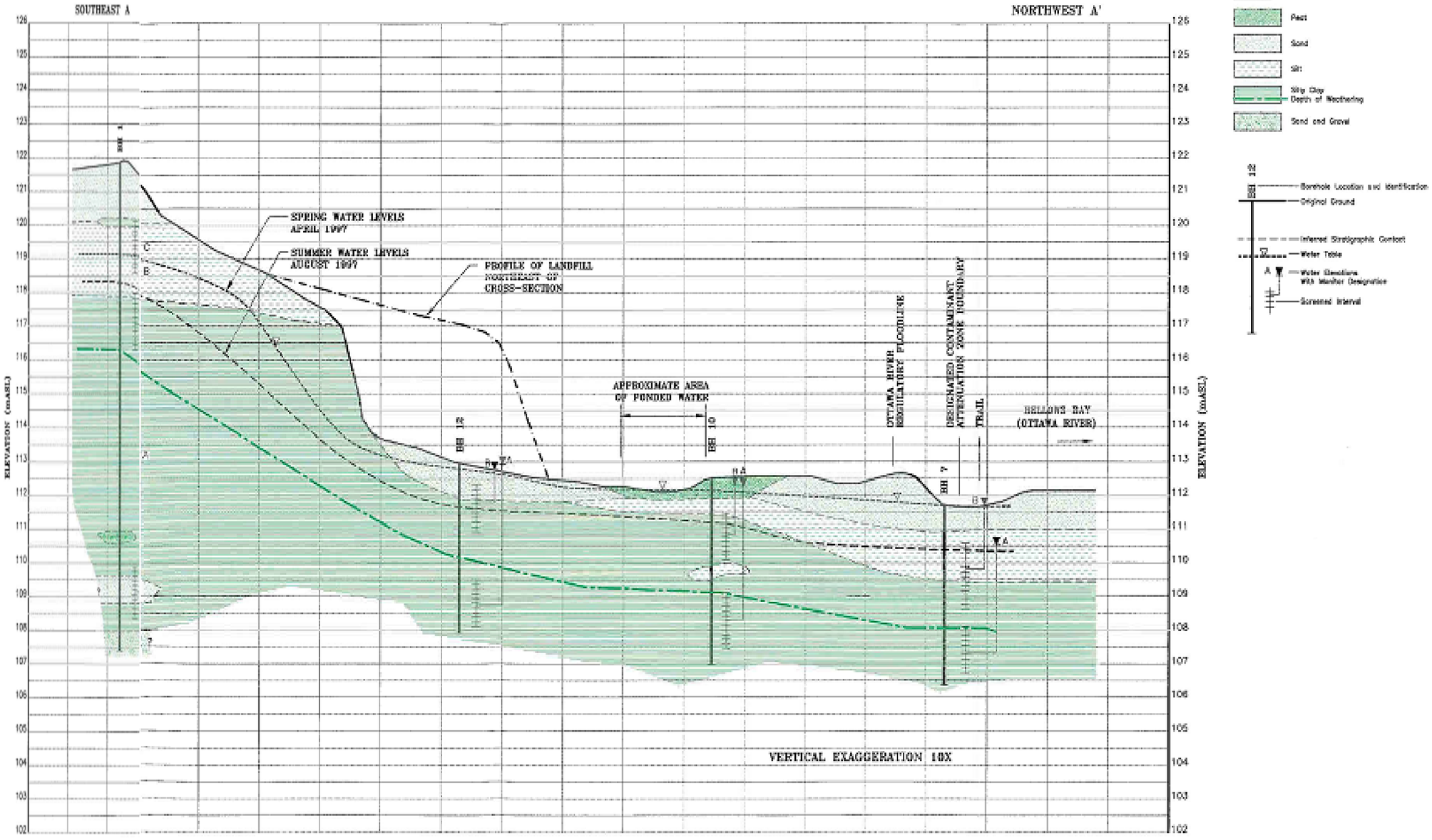
DEPTH SCALE (ALONG HOLE)

1 to 75

Golder Associates

LOGGED: K.A.M

CHECKED: KAM



Cross section courtesy of Gartner Lee; March 1997

Jp2g Consultants Inc.
ENGINEERS ■ PLANNERS ■ PROJECT MANAGERS

Westmeath WDS
Township of Whitewater Region

DRAWING TITLE	Cross Section
PROJECT NUMBER	2006048N
DATE	Mar-10
PLOT DATE	27-Feb-14

SCALE	NTS
DRAWN BY	AB
CHECKED BY	AB
DRAWING NO.	E1

Appendix F

Water Level Data

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
1A	122.58	121.69	28-Sep-90	10.43	112.15
	122.58	121.69	17-Dec-90	10.20	112.38
	122.58	121.69	14-Feb-91	10.20	112.38
	122.58	121.69	14-Nov-91	10.17	112.41
	122.58	121.69	18-Nov-92	9.90	112.68
	122.58	121.69	13-Nov-96	10.08	112.50
	122.58	121.69	28-Apr-97	9.50	113.08
	122.58	121.69	06-Aug-97	9.93	112.65
	122.58	121.69	30-Dec-97	10.18	112.40
	122.58	121.69	10-Feb-98	10.22	112.37
	122.58	121.69	28-Sep-98	10.22	112.36
	122.58	121.69	23-Nov-98	10.29	112.29
	122.58	121.69	13-Apr-99	9.86	112.73
	122.58	121.69	20-Sep-99	10.35	112.23
	122.58	121.69	01-Dec-99	10.15	112.43
	122.58	121.69	20-Apr-00	9.92	112.66
	122.58	121.69	14-Aug-00	10.14	112.44
	122.58	121.69	13-Jun-01	10.00	112.58
	122.58	121.69	07-Aug-01	10.28	112.30
	122.58	121.69	16-Sep-02	10.16	112.42
	122.58	121.69	28-Nov-02	10.37	112.21
	122.58	121.69	20-Aug-03	10.16	112.42
	122.58	121.69	27-Nov-03	9.85	112.73
	122.58	121.69	23-Aug-04	9.84	112.74
	122.58	121.69	01-Dec-04	10.08	112.50
	122.58	121.69	20-Sep-05	10.17	112.41
	122.58	121.69	07-Dec-05	10.10	112.48
	122.58	121.69	27-Sep-06	9.83	112.75
	122.58	121.69	08-Nov-06	9.67	112.91
	122.58	121.69	23-Oct-07	N/A	N/A
	122.58	121.69	21-Nov-08	9.96	112.62
	122.58	121.69	15-Oct-09	9.76	112.82
	122.58	121.69	30-Sep-10	10.16	112.42
	122.58	121.69	12-Jul-11	9.62	112.96
	122.58	121.69	13-Aug-12	10.04	112.54
	122.58	121.69	12-Aug-13	9.73	112.85
	122.58	121.69	10-Jul-14	9.55	113.03
	122.58	121.69	5-Aug-15	9.78	112.80
	122.58	121.69	24-Aug-16	9.72	112.86
	122.58	121.69	15-Aug-17	9.28	113.30
		121.69	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
1B	122.81	121.69	28-Sep-90	6.01	116.80
	122.81	121.69	17-Dec-90	4.63	118.18
	122.81	121.69	14-Feb-91	DRY	
	122.81	121.69	14-Nov-91	4.63	118.18
	122.81	121.69	18-Nov-92	4.06	118.75
	122.81	121.69	13-Nov-96	3.35	119.46
	122.81	121.69	28-Apr-97	4.26	118.55
	122.81	121.69	06-Aug-97	5.46	117.35
	122.81	121.69	30-Dec-97	5.26	117.55
	122.81	121.69	10-Feb-98	5.31	117.50
	122.81	121.69	28-Sep-98	5.54	117.28
	122.81	121.69	23-Nov-98	5.28	117.53
	122.81	121.69	13-Apr-99	4.24	118.57
	122.81	121.69	20-Sep-99	5.13	117.68
	122.81	121.69	01-Dec-99	4.21	118.60
	122.81	121.69	20-Apr-00	4.03	118.79
	122.81	121.69	14-Aug-00	4.64	118.17
	122.81	121.69	13-Jun-01	4.52	118.29
	122.81	121.69	07-Aug-01	5.13	117.68
	122.81	121.69	16-Sep-02	5.46	117.35
	122.81	121.69	28-Nov-02	5.67	117.14
	122.81	121.69	20-Aug-03	4.31	118.50
	122.81	121.69	27-Nov-03	3.74	119.07
	122.81	121.69	23-Aug-04	5.04	117.77
	122.81	121.69	01-Dec-04	4.42	118.39
	122.81	121.69	20-Sep-05	5.35	117.46
	122.81	121.69	07-Dec-05	4.13	118.68
	122.81	121.69	27-Sep-06	3.94	118.87
	122.81	121.69	08-Nov-06	3.92	118.89
	122.81	121.69	22-Oct-07	N/A	N/A
	122.81	121.69	21-Nov-08	4.58	118.23
	122.81	121.69	15-Oct-09	4.64	118.17
	122.81	121.69	30-Sep-10	5.31	117.50
	122.81	121.69	12-Jul-11	4.57	118.24
	122.81	121.69	13-Aug-12	5.33	117.48
	122.81	121.69	12-Aug-13	4.77	118.04
	122.81	121.69	10-Jul-14	4.38	118.43
	122.81	121.69	5-Aug-15	6.33	116.48
	122.81	121.69	24-Aug-16	5.30	117.51
	122.81	121.69	15-Aug-17	4.53	118.28
	122.81	121.69	16-Jul-18	4.86	117.95
	122.81	121.69	29-Aug-19	5.24	117.57
	122.81	121.69	11-Aug-20	5.37	117.44
	122.81	121.69	3-Aug-21	4.43	118.38
	122.81	121.69	22-Aug-22	5.29	117.52
	122.81	121.69	22-Aug-23	4.93	117.88
	122.81	121.69	6-Aug-24	5.24	117.57

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
1C	122.66	121.69	28-Sep-90	DRY	<118.4
	122.66	121.69	17-Dec-90	3.29	119.37
	122.66	121.69	14-Feb-91	DRY	<118.4
	122.66	121.69	14-Nov-91	3.48	119.18
	122.66	121.69	18-Nov-92	3.05	119.61
	122.66	121.69	13-Nov-96	3.54	119.12
	122.66	121.69	28-Apr-97	3.41	119.25
	122.66	121.69	06-Aug-97	DRY	<118.4
	122.66	121.69	30-Dec-97	DRY	<118.4
	122.66	121.69	10-Feb-98	DRY	<118.4
	122.66	121.69	28-Sep-98	DRY	<118.4
	122.66	121.69	23-Nov-98	DRY	<118.4
	122.66	121.69	13-Apr-99	3.40	119.26
	122.66	121.69	20-Sep-99	DRY	<118.4
	122.66	121.69	01-Dec-99	3.36	119.30
	122.66	121.69	20-Apr-00	3.13	119.53
	122.66	121.69	14-Aug-00	3.68	118.98
	122.66	121.69	13-Jun-01	3.57	119.09
	122.66	121.69	07-Aug-01	DRY	<118.4
	122.66	121.69	16-Sep-02	DRY	<118.4
	122.66	121.69	28-Nov-02	DRY	<118.4
	122.66	121.69	20-Aug-03	3.39	119.27
	122.66	121.69	27-Nov-03	2.78	119.88
	122.66	121.69	23-Aug-04	DRY	<118.4
	122.66	121.69	01-Dec-04	DRY	<118.4
	122.66	121.69	20-Sep-05	DRY	<118.4
	122.66	121.69	07-Dec-05	3.32	119.34
	122.66	121.69	27-Sep-06	2.98	119.68
	122.66	121.69	08-Nov-06	2.99	119.67
	122.66	121.69	22-Oct-07	N/A	N/A
	122.66	121.69	21-Nov-08	N/A	N/A
	122.66	121.69	15-Oct-09	N/A	N/A
	122.66	121.69	30-Sep-10	N/A	N/A
	122.81	121.69	12-Jul-11	4.57	118.24
	122.81	121.69	13-Aug-12	DRY	<118.4
	122.81	121.69	12-Aug-13	DRY	<118.4
	122.81	121.69	10-Jul-14	3.70	119.11
	122.81	121.69	5-Aug-15	DRY	<118.4
	122.81	121.69	24-Aug-16	DRY	<118.4
	122.81	121.69	15-Aug-17	4.00	118.81
		121.69	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
2A	114.44	113.32	28-Sep-90	2.53	111.91
	114.44	113.32	17-Dec-90	1.51	112.93
	114.44	113.32	14-Feb-91	1.50	112.94
	114.44	113.32	14-Nov-91	1.46	112.98
	114.44	113.32	18-Nov-92	1.29	113.15
	114.44	113.32	13-Nov-96	1.44	113.00
	114.44	113.32	28-Apr-97	1.19	113.25
	114.44	113.32	06-Aug-97	2.12	112.32
	114.44	113.32	30-Dec-97	1.49	112.95
	114.44	113.32	10-Feb-98	1.51	112.94
	114.44	113.32	28-Sep-98	2.33	112.11
	114.44	113.32	23-Nov-98	1.89	112.55
	114.44	113.32	13-Apr-99	1.39	113.06
	114.44	113.32	20-Sep-99	1.74	112.71
	114.44	113.32	01-Dec-99	1.43	113.02
	114.44	113.32	20-Apr-00	1.37	113.07
	114.44	113.32	14-Aug-00	1.51	112.93
	114.44	113.32	13-Jun-01	1.46	112.98
	114.44	113.32	07-Aug-01	2.07	112.37
	114.44	113.32	16-Sep-02	2.28	112.16
	114.44	113.32	28-Nov-02	2.22	112.22
	114.44	113.32	20-Aug-03	1.55	112.89
	114.44	113.32	27-Nov-03	1.32	113.12
	114.44	113.32	23-Aug-04	1.86	112.58
	114.44	113.32	01-Dec-04	1.49	112.95
	114.44	113.32	20-Sep-05	2.17	112.27
	114.44	113.32	07-Dec-05	1.46	112.98
	114.44	113.32	27-Sep-06	1.30	113.14
	114.44	113.32	08-Nov-06	1.21	113.23
	114.44	113.32	22-Oct-07	1.77	112.67
	114.44	113.32	21-Nov-08	1.48	112.96
	114.44	113.32	08-Oct-09	1.59	112.85
	114.44	113.32	30-Sep-10	2.23	112.21
	114.44	113.32	12-Jul-11	1.53	112.91
	114.44	113.32	13-Aug-12	2.26	112.18
	114.44	113.32	12-Aug-13	1.86	112.58
	114.44	113.32	10-Jul-14	1.49	112.95
	114.44	113.32	5-Aug-15	2.02	112.42
	114.44	113.32	24-Aug-16	2.08	112.36
	114.44	113.32	15-Aug-17	1.35	113.09
		113.32	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
2B	114.30	113.32	28-Sep-90	2.49	111.81
	114.30	113.32	17-Dec-90	FROZEN	
	114.30	113.32	14-Feb-91	FROZEN	
	114.30	113.32	14-Nov-91	1.00	113.30
	114.30	113.32	18-Nov-92	0.90	113.40
	114.30	113.32	13-Nov-96	1.12	113.19
	114.30	113.32	28-Apr-97	1.16	113.14
	114.30	113.32	06-Aug-97	2.70	111.60
	114.30	113.32	30-Dec-97	1.14	113.17
	114.30	113.32	10-Feb-98	FROZEN	
	114.30	113.32	28-Sep-98	2.19	112.11
	114.30	113.32	23-Nov-98	1.70	112.60
	114.30	113.32	13-Apr-99	1.07	113.23
	114.30	113.32	20-Sep-99	1.66	112.64
	114.30	113.32	01-Dec-99	1.10	113.20
	114.30	113.32	20-Apr-00	1.15	113.15
	114.30	113.32	14-Aug-00	1.34	112.96
	114.30	113.32	13-Jun-01	1.38	112.92
	114.44	113.32	07-Aug-01	2.07	112.37
	114.44	113.32	16-Sep-02	2.61	111.83
	114.44	113.32	28-Nov-02	2.33	112.11
	114.44	113.32	20-Aug-03	1.65	112.79
	114.44	113.32	27-Nov-03	1.26	113.18
	114.44	113.32	23-Aug-04	2.33	112.11
	114.44	113.32	01-Dec-04	1.37	113.07
	114.44	113.32	20-Sep-05	2.57	111.87
	114.44	113.32	07-Dec-05	1.46	112.98
	114.44	113.32	27-Sep-06	1.34	113.10
	114.44	113.32	08-Nov-06	1.31	113.13
	114.44	113.32	22-Oct-07	2.08	112.36
	114.44	113.32	21-Nov-08	1.64	112.80
	114.44	113.32	08-Oct-09	1.76	112.68
	114.44	113.32	30-Sep-10	2.68	111.76
	114.44	113.32	12-Jul-11	1.81	112.63
	114.44	113.32	13-Aug-12	2.99	111.45
	114.44	113.32	12-Aug-13	2.63	111.81
	114.44	113.32	10-Jul-14	2.10	112.34
	114.44	113.32	5-Aug-15	2.91	111.53
	114.44	113.32	24-Aug-16	3.04	111.40
	114.44	113.32	15-Aug-17	2.22	112.22
		113.32	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
3A	113.86	112.80	28-Sep-90	2.29	111.57
	113.86	112.80	17-Dec-90	1.44	112.42
	113.86	112.80	14-Feb-91	1.52	112.34
	113.86	112.80	14-Nov-91	1.47	112.39
	113.86	112.80	18-Nov-92	1.24	112.62
			13-Nov-96	DESTROYED	
3B	113.84	112.80	28-Sep-90	2.40	111.44
	113.84	112.80	17-Dec-90	1.26	112.58
	113.84	112.80	14-Feb-91	1.38	112.46
	113.84	112.80	14-Nov-91	1.32	112.52
	113.84	112.80	18-Nov-92	1.06	112.78
			13-Nov-96	DESTROYED	
4A	111.85	111.28	28-Sep-90	2.43	109.42
	111.85	111.28	17-Dec-90	0.96	110.89
	111.85	111.28	14-Feb-91	0.82	111.03
	111.85	111.28	14-Nov-91	1.32	110.53
	111.85	111.28	18-Nov-92	0.65	111.20
	111.85	111.28	13-Nov-96	0.80	111.05
	111.85	111.28	28-Apr-97	0.57	111.28
	111.85	111.28	06-Aug-97	2.00	109.85
	111.85	111.28	30-Dec-97	0.87	110.98
	111.85	111.28	10-Feb-98	0.72	111.14
	111.85	111.28	28-Sep-98	2.09	109.76
	111.85	111.28	23-Nov-98	1.53	110.32
	111.85	111.28	13-Apr-99	0.64	111.22
	111.85	111.28	20-Sep-99	1.69	110.16
	111.85	111.28	01-Dec-99	0.63	111.22
	111.85	111.28	20-Apr-00	0.63	111.23
	111.85	111.28	14-Aug-00	1.19	110.66
	111.85	111.28	13-Jun-01	1.02	110.83
	111.85	111.28	07-Aug-01	1.80	110.05
	111.85	111.28	16-Sep-02	2.41	109.44
	111.85	111.28	28-Nov-02	1.90	109.95
	111.85	111.28	20-Aug-03	1.19	110.66
	111.85	111.28	27-Nov-03	0.62	111.23
	111.85	111.28	23-Aug-04	1.76	110.09
	111.85	111.28	01-Dec-04	0.74	111.11
	111.85	111.28	20-Sep-05	2.17	109.68
	111.85	111.28	07-Dec-05	0.73	111.12
	111.85	111.28	27-Sep-06	0.64	111.21
	111.85	111.28	08-Nov-06	1.12	110.73
	111.85	111.28	22-Oct-07	1.47	110.38
	111.85	111.28	21-Nov-08	0.69	111.16
	111.85	111.28	08-Oct-09	Destroyed	Destroyed
Repaired	111.85	111.28	10-Jul-14	1.30	110.55
	111.85	111.28	5-Aug-15	1.56	110.29
	111.85	111.28	24-Aug-16	2.00	109.85
	111.85	111.28	15-Aug-17	1.36	110.49
	111.85	111.28	16-Jul-18	1.73	110.12
	111.85	111.28	29-Aug-19	1.95	109.90
	111.85	111.28	11-Aug-20	1.62	110.23
	111.85	111.28	3-Aug-21	0.85	111.00
	111.85	111.28	22-Aug-22	1.57	110.28
	111.85	111.28	22-Aug-23	1.36	110.49
	111.85	111.28	6-Aug-24	1.84	110.01

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
4B	112.27	111.28	28-Sep-90	DRY	<109.7
	112.27	111.28	17-Dec-90	1.35	110.92
	112.27	111.28	14-Feb-91	1.20	111.07
	112.27	111.28	14-Nov-91	1.71	110.56
	112.27	111.28	18-Nov-92	0.97	111.30
	112.27	111.28	13-Nov-96	1.20	111.07
	112.27	111.28	28-Apr-97	1.03	111.24
	112.27	111.28	06-Aug-97	DRY	<109.7
	112.27	111.28	30-Dec-97	1.31	110.96
	112.27	111.28	10-Feb-98	1.18	111.09
	112.27	111.28	28-Sep-98	DRY	<109.7
	112.27	111.28	23-Nov-98	2.00	110.27
	112.27	111.28	13-Apr-99	1.09	111.18
	112.27	111.28	20-Sep-99	2.17	110.11
	112.27	111.28	01-Dec-99	1.10	111.17
	112.27	111.28	20-Apr-00	1.24	111.03
	112.27	111.28	14-Aug-00	1.74	110.53
	112.27	111.28	13-Jun-01	1.58	110.69
	112.27	111.28	07-Aug-01	2.29	109.98
	112.27	111.28	16-Sep-02	DRY	<109.7
	112.27	111.28	28-Nov-02	2.28	109.99
	112.27	111.28	20-Aug-03	1.74	110.53
	112.27	111.28	27-Nov-03	1.12	111.15
	112.27	111.28	23-Aug-04	DRY	<109.7
	112.27	111.28	01-Dec-04	1.18	111.09
	112.27	111.28	20-Sep-05	DRY	<109.7
	112.27	111.28	07-Dec-05	1.25	111.02
	112.27	111.28	27-Sep-06	1.19	111.08
	111.85	111.28	22-Oct-07	2.03	109.82
	111.85	111.28	21-Nov-08	1.24	110.61
	111.85	111.28	08-Oct-09	1.55	110.30
	111.85	111.28	30-Aug-10	2.80	109.05
	111.85	111.28	12-Jul-11	Destroyed	Destroyed
Repaired	111.92	111.28	10-Jul-14	1.56	110.36
	111.92	111.28	5-Aug-15	1.81	110.11
	111.92	111.28	24-Aug-16	1.83	110.09
	111.92	111.28	15-Aug-17	1.64	110.28
	111.92	111.28	16-Jul-18	DRY	<109.7
	111.92	111.28	29-Aug-19	DRY	<109.7
	111.92	111.28	11-Aug-20	1.84	110.08
	111.92	111.28	3-Aug-21	0.91	111.01
	111.92	111.28	22-Aug-22	1.81	110.11
	111.92	111.28	22-Aug-23	1.62	110.30
	111.92	111.28	6-Aug-24	1.83	110.09

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
5A	112.48	111.75	28-Sep-90	4.37	108.11
	112.48	111.75	17-Dec-90	1.33	111.15
	112.48	111.75	14-Feb-91	1.24	111.24
	112.48	111.75	14-Nov-91	1.62	110.86
	112.48	111.75	18-Nov-92	1.04	111.44
	112.48	111.75	13-Nov-96	1.37	111.12
	112.48	111.75	28-Apr-97	1.00	111.48
	112.48	111.75	06-Aug-97	1.74	110.74
	112.48	111.75	30-Dec-97	1.24	111.24
	112.48	111.75	10-Feb-98	1.20	111.28
	112.48	111.75	28-Sep-98	2.00	110.48
	112.48	111.75	23-Nov-98	1.63	110.85
	112.48	111.75	13-Apr-99	1.20	111.28
	112.48	111.75	20-Sep-99	1.76	110.72
	112.48	111.75	01-Dec-99	1.06	111.42
	112.48	111.75	20-Apr-00	1.05	111.44
	112.48	111.75	14-Aug-00	1.31	111.17
	112.48	111.75	13-Jun-01	1.13	111.35
	112.48	111.75	07-Aug-01	1.63	110.85
	112.48	111.75	16-Sep-02	2.10	110.38
	112.48	111.75	28-Nov-02	2.07	110.41
	112.48	111.75	20-Aug-03	1.40	111.08
	112.48	111.75	27-Nov-03	1.01	111.47
	112.48	111.75	23-Aug-04	1.53	110.95
	112.48	111.75	01-Dec-04	1.27	111.21
	112.48	111.75	20-Sep-05	1.97	110.51
	112.48	111.75	07-Dec-05	1.29	111.19
	112.48	111.75	27-Sep-06	1.15	111.33
	112.48	111.75	08-Nov-06	0.93	111.55
	112.48	111.75	22-Oct-07	1.60	110.88
	112.48	111.75	21-Nov-08	1.70	110.78
	112.48	111.75	08-Oct-09	casing damaged	
	112.48	111.75	30-Sep-10	1.38	111.10
Repaired at Surface	111.75	111.75	12-Jul-11	0.61	111.14
	111.75	111.75	13-Aug-12	1.43	110.32
	111.75	111.75	12-Aug-13	0.70	111.05
	111.75	111.75	10-Jul-14	0.43	111.32
	111.75	111.75	5-Aug-15	0.76	110.99
	111.75	111.75	24-Aug-16	0.95	110.80
	111.75	111.75	15-Aug-17	0.41	111.34
		111.75	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
5B	112.16	111.75	28-Sep-90	DRY	<111.4
	112.16	111.75	17-Dec-90	0.95	111.21
	112.16	111.75	14-Feb-91	0.67	111.49
	112.16	111.75	14-Nov-91	1.36	110.80
	112.16	111.75	18-Nov-92	0.59	111.57
	112.16	111.75	13-Nov-96	0.67	111.49
	112.16	111.75	28-Apr-97	0.48	111.68
	112.16	111.75	06-Aug-97	DRY	<111.4
	112.16	111.75	30-Dec-97	0.84	111.32
	112.16	111.75	10-Feb-98	0.69	111.47
	112.16	111.75	28-Sep-98	1.72	110.44
	112.16	111.75	23-Nov-98	1.28	110.88
	112.16	111.75	13-Apr-99	0.57	111.59
	112.16	111.75	20-Sep-99	1.59	110.57
	112.16	111.75	01-Dec-99	0.60	111.56
	112.16	111.75	20-Apr-00	FROZEN @ 0.60	
	112.16	111.75	14-Aug-00	1.21	110.95
	112.16	111.75	13-Jun-01	1.11	111.05
	112.16	111.75	07-Aug-01	1.73	110.43
	112.16	111.75	16-Sep-02	DRY	<111.4
	112.16	111.75	28-Nov-02	1.73	110.43
	112.16	111.75	20-Aug-03	1.23	110.93
	112.16	111.75	27-Nov-03	0.59	111.57
	112.16	111.75	23-Aug-04	1.69	110.47
	112.16	111.75	01-Dec-04	0.60	111.56
	112.16	111.75	20-Sep-05	2.03	110.13
	112.16	111.75	07-Dec-05	0.72	111.44
	112.16	111.75	27-Sep-06	0.61	111.55
	112.16	111.75	08-Nov-06	0.54	111.62
	112.16	111.75	22-Oct-07	1.30	110.86
	112.16	111.75	21-Nov-08	0.66	111.50
	112.16	111.75	08-Oct-09	0.78	111.38
	112.16	111.75	30-Sep-10	casing damaged	
Repaired	112.16	111.75	12-Jul-11	0.80	111.36
	112.16	111.75	13-Aug-12	1.95	110.21
	112.16	111.75	12-Aug-13	1.53	110.63
	112.16	111.75	10-Jul-14	1.47	110.69
	112.16	111.75	5-Aug-15	1.64	110.52
	112.16	111.75	24-Aug-16	1.64	110.52
	112.16	111.75	15-Aug-17	1.52	110.64
		111.75	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
6A	114.11	113.20	17-Dec-90	FROZEN	
	114.11	113.20	14-Feb-91	1.26	112.85
	114.11	113.20	14-Nov-91	1.23	112.88
	114.11	113.20	18-Nov-92	1.01	113.10
	114.11	113.20	13-Nov-96	1.34	112.77
	114.11	113.20	28-Apr-97	1.05	113.06
	114.11	113.20	06-Aug-97	2.37	111.74
	114.11	113.20	30-Dec-97	1.43	112.69
	114.11	113.20	10-Feb-98	1.32	112.80
	114.11	113.20	28-Sep-98	2.73	111.38
	114.11	113.20	23-Nov-98	1.96	112.15
	114.11	113.20	13-Apr-99	1.14	112.97
	114.11	113.20	20-Sep-99	1.96	112.15
	114.11	113.20	01-Dec-99	1.16	112.96
	114.11	113.20	20-Apr-00	1.24	112.87
	114.11	113.20	14-Aug-00	1.57	112.54
	114.11	113.20	13-Jun-01	1.28	112.83
	114.11	113.20	07-Aug-01	2.17	111.94
	114.11	113.20	16-Sep-02	2.75	111.36
	114.11	113.20	28-Nov-02	3.90	110.21
	114.11	113.20	20-Aug-03	1.40	112.71
	114.11	113.20	27-Nov-03	1.07	113.04
	114.11	113.20	23-Aug-04	2.07	112.04
	114.11	113.20	01-Dec-04	1.19	112.92
	114.11	113.20	20-Sep-05	2.58	111.53
	114.11	113.20	07-Dec-05	1.21	112.90
	114.11	113.20	27-Sep-06	1.13	112.98
	114.11	113.20	08-Nov-06	1.08	113.03
	114.11	113.20	22-Oct-07	N/A	N/A
	114.11	113.20	21-Nov-08	1.18	112.93
	114.11	113.20	08-Oct-09	1.47	112.64
	114.11	113.20	30-Sep-10	2.26	111.85
	114.11	113.20	12-Jul-11	1.45	112.66
	114.11	113.20	13-Aug-12	2.74	111.37
	114.11	113.20	12-Aug-13	1.98	112.13
	114.11	113.20	10-Jul-14	1.87	112.24
	114.11	113.20	5-Aug-15	2.63	111.48
	114.11	113.20	24-Aug-16	2.35	111.76
	114.11	113.20	15-Aug-17	1.73	112.38
		113.20	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
6B	114.02	113.20	17-Dec-90	FROZEN	
	114.02	113.20	14-Feb-91	FROZEN	
	114.02	113.20	14-Nov-91	0.96	113.06
	114.02	113.20	18-Nov-92	0.90	113.12
	114.02	113.20	13-Nov-96	1.22	112.80
	114.02	113.20	28-Apr-97	1.07	112.95
	114.02	113.20	06-Aug-97	DRY	<111.37
	114.02	113.20	30-Dec-97	1.44	112.58
	114.02	113.20	10-Feb-98	FROZEN	
	114.02	113.20	28-Sep-98	DRY	<111.37
	114.02	113.20	23-Nov-98	2.00	112.02
	114.02	113.20	13-Apr-99	1.15	112.87
	114.02	113.20	20-Sep-99	2.13	111.90
	114.02	113.20	01-Dec-99	1.26	112.77
	114.02	113.20	20-Apr-00	1.20	112.82
	114.02	113.20	14-Aug-00	1.87	112.15
	114.02	113.20	13-Jun-01	1.62	112.40
	114.02	113.20	07-Aug-01	2.48	111.54
	114.02	113.20	16-Sep-02	DRY	<111.37
	114.02	113.20	28-Nov-02	DRY	<111.37
	114.02	113.20	20-Aug-03	1.81	112.21
	114.02	113.20	27-Nov-03	1.19	112.83
	114.02	113.20	23-Aug-04	DRY	<111.37
	114.02	113.20	01-Dec-04	1.22	112.80
	114.02	113.20	20-Sep-05	DRY	<111.37
	114.02	113.20	07-Dec-05	1.34	112.68
	114.02	113.20	27-Sep-06	1.24	112.78
	114.02	113.20	08-Nov-06	1.22	112.80
	114.02	113.20	22-Oct-07	N/A	N/A
	114.02	113.20	21-Nov-08	1.48	112.54
	114.02	113.20	08-Oct-09	1.42	112.60
	114.02	113.20	30-Sep-10	2.19	111.83
	114.02	113.20	12-Jul-11	1.45	112.57
	114.02	113.20	13-Aug-12	DRY	<111.37
	114.02	113.20	12-Aug-13	DRY	<111.37
	114.02	113.20	10-Jul-14	2.04	111.98
	114.02	113.20	5-Aug-15	DRY	<111.37
	114.02	113.20	24-Aug-16	DRY	<111.37
	114.02	113.20	15-Aug-17	DRY	<111.37
		113.20	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
7A	112.67	111.66	17-Dec-90	1.22	111.45
	112.67	111.66	14-Feb-91	1.11	111.56
	112.67	111.66	14-Nov-91	1.42	111.25
	112.67	111.66	18-Nov-92	0.93	111.74
	112.67	111.66	13-Nov-96	1.02	111.65
	112.67	111.66	28-Apr-97	0.98	111.69
	112.67	111.66	06-Aug-97	2.14	110.53
	112.67	111.66	30-Dec-97	1.15	111.52
	112.67	111.66	10-Feb-98	1.10	111.57
	112.67	111.66	28-Sep-98	1.71	110.96
	112.67	111.66	23-Nov-98	1.15	111.52
	112.67	111.66	13-Apr-99	1.04	111.63
	112.67	111.66	20-Sep-99	1.48	111.19
	112.67	111.66	01-Dec-99	1.05	111.63
	112.67	111.66	20-Apr-00	Frozen @ 1.06	
	112.67	111.66	14-Aug-00	1.26	111.41
	112.67	111.66	13-Jun-01	1.29	111.38
	112.67	111.66	07-Aug-01	1.95	110.72
	112.67	111.66	16-Sep-02	2.46	110.21
	112.67	111.66	28-Nov-02	1.86	110.81
	112.67	111.66	20-Aug-03	1.45	111.22
	112.67	111.66	27-Nov-03	1.02	111.65
	112.67	111.66	23-Aug-04	1.82	110.85
	112.67	111.66	01-Dec-04	1.06	111.61
	112.67	111.66	20-Sep-05	2.07	110.60
	112.67	111.66	07-Dec-05	1.09	111.58
	112.67	111.66	27-Sep-06	1.03	111.64
	112.67	111.66	08-Nov-06	1.00	111.67
	112.67	111.66	23-Oct-07	1.23	111.44
	112.67	111.66	21-Nov-08	1.70	110.97
	112.67	111.66	08-Oct-09	0.43	112.24
	112.67	111.66	30-Sep-10	0.69	111.98
	112.67	111.66	12-Jul-11	1.27	111.40
	112.67	111.66	13-Aug-12	2.47	110.20
	112.67	111.66	12-Aug-13	1.73	110.94
	112.67	111.66	10-Jul-14	1.61	111.06
	112.67	111.66	5-Aug-15	1.89	110.78
	112.67	111.66	24-Aug-16	1.91	110.76
	112.67	111.66	15-Aug-17	1.68	110.99
	112.67	111.66	16-Jul-18	2.07	110.60
	112.67	111.66	29-Aug-19	2.29	110.38
	112.67	111.66	11-Aug-20	1.98	110.69
	112.67	111.66	3-Aug-21	1.08	111.59
	112.67	111.66	22-Aug-22	2.00	110.67
	112.67	111.66	22-Aug-23	Not Meassured	--
	112.67	111.66	6-Aug-24	1.97	110.70

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
7B	111.99	111.66	17-Dec-90		111.43
	111.99	111.66	14-Feb-91		111.58
	111.99	111.66	14-Nov-91		111.25
	111.99	111.66	18-Nov-92	0.95	111.72
	111.99	111.66	13-Nov-96	0.32	111.67
	111.99	111.66	28-Apr-97	0.28	111.71
	111.99	111.66	06-Aug-97	1.58	110.41
	111.22	111.66	30-Dec-97	0.46	110.77
	111.22	111.66	10-Feb-98	0.43	110.79
	111.22	111.66	28-Sep-98	1.41	109.81
	111.22	111.66	23-Nov-98	0.64	110.58
	111.22	111.66	13-Apr-99	0.34	110.89
	111.22	111.66	20-Sep-99	0.90	110.32
	111.22	111.66	01-Dec-99	0.39	110.83
	111.22	111.66	20-Apr-00	FROZEN @ 0.39	
	111.22	111.66	14-Aug-00	0.70	110.52
	111.22	111.66	13-Jun-01	0.77	110.45
	111.22	111.66	07-Aug-01	1.41	109.81
	111.22	111.66	16-Sep-02	1.90	109.32
	111.22	111.66	28-Nov-02	1.28	109.94
	111.22	111.66	20-Aug-03	0.85	110.37
	111.22	111.66	27-Nov-03	0.37	110.85
	111.22	111.66	23-Aug-04	1.33	109.89
	111.22	111.66	01-Dec-04	0.52	110.70
	111.22	111.66	20-Sep-05	1.45	109.77
	111.22	111.66	07-Dec-05	0.38	110.84
	111.22	111.66	27-Sep-06	0.40	110.82
	111.22	111.66	08-Nov-06	0.35	110.87
	111.22	111.66	23-Oct-07	0.48	110.74
	111.22	111.66	21-Nov-08	0.44	110.78
	111.22	111.66	08-Oct-09	1.14	110.08
	111.22	111.66	30-Sep-10	0.97	110.25
	111.22	111.66	12-Jul-11	0.50	110.72
	111.22	111.66	13-Aug-12	1.63	109.59
	111.22	111.66	12-Aug-13	1.32	109.90
	111.22	111.66	10-Jul-14	1.27	109.95
	111.22	111.66	5-Aug-15	1.45	109.77
	111.22	111.66	24-Aug-16	1.43	109.79
	111.22	111.66	15-Aug-17	1.29	109.93
	111.22	111.66	16-Jul-18	1.62	109.60
	111.22	111.66	29-Aug-19	1.83	109.39
	111.22	111.66	11-Aug-20	1.45	109.77
	111.22	111.66	3-Aug-21	0.52	110.70
	111.22	111.66	22-Aug-22	1.55	109.67
	111.22	111.66	22-Aug-23	Not Meassured	--
	111.22	111.66	6-Aug-24	1.44	109.78

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
8A	112.43	111.45	17-Dec-90	1.02	111.41
	112.43	111.45	14-Feb-91	0.98	111.45
	112.43	111.45	14-Nov-91	1.01	111.42
	112.43	111.45	18-Nov-92	0.91	111.52
	112.43	111.45	13-Nov-96	0.97	111.46
	112.43	111.45	28-Apr-97	0.90	111.53
	112.43	111.45	06-Aug-97	2.10	110.33
	112.43	111.45	30-Dec-97	1.05	111.38
	112.43	111.45	10-Feb-98	FROZEN	
	112.43	111.45	28-Sep-98	1.22	111.21
	112.43	111.45	23-Nov-98	1.01	111.42
	112.43	111.45	13-Apr-99	0.95	111.48
	112.43	111.45	20-Sep-99	1.48	110.96
	112.43	111.45	01-Dec-99	1.02	111.41
	112.43	111.45	20-Apr-00	0.98	111.45
	112.43	111.45	14-Aug-00	1.24	111.19
	112.43	111.45	13-Jun-01	1.26	111.17
	112.43	111.45	07-Aug-01	2.05	110.38
	112.43	111.45	16-Sep-02	2.49	109.94
	112.43	111.45	28-Nov-02	1.48	110.95
	112.43	111.45	20-Aug-03	1.38	111.05
	112.43	111.45	27-Nov-03	0.97	111.46
	112.43	111.45	23-Aug-04	1.80	110.63
	112.43	111.45	01-Dec-04	0.96	111.47
	112.43	111.45	20-Sep-05	2.12	110.31
	112.43	111.45	07-Dec-05	1.19	111.24
	112.43	111.45	27-Sep-06	0.99	111.44
	112.43	111.45	08-Nov-06	0.96	111.47
	112.43	111.45	23-Oct-07	1.49	110.94
	112.43	111.45	21-Nov-08	1.20	111.23
	112.43	111.45	08-Oct-09	1.16	111.27
	112.43	111.45	30-Sep-10	Casing Destroyed	
Repaired	112.43	111.45	12-Jul-11	1.02	111.41
	112.43	111.45	13-Aug-12	1.90	110.53
	112.43	111.45	12-Aug-13	1.67	110.76
	112.43	111.45	10-Jul-14	1.54	110.89
	112.43	111.45	5-Aug-15	1.89	110.54
	112.43	111.45	24-Aug-16	1.42	111.01
	112.43	111.45	15-Aug-17	1.41	111.02
	112.43	111.45	16-Jul-18	1.98	110.45
	112.43	111.45	29-Aug-19	2.27	110.16
	112.43	111.45	11-Aug-20	1.79	110.64
	112.43	111.45	3-Aug-21	1.06	111.37
	112.43	111.45	22-Aug-22	1.95	110.48
	112.43	111.45	22-Aug-23	1.56	110.87
	112.43	111.45	6-Aug-24	1.82	110.61

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
8B	112.62	111.45	17-Dec-90	1.26	111.36
	112.62	111.45	14-Feb-91	1.23	111.39
	112.62	111.45	14-Nov-91	1.20	111.42
	112.62	111.45	18-Nov-92	1.13	111.49
	112.62	111.45	13-Nov-96	1.20	111.42
	112.62	111.45	28-Apr-97	1.14	111.48
	112.62	111.45	06-Aug-97	2.42	110.20
	112.62	111.45	30-Dec-97	1.29	111.34
	112.62	111.45	10-Feb-98	FROZEN	
	112.62	111.45	28-Sep-98	1.38	111.24
	112.49	111.45	23-Nov-98	1.09	111.40
	112.49	111.45	13-Apr-99	1.04	111.46
	112.49	111.45	20-Sep-99	1.61	110.88
	112.49	111.45	01-Dec-99	1.13	111.37
	112.49	111.45	20-Apr-00	1.14	111.35
	112.49	111.45	14-Aug-00	1.39	111.10
	112.49	111.45	13-Jun-01	1.40	111.09
	112.49	111.45	07-Aug-01	2.24	110.25
	112.49	111.45	16-Sep-02	2.68	109.81
	112.49	111.45	28-Nov-02	1.62	110.87
	112.49	111.45	20-Aug-03	1.57	110.92
	112.49	111.45	27-Nov-03	1.12	111.37
	112.49	111.45	23-Aug-04	2.01	110.48
	112.49	111.45	01-Dec-04	1.10	111.39
	112.49	111.45	20-Sep-05	2.29	110.20
	112.49	111.45	07-Dec-05	1.05	111.44
	112.49	111.45	27-Sep-06	1.14	111.35
	112.49	111.45	08-Nov-06	1.09	111.40
	112.49	111.45	23-Oct-07	1.00	111.49
	112.49	111.45	21-Nov-08	1.05	111.44
	112.49	111.45	08-Oct-09	1.00	111.49
	112.49	111.45	30-Sep-10	1.00	111.49
Repaired	111.55	111.45	12-Jul-11	0.17	111.38
At Surface	111.55	111.45	13-Aug-12	1.06	110.49
	111.55	111.45	12-Aug-13	0.93	110.62
	111.55	111.45	10-Jul-14	0.83	110.72
	111.55	111.45	5-Aug-15	1.12	110.43
	111.55	111.45	24-Aug-16	0.61	110.94
	111.55	111.45	15-Aug-17	0.67	110.88
	111.55	111.45	16-Jul-18	1.21	110.34
	111.55	111.45	29-Aug-19	1.51	110.04
	111.55	111.45	11-Aug-20	0.94	110.61
	111.55	111.45	3-Aug-21	0.22	111.33
	111.55	111.45	22-Aug-22	1.11	110.44
	111.55	111.45	22-Aug-23	0.74	110.81
	111.55	111.45	6-Aug-24	1.02	110.53

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
9A	113.47	112.52	17-Dec-90	1.31	112.16
	113.47	112.52	14-Feb-91	1.33	112.14
	113.47	112.52	14-Nov-91	1.34	112.13
	113.47	112.52	18-Nov-92	1.11	112.36
	113.47	112.52	13-Nov-96	1.27	112.21
	113.47	112.52	28-Apr-97	0.98	112.49
	113.47	112.52	06-Aug-97	1.56	111.91
	113.47	112.52	30-Dec-97	1.37	112.10
	113.47	112.52	10-Feb-98	1.40	112.08
	113.47	112.52	28-Sep-98	1.54	111.94
	113.47	112.52	23-Nov-98	1.43	112.04
	113.47	112.52	13-Apr-99	1.15	112.32
	113.47	112.52	20-Sep-99	1.57	111.90
	113.47	112.52	01-Dec-99	1.31	112.17
	113.47	112.52	20-Apr-00	1.20	112.27
	113.47	112.52	14-Aug-00	1.42	112.05
	113.47	112.52	13-Jun-01	1.33	112.14
	113.47	112.52	07-Aug-01	1.75	111.72
	113.47	112.52	16-Sep-02	1.79	111.68
	113.47	112.52	28-Nov-02	1.66	111.81
	113.47	112.52	20-Aug-03	1.45	112.02
	113.47	112.52	27-Nov-03	1.16	112.31
	113.47	112.52	23-Aug-04	1.46	112.01
	113.47	112.52	01-Dec-04	1.26	112.21
	113.47	112.52	20-Sep-05	1.73	111.74
	113.47	112.52	07-Dec-05	1.32	112.15
	113.47	112.52	27-Sep-06	1.17	112.30
	113.47	112.52	08-Nov-06	1.08	112.39
	113.47	112.52	22-Oct-07	1.28	112.19
	113.47	112.52	21-Nov-08	1.24	112.23
	113.47	112.52	08-Oct-09	1.19	112.28
	113.47	112.52	30-Sep-10	Casing Destroyed	
Repaired	112.72	112.52	12-Jul-11	0.40	112.32
0.20 above	112.72	112.52	13-Aug-12	0.95	111.77
Surface	112.72	112.52	12-Aug-13	0.62	112.10
	112.72	112.52	10-Jul-14	0.48	112.24
	112.72	112.52	5-Aug-15	0.70	112.02
	112.72	112.52	24-Aug-16	0.57	112.15
	112.72	112.52	15-Aug-17	0.37	112.35
		112.52	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
9B	113.04	112.52	17-Dec-90	0.84	112.20
	113.04	112.52	14-Feb-91	0.82	112.22
	113.04	112.52	14-Nov-91	0.88	112.16
	113.04	112.52	18-Nov-92	0.74	112.30
	113.04	112.52	13-Nov-96	0.82	112.22
	113.04	112.52	28-Apr-97	0.65	112.39
	113.04	112.52	06-Aug-97	1.79	111.25
	113.04	112.52	30-Dec-97	0.89	112.15
	113.04	112.52	10-Feb-98	0.88	112.16
	113.04	112.52	28-Sep-98	1.26	111.78
	113.04	112.52	23-Nov-98	0.86	112.18
	113.04	112.52	13-Apr-99	0.80	112.24
	113.04	112.52	20-Sep-99	1.22	111.82
	113.04	112.52	01-Dec-99	0.84	112.20
	113.04	112.52	20-Apr-00	0.79	112.25
	113.04	112.52	14-Aug-00	1.05	111.99
	113.04	112.52	13-Jun-01	1.07	111.97
	113.04	112.52	07-Aug-01	1.73	111.31
	113.04	112.52	16-Sep-02	2.00	111.04
	113.04	112.52	28-Nov-02	1.40	111.64
	113.04	112.52	20-Aug-03	1.11	111.93
	113.04	112.52	27-Nov-03	0.80	112.24
	113.04	112.52	23-Aug-04	1.58	111.46
	113.04	112.52	01-Dec-04	0.75	112.29
	113.04	112.52	20-Sep-05	1.85	111.19
	113.04	112.52	07-Dec-05	0.87	112.17
	113.04	112.52	27-Sep-06	0.80	112.24
	113.04	112.52	08-Nov-06	0.72	112.32
	113.04	112.52	22-Oct-07	0.90	112.14
	113.04	112.52	21-Nov-08	0.88	112.16
	113.04	112.52	08-Oct-09	0.82	112.22
	113.04	112.52	30-Sep-10	0.86	112.18
	113.04	112.52	12-Jul-11	0.82	112.22
	113.04	112.52	13-Aug-12	1.91	111.13
	113.04	112.52	12-Aug-13	1.45	111.59
	113.04	112.52	10-Jul-14	1.18	111.86
	113.04	112.52	5-Aug-15	1.64	111.40
	113.04	112.52	24-Aug-16	1.39	111.65
	113.04	112.52	15-Aug-17	1.25	111.79
		112.52	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
10A	113.42	112.55	17-Dec-90	1.25	112.17
	113.42	112.55	14-Feb-91	1.22	112.20
	113.42	112.55	14-Nov-91	1.26	112.16
	113.42	112.55	18-Nov-92	1.11	112.31
	113.42	112.55	13-Nov-96	1.27	112.15
	113.42	112.55	28-Apr-97	1.13	112.29
	113.42	112.55	06-Aug-97	2.02	111.40
	113.42	112.55	30-Dec-97	1.32	112.10
	113.42	112.55	10-Feb-98	1.34	112.08
	113.42	112.55	28-Sep-98	1.90	111.53
	113.42	112.55	23-Nov-98	1.36	112.06
	113.42	112.55	13-Apr-99	1.26	112.16
	113.42	112.55	20-Sep-99	1.45	111.98
	113.42	112.55	01-Dec-99	1.28	112.14
	113.42	112.55	20-Apr-00	1.26	112.17
	113.42	112.55	14-Aug-00	1.38	112.04
	113.42	112.55	13-Jun-01	1.34	112.08
	113.42	112.55	07-Aug-01	1.84	111.58
	113.42	112.55	16-Sep-02	2.19	111.23
	113.42	112.55	28-Nov-02	1.72	111.70
	113.42	112.55	20-Aug-03	1.39	112.03
	113.42	112.55	27-Nov-03	1.24	112.18
	113.42	112.55	23-Aug-04	1.67	111.75
	113.42	112.55	01-Dec-04	1.33	112.09
	113.42	112.55	20-Sep-05	2.10	111.32
	113.42	112.55	07-Dec-05	1.35	112.07
	113.42	112.55	27-Sep-06	1.25	112.17
	113.42	112.55	08-Nov-06	1.19	112.23
	113.42	112.55	22-Oct-07	1.37	112.05
	113.42	112.55	21-Nov-08	1.33	112.09
	113.42	112.55	08-Oct-09	1.33	112.09
	113.42	112.55	30-Sep-09	1.48	111.94
	113.42	112.55	12-Jul-11	1.35	112.07
	113.42	112.55	13-Aug-12	2.28	111.14
	113.42	112.55	12-Aug-13	1.81	111.61
	113.42	112.55	10-Jul-14	1.57	111.85
	113.42	112.55	5-Aug-15	2.09	111.33
	113.42	112.55	24-Aug-16	1.84	111.58
	113.42	112.55	15-Aug-17	1.56	111.86
		112.55	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
10B	113.15	112.55	17-Dec-90	0.88	112.27
	113.15	112.55	14-Feb-91	0.87	112.28
	113.15	112.55	14-Nov-91	0.93	112.22
	113.15	112.55	18-Nov-92	0.81	112.34
	113.15	112.55	13-Nov-96	0.91	112.25
	113.15	112.55	28-Apr-97	0.82	112.33
	113.15	112.55	06-Aug-97	1.90	111.25
	113.15	112.55	30-Dec-97	0.92	112.23
	113.15	112.55	10-Feb-98	0.92	112.23
	113.15	112.55	28-Sep-98	1.07	112.08
	113.15	112.55	23-Nov-98	0.95	112.20
	113.15	112.55	13-Apr-99	0.88	112.27
	113.15	112.55	20-Sep-99	1.04	112.11
	113.15	112.55	01-Dec-99	0.90	112.25
	113.15	112.55	20-Apr-00	0.88	112.28
	113.15	112.55	14-Aug-00	1.00	112.15
	113.15	112.55	13-Jun-01	1.02	112.13
	113.15	112.55	07-Aug-01	1.74	111.41
	113.15	112.55	16-Sep-02	2.03	111.12
	113.15	112.55	28-Nov-02	1.40	111.75
	113.15	112.55	20-Aug-03	1.03	112.12
	113.15	112.55	27-Nov-03	0.88	112.27
	113.15	112.55	23-Aug-04	1.62	111.53
	113.15	112.55	01-Dec-04	0.90	112.25
	113.15	112.55	20-Sep-05	1.81	111.34
	113.15	112.55	07-Dec-05	0.92	112.23
	113.15	112.55	27-Sep-06	0.87	112.28
	113.15	112.55	08-Nov-06	0.82	112.33
	113.15	112.55	22-Oct-07	0.90	112.25
	113.15	112.55	21-Nov-08	0.89	112.26
	113.15	112.55	08-Oct-09	0.89	112.26
	113.15	112.55	30-Sep-10	0.94	112.21
	113.15	112.55	12-Jul-11	0.92	112.23
	113.15	112.55	13-Aug-12	1.85	111.30
	113.15	112.55	12-Aug-13	1.45	111.70
	113.15	112.55	10-Jul-14	1.20	111.95
	113.15	112.55	5-Aug-15	1.68	111.47
	113.15	112.55	24-Aug-16	1.44	111.71
	113.15	112.55	15-Aug-17	1.19	111.96
		112.55	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
11A	113.29	112.25	17-Dec-90	1.05	112.24
	113.29	112.25	14-Feb-91	FROZEN	
	113.29	112.25	14-Nov-91	1.05	112.24
	113.29	112.25	18-Nov-92	0.91	112.38
	113.29	112.25	13-Nov-96	1.12	112.18
	113.29	112.25	06-Aug-97	1.70	111.59
	113.29	112.25	30-Dec-97	FROZEN	
	113.29	112.25	10-Feb-98	1.07	112.23
	113.29	112.25	28-Sep-98	1.54	111.75
	113.29	112.25	23-Nov-98	1.10	112.19
	113.29	112.25	13-Apr-99	0.98	112.31
	113.29	112.25	20-Sep-99	1.12	112.18
	113.29	112.25	01-Dec-99	1.00	112.29
	113.29	112.25	20-Apr-00	1.00	112.29
	113.29	112.25	14-Aug-00	1.10	112.19
	113.29	112.25	13-Jun-01	1.07	112.22
	113.29	112.25	07-Aug-01	1.45	111.84
	113.29	112.25	16-Sep-02	1.84	111.45
	113.29	112.25	28-Nov-02	1.35	111.94
	113.29	112.25	20-Aug-03	1.13	112.16
	113.29	112.25	27-Nov-03	0.99	112.30
	113.29	112.25	23-Aug-04	1.34	111.95
	113.29	112.25	01-Dec-04	1.09	112.20
	113.29	112.25	20-Sep-05	1.73	111.56
	113.29	112.25	07-Dec-05	1.08	112.21
	113.29	112.25	27-Sep-06	1.00	112.29
	113.29	112.25	08-Nov-06	0.96	112.33
	113.29	112.25	22-Oct-07	1.14	112.15
	113.29	112.25	21-Nov-08	1.70	111.59
	113.29	112.25	08-Oct-09	0.87	112.42
	113.29	112.25	30-Sep-10	0.87	112.42
	113.29	112.25	12-Jul-11	1.09	112.20
	113.29	112.25	13-Aug-12	1.89	111.40
	113.29	112.25	12-Aug-13	1.31	111.98
	113.29	112.25	10-Jul-14	1.17	112.12
	113.29	112.25	5-Aug-15	1.58	111.71
	113.29	112.25	24-Aug-16	1.55	111.74
	113.29	112.25	15-Aug-17	1.11	112.18
		112.25	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
11B	113.14	112.25	17-Dec-90	FROZEN	
	113.14	112.25	14-Feb-91	FROZEN	
	113.14	112.25	14-Nov-91	0.88	112.26
	113.14	112.25	18-Nov-92	0.76	112.38
	113.14	112.25	13-Nov-96	0.86	112.29
	113.14	112.25	28-Apr-97	0.75	112.39
	113.14	112.25	06-Aug-97	1.70	111.44
	113.14	112.25	30-Dec-97	FROZEN	
	113.14	112.25	10-Feb-98	0.84	112.30
	113.14	112.25	28-Sep-98	0.92	112.22
	113.14	112.25	23-Nov-98	0.87	112.27
	113.14	112.25	13-Apr-99	0.80	112.34
	113.14	112.25	20-Sep-99	0.88	112.27
	113.14	112.25	01-Dec-99	0.82	112.32
	113.14	112.25	20-Apr-00	0.81	112.33
	113.14	112.25	14-Aug-00	0.89	112.25
	113.14	112.25	13-Jun-01	0.88	112.26
	113.14	112.25	07-Aug-01	1.47	111.67
	113.14	112.25	16-Sep-02	1.77	111.37
	113.14	112.25	28-Nov-02	1.18	111.96
	113.14	112.25	20-Aug-03	0.89	112.25
	113.14	112.25	27-Nov-03	0.81	112.33
	113.14	112.25	23-Aug-04	1.40	111.74
	113.14	112.25	01-Dec-04	0.82	112.32
	113.14	112.25	20-Sep-05	1.53	111.61
	113.14	112.25	07-Dec-05	0.85	112.29
	113.14	112.25	27-Sep-06	0.76	112.38
	113.14	112.25	08-Nov-06	0.76	112.38
	113.14	112.25	22-Oct-07	0.90	112.24
	113.14	112.25	21-Nov-08	0.87	112.27
	113.14	112.25	08-Oct-09	0.80	112.34
	113.29	112.25	30-Sep-10	0.87	112.42
	113.29	112.25	12-Jul-11	0.87	112.42
	113.29	112.25	13-Aug-12	1.62	111.67
	113.29	112.25	12-Aug-13	1.24	112.05
	113.29	112.25	10-Jul-14	1.00	112.29
	113.29	112.25	5-Aug-15	1.58	111.71
	113.29	112.25	24-Aug-16	1.56	111.73
	113.29	112.25	15-Aug-17	1.00	112.29
	113.29	112.25	16-Jul-18	1.65	111.64
	113.29	112.25	29-Aug-19	1.68	111.61
	113.29	112.25	11-Aug-20	1.41	111.88
	113.29	112.25	3-Aug-21	0.94	112.35
	113.29	112.25	22-Aug-22	1.57	111.72
	113.29	112.25	22-Aug-23	1.45	111.84
	113.29	112.25	6-Aug-24	1.56	111.73

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
12A	113.81	112.93	17-Dec-90	1.14	112.67
	113.81	112.93	14-Feb-91	1.25	112.56
	113.81	112.93	14-Nov-91	1.15	112.66
	113.81	112.93	18-Nov-92	0.93	112.88
	113.81	112.93	13-Nov-96	1.20	112.62
	113.81	112.93	28-Apr-97	0.89	112.92
	113.81	112.93	06-Aug-97	1.91	111.90
	113.81	112.93	30-Dec-97	1.32	112.49
	113.81	112.93	10-Feb-98	1.37	112.45
	113.81	112.93	28-Sep-98	1.46	112.35
	113.81	112.93	23-Nov-98	1.34	112.47
	113.81	112.93	13-Apr-99	0.99	112.82
	113.81	112.93	20-Sep-99	1.56	112.26
	113.81	112.93	01-Dec-99	1.12	112.69
	113.81	112.93	20-Apr-00	1.04	112.77
	113.81	112.93	14-Aug-00	1.46	112.35
	113.81	112.93	13-Jun-01	1.45	112.36
	113.81	112.93	07-Aug-01	1.90	111.91
	113.81	112.93	16-Sep-02	2.02	111.79
	113.81	112.93	28-Nov-02	1.60	112.21
	113.81	112.93	20-Aug-03	1.46	112.35
	113.81	112.93	27-Nov-03	1.02	112.79
	113.81	112.93	23-Aug-04	1.73	112.08
	113.81	112.93	01-Dec-04	1.05	112.76
	113.81	112.93	20-Sep-05	1.92	111.89
	113.81	112.93	07-Dec-05	1.21	112.60
	113.81	112.93	27-Sep-06	0.94	112.87
	113.81	112.93	08-Nov-06	0.96	112.85
	113.81	112.93	22-Oct-07	1.36	112.45
	113.81	112.93	21-Nov-08	1.50	112.31
	113.81	112.93	08-Oct-09	1.13	112.68
	113.81	112.93	30-Sep-10	1.57	112.24
	113.81	112.93	12-Jul-11	1.10	112.71
	113.81	112.93	13-Aug-12	1.98	111.83
	113.81	112.93	12-Aug-13	1.64	112.17
	113.81	112.93	10-Jul-14	1.25	112.56
	113.81	112.93	5-Aug-15	1.73	112.08
	113.81	112.93	24-Aug-16	1.60	112.21
	113.81	112.93	15-Aug-17	1.23	112.58
		112.93	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
12B	113.91	112.93	17-Dec-90	1.17	112.74
	113.91	112.93	14-Feb-91	1.31	112.60
	113.91	112.93	14-Nov-91	1.22	112.69
	113.91	112.93	18-Nov-92	1.02	112.89
	113.91	112.93	13-Nov-96	1.23	112.68
	113.91	112.93	28-Apr-97	1.14	112.77
	113.91	112.93	06-Aug-97	2.16	111.75
	113.91	112.93	30-Dec-97	1.55	112.37
	113.91	112.93	10-Feb-98	1.58	112.33
	113.91	112.93	28-Sep-98	1.67	112.24
	113.91	112.93	23-Nov-98	1.55	112.36
	113.91	112.93	13-Apr-99	1.16	112.75
	113.91	112.93	20-Sep-99	1.76	112.15
	113.91	112.93	01-Dec-99	1.31	112.60
	113.91	112.93	20-Apr-00	1.24	112.67
	113.91	112.93	14-Aug-00	1.71	112.20
	113.91	112.93	13-Jun-01	1.70	112.21
	113.91	112.93	07-Aug-01	2.15	111.76
	113.91	112.93	16-Sep-02	2.28	111.63
	113.91	112.93	28-Nov-02	1.82	112.09
	113.91	112.93	20-Aug-03	1.65	112.26
	113.91	112.93	27-Nov-03	1.24	112.67
	113.91	112.93	23-Aug-04	2.02	111.89
	113.91	112.93	01-Dec-04	1.29	112.62
	113.91	112.93	20-Sep-05	2.16	111.75
	113.91	112.93	07-Dec-05	1.39	112.52
	113.91	112.93	27-Sep-06	1.17	112.74
	113.91	112.93	08-Nov-06	1.18	112.73
	113.91	112.93	22-Oct-07	1.60	112.31
	113.91	112.93	21-Nov-08	1.27	112.64
	113.91	112.93	08-Oct-09	1.35	112.56
	113.91	112.93	30-Sep-10	1.75	112.16
	113.91	112.93	12-Jul-11	1.35	112.56
	113.91	112.93	13-Aug-12	2.22	111.69
	113.91	112.93	12-Aug-13	1.88	112.03
	113.91	112.93	10-Jul-14	1.53	112.38
	113.91	112.93	5-Aug-15	2.03	111.88
	113.91	112.93	24-Aug-16	1.92	111.99
	113.91	112.93	15-Aug-17	1.49	112.42
		112.93	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
13	113.89	112.92	14-Nov-91	1.56	112.33
	113.89	112.92	18-Nov-92	1.31	112.58
	113.89	112.92	13-Nov-96	1.67	112.22
	113.89	112.92	28-Apr-97	1.15	112.74
	113.89	112.92	06-Aug-97	1.72	112.17
	113.89	112.92	30-Dec-97	1.72	112.17
	113.89	112.92	10-Feb-98	1.75	112.14
	113.89	112.92	28-Sep-98	1.76	112.14
	113.89	112.92	23-Nov-98	1.72	112.17
	113.89	112.92	13-Apr-99	1.20	112.69
	113.89	112.92	20-Sep-99	2.17	111.73
	113.89	112.92	01-Dec-99	1.55	112.34
	113.89	112.92	20-Apr-00	1.52	112.37
	113.89	112.92	14-Aug-00	1.82	112.07
	113.89	112.92	13-Jun-01	1.69	112.20
	113.89	112.92	07-Aug-01	2.32	111.57
	113.89	112.92	16-Sep-02	2.08	111.81
	113.89	112.92	28-Nov-02	2.11	111.78
	113.89	112.92	20-Aug-03	1.86	112.03
	113.89	112.92	27-Nov-03	1.35	112.54
	113.89	112.92	23-Aug-04	1.69	112.20
	113.89	112.92	01-Dec-04	1.46	112.43
	113.89	112.92	20-Sep-05	2.09	111.80
	113.89	112.92	07-Dec-05	1.70	112.19
	113.89	112.92	27-Sep-06	1.48	112.41
	113.89	112.92	08-Nov-06	1.35	112.54
	113.89	112.92	22-Oct-07	1.72	112.17
	113.89	112.92	21-Nov-08	1.70	112.19
	113.89	112.92	08-Oct-09	1.61	112.28
	113.89	112.92	30-Sep-10	1.78	112.11
	113.89	112.92	12-Jul-11	1.56	112.33
	113.89	112.92	13-Aug-12	2.04	111.85
	113.89	112.92	12-Aug-13	1.88	112.01
	113.89	112.92	10-Jul-14	1.66	112.23
	113.89	112.92	5-Aug-15	1.90	111.99
	113.89	112.92	24-Aug-16	1.80	112.09
	113.89	112.92	15-Aug-17	1.43	112.46
		112.92	3-Nov-17	Decommissioned	

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
14	112.89	111.97	14-Nov-91	0.98	111.91
	112.89	111.97	18-Nov-92	0.84	112.05
	112.89	111.97	13-Nov-96	1.03	111.86
	112.89	111.97	28-Apr-97	1.10	111.79
	112.89	111.97	06-Aug-97	2.23	110.66
	112.89	111.97	30-Dec-97	FROZEN	
	112.89	111.97	10-Feb-98	FROZEN	
	112.89	111.97	28-Sep-98	2.26	110.63
	112.89	111.97	23-Nov-98	1.56	111.33
	112.89	111.97	13-Apr-99	DESTROYED	
	112.89	111.97	20-Sep-99	DESTROYED	
	112.89	111.97	01-Dec-99	DESTROYED	
	112.89	111.97	20-Apr-00	DESTROYED	
REPAIRED	112.35	111.97	14-Aug-00	0.96	111.39
	112.35	111.97	13-Jun-01	0.88	111.47
	112.35	111.97	07-Aug-01	1.57	110.78
	112.35	111.97	16-Sep-02	DRY	<109.69
	112.35	111.97	28-Nov-02	DRY	<109.69
	112.35	111.97	20-Aug-03	1.19	111.16
	112.35	111.97	27-Nov-03	0.56	111.79
	112.35	111.97	23-Aug-04	1.80	110.55
	112.35	111.97	01-Dec-04	0.59	111.76
	112.35	111.97	20-Sep-05	2.05	110.30
	112.35	111.97	07-Dec-05	0.63	111.72
	112.35	111.97	27-Sep-06	0.57	111.78
	112.35	111.97	08-Nov-06	0.54	111.81
	112.35	111.97	22-Oct-07	1.15	111.20
	112.35	111.97	21-Nov-08	0.63	111.72
	112.35	111.97	08-Oct-09	0.67	111.68
	112.35	111.97	30-Sep-10	1.23	111.12
	112.35	111.97	12-Jul-11	0.67	111.68
	112.35	111.97	13-Aug-12	DRY	<109.69
	112.35	111.97	12-Aug-13	1.52	110.83
	112.35	111.97	10-Jul-14	1.45	110.90
	112.35	111.97	5-Aug-15	1.63	110.72
	112.35	111.97	24-Aug-16	2.10	110.25
	112.35	111.97	15-Aug-17	1.51	110.84
	112.35	111.97	16-Jul-18	1.87	110.48
	112.35	111.97	29-Aug-19	DRY	<109.69
	112.35	111.97	11-Aug-20	DRY	<109.69
	112.35	111.97	3-Aug-21	0.72	111.63
	112.35	111.97	22-Aug-22	1.57	<109.69
	112.35	111.97	22-Aug-23	1.17	111.18
	112.35	111.97	6-Aug-24	1.56	110.79

Groundwater Elevations
Westmeath Waste Disposal Site

Monitor	Top of Pipe Elevation (mASL)	Ground Elevation (mASL)	Date	Water Depth From Top of Pipe (m)	Water elevation (mASL)
15	113.19	112.35	14-Nov-91	1.00	112.19
	113.19	112.35	18-Nov-92	1.01	112.18
	113.19	112.35	13-Nov-96	1.05	112.14
	113.19	112.35	28-Apr-97	0.89	112.30
	113.19	112.35	06-Aug-97	2.16	111.03
	113.19	112.35	30-Dec-97	0.99	112.21
	113.19	112.35	10-Feb-98	1.01	112.19
	113.19	112.35	28-Sep-98	1.58	111.62
	113.19	112.35	23-Nov-98	1.17	112.02
	113.19	112.35	13-Apr-99	0.97	112.23
	113.19	112.35	20-Sep-99	1.37	111.82
	113.19	112.35	01-Dec-99	0.98	112.22
	113.19	112.35	20-Apr-00	1.06	112.13
	113.19	112.35	14-Aug-00	1.17	112.02
	113.19	112.35	13-Jun-01	1.17	112.02
	113.19	112.35	07-Aug-01	1.97	111.22
	113.19	112.35	16-Sep-02	2.62	110.57
	113.19	112.35	28-Nov-02	1.77	111.42
	113.19	112.35	20-Aug-03	1.25	111.94
	113.19	112.35	27-Nov-03	0.96	112.23
	113.19	112.35	23-Aug-04	1.96	111.23
	113.19	112.35	01-Dec-04	1.00	112.19
	113.19	112.35	20-Sep-05	2.19	111.00
	113.19	112.35	07-Dec-05	1.05	112.14
	113.19	112.35	27-Sep-06	0.99	112.20
	113.19	112.35	08-Nov-06	0.92	112.27
	113.19	112.35	22-Oct-07	1.11	112.08
	113.19	112.35	21-Nov-08	1.40	111.79
	113.19	112.35	08-Oct-09	1.02	112.17
	113.19	112.35	30-Sep-10	1.22	111.97
	113.19	112.35	12-Jul-11	1.16	112.03
	113.19	112.35	13-Aug-12	2.64	110.55
	113.19	112.35	12-Aug-13	1.89	111.30
	113.19	112.35	10-Jul-14	1.60	111.59
	113.19	112.35	5-Aug-15	2.04	111.15
	113.19	112.35	24-Aug-16	2.10	111.09
	113.19	112.35	15-Aug-17	1.80	111.39
		112.35	3-Nov-17	Decommissioned	

Appendix G

Well Records for Decommissioned Wells

Ontario

Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Township of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	CUBDEN	ON	K0J1K0	6136462828

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	29	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83 18	352837	5017361		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	7

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* monitoring ~~Completed~~
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, specify
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

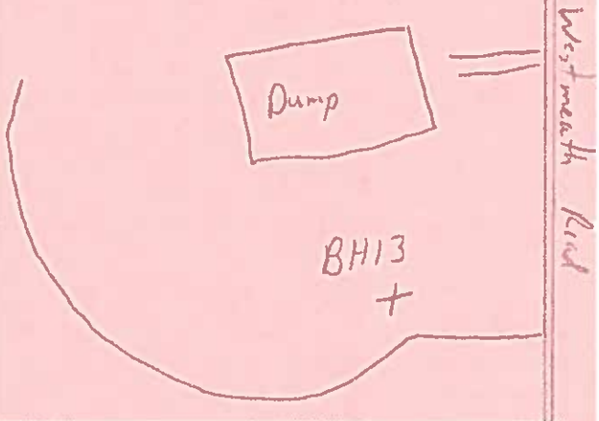
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

BH13

N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd.	6913

Business Address (Street Number/Name)	Municipality
2497 B-line Rd.	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137324922	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
21613	Rod Mackinnon	Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017 11 03

Ministry Use Only

Audit No. Z265738

Received

0506E (2014/11)

Well Owner's Copy

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Ontario — Ministry of the Environment and Climate Change

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP	OF Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83 18	352590	5073147		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	7

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* monitoring completed
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Other, specify
	☐	☐ Fresh ☐ Untested	
	☐	☐ Fresh ☐ Untested	
	☐	☐ Fresh ☐ Untested	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

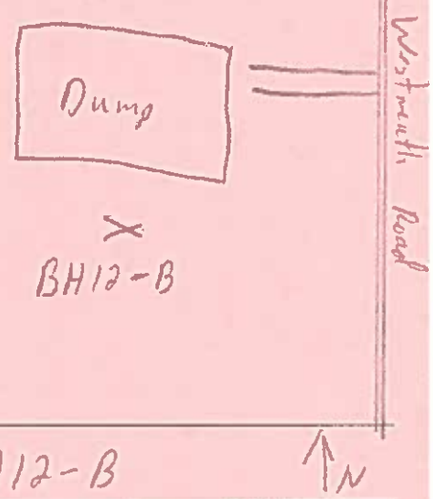
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH12-B

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd.	6928

Business Address (Street Number/Name)	Municipality
2497 B-line Rd.	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
613 732 4923	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2618		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No	Y Y Y Y M M D D	2017 11 03

Ministry Use Only

Audit No. Z265739

Received

0506E (2014/11)

Well Owner's Copy

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Ontario — Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township	OF Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	6136446228182

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18 352590	5073147		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	16

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify ____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify ____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, specify monitoring ~~Completed~~
☐ Other, specify ____

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify ____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

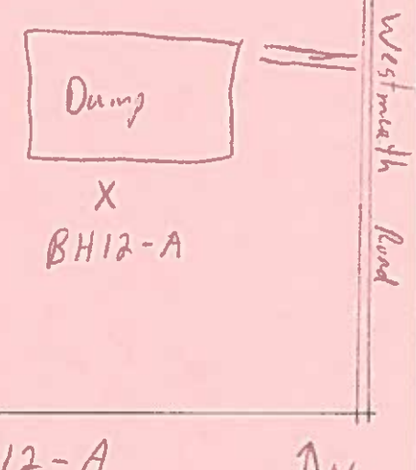
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH12-A

N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd.	6913

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
2497 B-line Rd.	Pembroke	ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
613 732 4923	MacKinnon, James	21618		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017 11 09

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township	of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	6136462822

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6M2

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	18	352897	5017329		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bedrock			0	17

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used *(Material and Type)*	Volume Placed *(m³/ft³)*

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

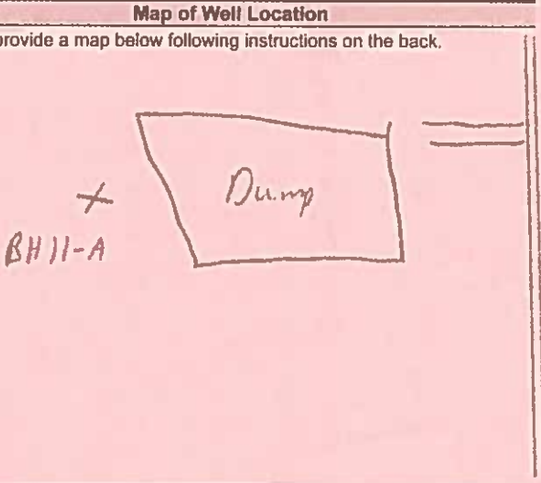
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH11-A

N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd	6923

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
2497 B-line Rd.	Pembroke	ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6137324923	MacKinnon, James	21613		

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: ____

Date Work Completed: 2019/11/03

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Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP	OF White water Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
P.O. Box 40.	COBDEN	ON	K0J 1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 West Meath Road	West Meath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W5

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 18	352819	5073188		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	6.5

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, specify Monitoring Completed.
☐ Other, specify _____

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping _____ hrs + _____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

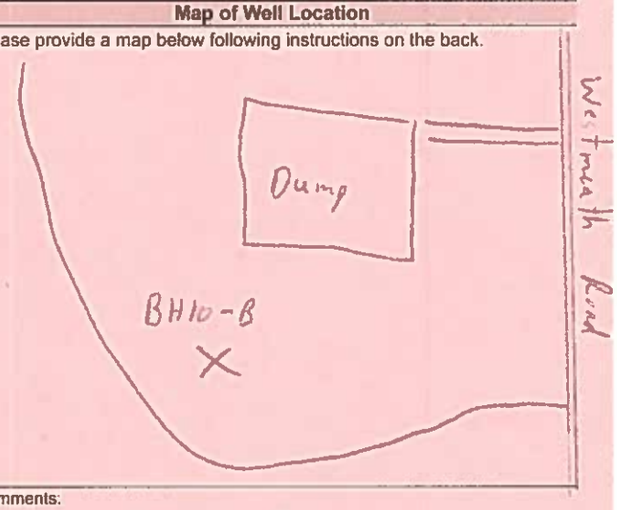
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH 10 - B

↑N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd	6923

Business Address (Street Number/Name)	Municipality
2497 B-line Rd.	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A 6W8	info@mackinnonwelldrilling.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
613 732 4927	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
26813		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017 04 19

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Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP	OF Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	6136462282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	352819	5073188		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	18.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed.
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	Kind of Water	Water found at Depth (m/ft)	Kind of Water	Water found at Depth (m/ft)	Kind of Water
☐ Gas	☐ Fresh ☐ Untested	☐ Gas	☐ Fresh ☐ Untested	☐ Gas	☐ Fresh ☐ Untested
	☐ Other, *specify*		☐ Other, *specify*		☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd.	6923

Business Address (Street Number/Name)	Municipality
2497 B-line Rd.	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137624923	MacKinnon, James.

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2683		Y Y Y Y M M D D

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

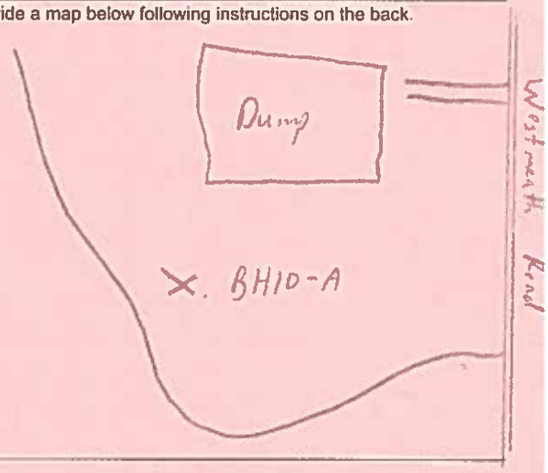
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

BH10-A TN

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	Y Y Y Y M M D D	Audit No. Z265743
	Date Work Completed 2017 11 03	Received

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township	OF White water Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	6132282212

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	West meath	29	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18 352785	5017134		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	8

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

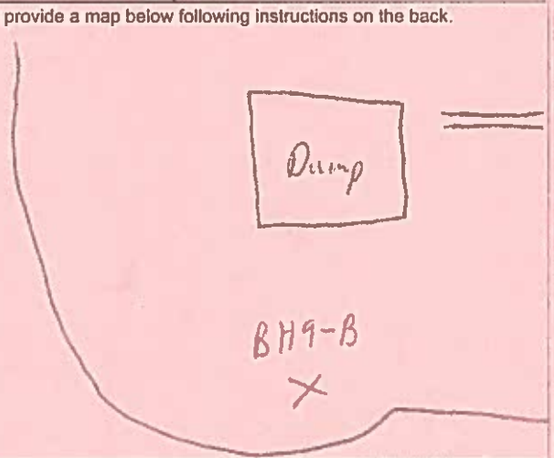
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH9-B

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd	6912 13

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
2497 B-line Rd	Pembroke	ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6137324923	MacKinnon, James	21683		Y Y Y Y M M D D

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: Y Y Y Y M M D D

Date Work Completed: 2017 11 03

Ministry Use Only

Audit No. Z265744

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Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township of	White water Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	Cobden	ON	K0J1K0	6136644622182

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	29	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 18	352785	5073134		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	20

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Kind of Water	
☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify* _____
Water found at Depth (m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify* _____
Water found at Depth (m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify* _____

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

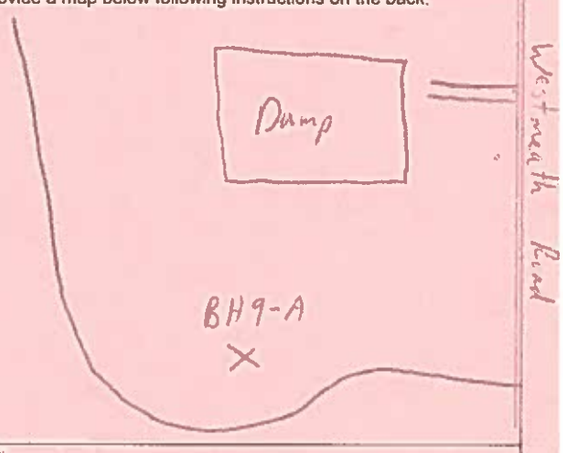
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH9-A

N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd.	6913

Business Address (Street Number/Name)	Municipality
2497 B-line Rd.	Ambrose

Province	Postal Code	Business E-mail Address
ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137324923	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
21613		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	Y Y Y Y M M D D	Audit No. Z265745
	Date Work Completed 2017 11 03	Received

0506E (2014/11)

Well Owner's Copy

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	TOWNSHIP OF Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 West meath Road	West meath	20	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 18	352976	5073295		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
				0	6.5

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* monitoring Completed
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, specify
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

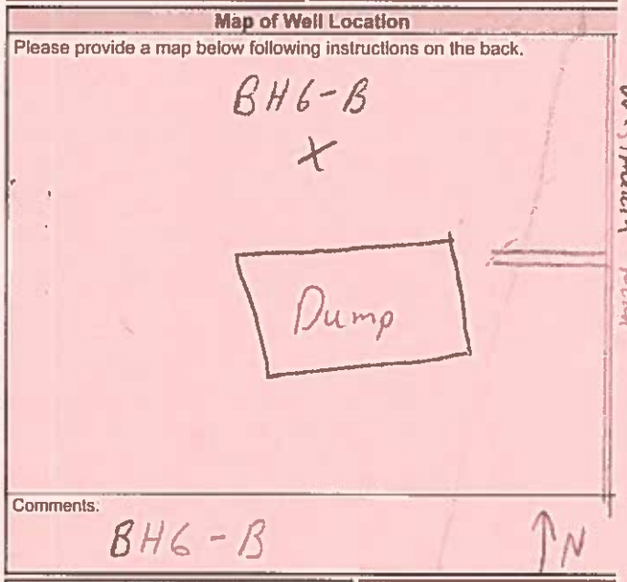
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH6-B

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd.	6913

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
2497 B-line Road.	Pembroke	ON	K8A 6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
613 732 1492 3	MacKinnon, James	2683		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017/11/03

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Audit No. Z265749

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township	of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O Box 40	CUBDEN	ON	K0J 1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 West meath Rd.	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83 18	352835	5017366		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	5.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☑ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☑ Abandoned, other, *specify* Monitoring Completed
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, *specify*
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☑

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

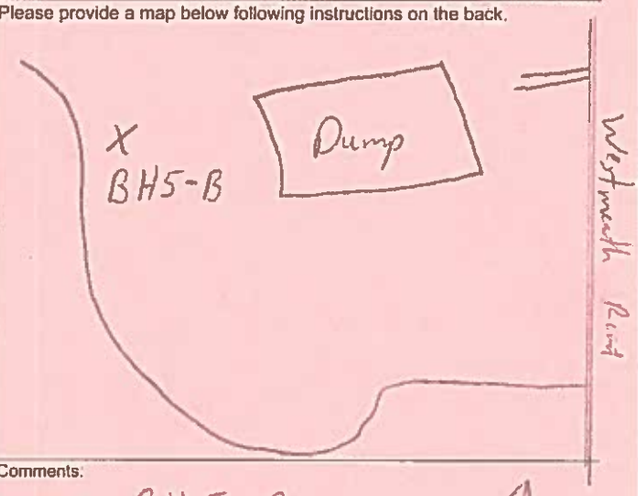
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH5-B

↑N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mac Kinnon Well Drilling Ltd.	6913

Business Address (Street Number/Name)	Municipality
2497 B-line Road	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A 6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137329123	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
26883		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No	Y Y Y Y M M D D	2017 11 03

Ministry Use Only

Audit No. Z265750

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township of	Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	Cobden	ON	K0J 1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	20	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W8

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3 18	352916	5073295		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	17

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* monitoring complete
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping _____ hrs + _____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

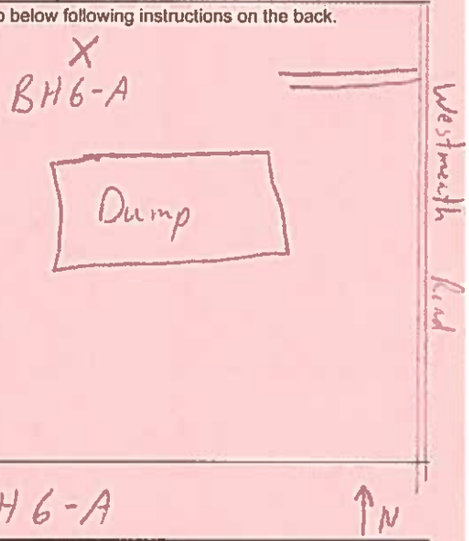
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH6-A

↑N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Mackinnon Well Drilling Ltd.	6923

Business Address (Street Number/Name)	Municipality
2497 B-line	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A 6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
613 732 4923	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2683		Y Y Y Y M M D D

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	Y Y Y Y M M D D	Audit No. Z265751
	Date Work Completed 2017 11 03	Received

Well Owner's Copy

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Township of White water Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	COBDEN	ON	K0J1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 West north Road	Westmeath	20	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W8

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 18	352976	5073112		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bedrock			0	8

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, specify
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

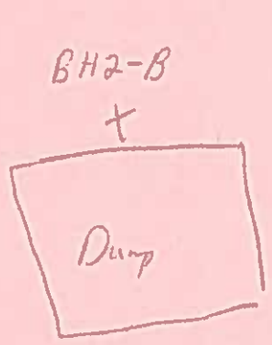
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH2-B ↑N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd	6923

Business Address (Street Number/Name)	Municipality
2497 B-line Road	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137324923	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2463		

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: _____

Date Work Completed: 2017 11 03

Ministry Use Only

Audit No. Z265752

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0506E (2014/11)

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
Township of	White water Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	Cobden	ON	K0J 1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W2

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	18	352835	5073366		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	25

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, specify
Monitoring Completed
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, *specify*
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping _____ hrs + _____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

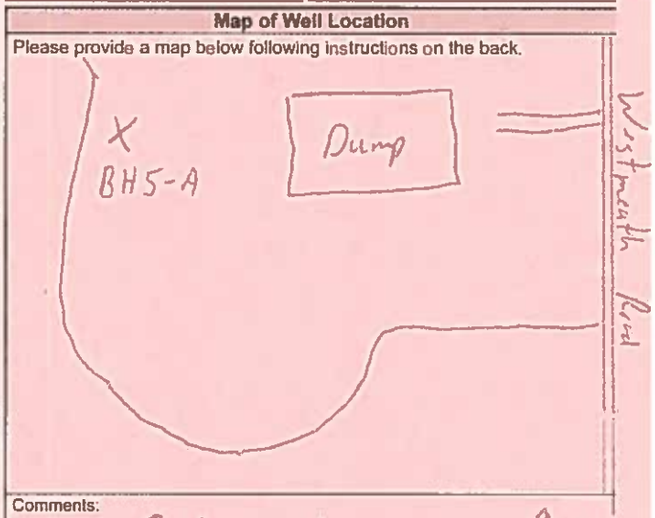
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

BH5-A ↑N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd	6923

Business Address (Street Number/Name)	Municipality
2497 B-line Road.	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A 6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137324923	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
26813		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017/11/03

Ministry Use Only

Audit No. Z265753

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Ministry of the Environment and Climate Change

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Township of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	Cobden	ON	K0J1K0	6136462282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 18	352910	5072306		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	7

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed
☐ Other *specify* _____

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

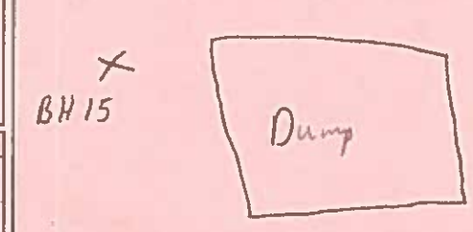
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH 15 MN

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd	6912

Business Address (Street Number/Name)	Municipality
2497 B-Line Road	Pembroke

Province	Postal Code	Business E-mail Address
ON	K8A6W2	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137329223	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
21813		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017/11/03

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Audit No. Z265754

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Ministry of the Environment and Climate Change

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Township of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	Cobden	ON	K0J1K0	6136146282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	20	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	352976	5073212		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bedrock			0	22.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* monitoring well
☐ Other, *specify* _____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, *specify*
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

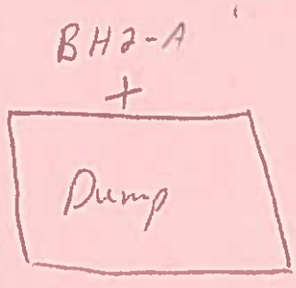
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH2-A

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd	6923

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
2497 B-line Road	Pembroke	ON	K8A6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6137324923	MacKinnon, James	2613		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017/11/03

Ministry Use Only

Audit No. Z265755

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Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Township of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
P.O. Box 40	Cobden	ON	K0J1K0	6136462282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A6W2

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	18	352992	5073082		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	10.5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, *specify* ____

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☒ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, *specify* ____

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☒ Abandoned, other, *specify* monitoring capability ☐ Other, *specify* ____

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, specify
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, *specify* ____

If pumping discontinued, give reason: ____

Pump intake set at (m/ft) ____

Pumping rate (l/min / GPM) ____

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft) ____

If flowing give rate (l/min / GPM) ____

Recommended pump depth (m/ft) ____

Recommended pump rate (l/min / GPM) ____

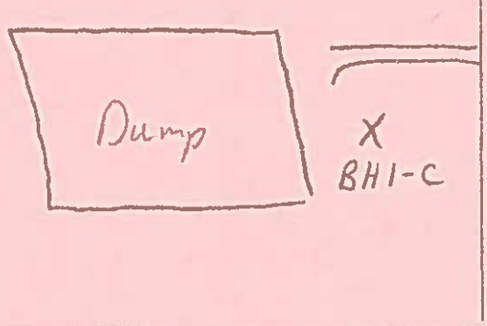
Well production (l/min / GPM) ____

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH1-C ↑N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling LTD	6923

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
2497 B-line Road	Pembroke	ON	K8A6W2	info@mackinnondrilling.com

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6137324923	MacKinnon, James	26813		

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		2017/11/13

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Audit No. Z265756

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Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Township of Whitewater Region		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
P.O. Box 40	Cobden	ON	K0J 1K0	613 646 2282

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1597 Westmeath Road	Westmeath	30	NFA

County/District/Municipality	City/Town/Village	Province	Postal Code
Renfrew	Pembroke	Ontario	K8A 6W2

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	352992	5017302		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Bentonite			0	47

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used *(Material and Type)*	Volume Placed *(m³/ft³)*

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, *specify* _____

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, *specify* _____

Construction Record - Casing

Inside Diameter *(cm/in)*	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness *(cm/in)*	Depth (m/ft) From	To

Construction Record - Screen

Outside Diameter *(cm/in)*	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☒ Abandoned, other, *specify* Monitoring Completed
☐ Other, *specify*

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	To	Diameter *(cm/in)*

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping _____ hrs + _____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: BH1-A

N

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
MacKinnon Well Drilling Ltd.	6912

Business Address (Street Number/Name)	Municipality
2497 B-line Road	Pembroke

Province	Postal Code	Business E-mail Address
ON.	K8A 6W8	info@mackinnondrilling.com

Bus. Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
6137324923	MacKinnon, James

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
21618		

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No		Audit No. Z265757
	Date Work Completed: 2017/11/03	Received

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Appendix H

Site Photographs



SW 3A



SW 5 (Spring 2022)



SW 20



SW 3

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Westmeath Closed Waste Disposal Site

Spring 2023 Surface Water Monitoring Locations

DATE	02-May-23
PROJECT	17-6048I
FIGURE	1



BH 1B



BH 4B



BH 7B



BH 4A



BH 7A



BH 8A

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Westmeath Closed Waste Disposal Site

Summer 2024 Groundwater Monitoring Locations

DATE	06-Aug-24
PROJECT	17-6048I
FIGURE	1



BH 8B



BH 14



BH 11B

Jp2g Consultants Inc.
ENGINEERS · PLANNERS · PROJECT MANAGERS

Westmeath Closed Waste Disposal Site

Summer 2024 Groundwater Monitoring Locations

DATE	06-Aug-24
PROJECT	17-6048I
FIGURE	2

Appendix I

Water Quality Data

Water Quality Notes

Surface Water

CWQG	CCME Water Quality Guidelines for the Protection of Aquatic Life	
PWQO	Provincial Water Quality Objectives	
IPWQO	Interim Water Quality Objectives	
"a"	*Alkalinity*	Should not be decreased by more than 25%
"b"	*Beryllium*	If hardness <75 then 0.011 mg/L
		If hardness >75 then 1.1 mg/L
"c"	*Cadmium*	
	PWQO	0.0002 mg/L
	IPWQO	If hardness 0-100 mg/L then 0.0001 mg/L
		If hardness >100 mg/L then 0.0005 mg/L
	CWQG	Cadmium concentration = $10^{0.86[\log10(\text{hardness})]-3.2}$ µg/L
"d"	*Copper*	
	PWQO	0.005 mg/L
	IPWQO	If hardness 0 –20 mg/L then 0.001 mg/L
		If hardness >20 mg/L then 0.005 mg/L
	CWQG	Copper concentration = $e^{0.8545[\ln(\underline{\text{hardness}})]-1.465} * 0.2$ µg/L
"e"	*Lead*	
	PWQO	If alkalinity <20 then 0.005 mg/L
		If alkalinity 20 - 40 mg/L then 0.010 mg/L
		If alkalinity 40 - 80 mg/L then 0.02 mg/L
		If alkalinity > 80 mg/L then 0.025 mg/L
	IPWQO	If hardness <30 mg/L then 0.001 mg/L
		If hardness 30 - 80 mg/L then 0.003 mg/L
		If hardness > 80 mg/L then 0.005 mg/L
	CWQG	Lead concentration = $e^{1.273[\ln(\underline{\text{hardness}})]-4.705}$ µg/L
"f"	*DO*	
	PWQO	Varies with temperature
"g"	*Nickel*	
	CWQG	Nickel concentration = $e^{0.76[\ln(\underline{\text{hardness}})]+1.06}$ µg/L

Groundwater

MAC	Maximum Acceptable Concentration
IMAC	Interim Maximum Acceptable Concentration
OG	Operational Guideline (non health related)
MDC	Maximum Desirable Concentration
AO	Aesthetic Objective

Groundwater

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1A					
Date>				Oct-90	Jan-91	Nov-91	Nov-96	Aug-00	Oct-07
Parameters	PWQO		ODWS						
Fluoride			1.5		0.25	No Sample	No Sample	No Sample	
Chloride			250			Collected	Collected	Collected	13
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10						0.16
Bromide					0.6				
Phosphate					0.27				
Sulphate			500		15				7
Calcium					35				39
Magnesium					15				18
Sodium			200		13				11
Potassium					5				6
Aluminum	IPWQO	0.075	0.1		0.18				
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		0.06				
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5						0.04
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									368
Copper	PWQO IPWQO	0.005 d	1						<0.001
Iron	PWQO	0.3	0.3		0.29				<0.03
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05		0.01				0.01
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04			0.01				
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon					8.7				
Silver	PWQO	0.0001	0.05						
Strontium					0.26				0.491
Sulphur					4				
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500		149				
Alkalinity as CaCO3	IPWQO	a	30 - 500		156				172
TKN									0.44
N-NH3 - Ammonia									0.29
Organic Nitrogen			0.15						0.15
Phenols	IPWQO	0.005							<0.001
BOD					3				
COD					nd				<5
DOC			5						
TDS			500		216				239
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									1.03
Field Measured									
Water Temp. (°C)			15	7	6				9.1
Conductivity (microS/cm)				330	340				388
pH (pH units)			6.5 - 8.5	7.8	8.1				7.91

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1A					
Date>				Nov-08	Oct-09	Sep-10	Jul-11	Aug-12	Aug-13
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	14	9	9	10	9	10
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.2	0.24	0.18	0.22	<0.10	0.24
Bromide									
Phosphate									
Sulphate			500	8	8	8	8	5	6
Calcium				39	33	40	39	40	39
Magnesium				17	16	16	16	16	17
Sodium			200	11	8	9	8	10	9
Potassium				5	5	5	5	6	5
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001	<0.001	<0.001	<0.001	<0.001
Barium			1		0.05	0.05	0.18	0.05	0.05
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.05	0.06	0.03	0.02	0.03	0.03
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05		0.002	<0.001	0.002	0.001	0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				375	354	342	358	375	357
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001	<0.001	0.001	<0.001	0.001
Iron	PWQO	0.3	0.3	<0.03	<0.03	<0.03	0.63	0.38	0.5
Lead	PWQO IPWQO	e	0.01		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese			0.05	0.02	0.02	0.03	0.05	0.04	0.04
Mercury	PWQO	0.0002	0.001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		5.64	5.11	7.97	22.8	51.5	6.86
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.356	0.322				
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	177	168	164	173	188	172
TKN				0.26	0.28	0.37	0.5	0.52	0.38
N-NH3 - Ammonia				0.2	0.23	0.21	0.22	0.22	0.22
Organic Nitrogen			0.15	0.15	0.05	0.16	0.28	0.3	0.16
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.005	<0.001
BOD					6				
COD				13	<5	5	10	16	22
DOC			5		2.4	3	2.2	1.9	2.1
TDS			500	244	230	222	233	244	232
Total Sus. Solids					7610				
pH			6.5-8.5		8.23	8.1	8.18	8.27	8.06
Ion Balance				0.96					
Field Measured									
Water Temp. (°C)			15	6.9		10.5	11.2	11.2	11.3
Conductivity (microS/cm)				379		347	270	311	344
pH (pH units)			6.5 - 8.5	8		9.05	7.9	7.9	7.8

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1A					
Date>				Jul-14	Aug-17	Aug-17	Median		
Parameters	PWQO		ODWS			Dup BH 16			
Fluoride			1.5						
Chloride			250	10.5	12.9	12.9	10		
N-NO2 - Nitrite			1	< 0.10	< 0.05	< 0.05			
N-NO3 -Nitrate			10	0.3	0.12	0.1	0.22		
Bromide									
Phosphate									
Sulphate			500	7	5	5	7.5		
Calcium				41.4	39.7	39.3	39.35		
Magnesium				17.7	19.2	19.2	16.5		
Sodium			200	10.8	12.3	12.4	9.5		
Potassium				5.9	5.8	5.8	5		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0004	0.0002	0.0001	0.0003		
Barium			1	0.06	0.083	0.085	0.05		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	< 0.005	0.042	0.043	0.03		
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.00002	< 0.000014	< 0.000014			
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.002	0.002		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				361	389	382	359.5		
Copper	PWQO IPWQO	0.005 d	1	0.001	< 0.002	< 0.002	0.001		
Iron	PWQO	0.3	0.3	0.312	0.029	0.024	0.38		
Lead	PWQO IPWQO	e	0.01	0.0003	< 0.00002	< 0.00002	0.0003		
Manganese			0.05	0.026	0.031	0.03	0.0305		
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002			
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		7.77	17.4	17.4	7.87		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium							0.339		
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.005	< 0.005	< 0.005			
Hardness (as CaCO3)			500		178	177			
Alkalinity as CaCO3	IPWQO	a	30 - 500	163	173	169	172.5		
TKN				0.54	0.8	0.8	0.44		
N-NH3 - Ammonia				< 0.01	0.33	0.37	0.22		
Organic Nitrogen			0.15	≤ 0.54			0.16		
Phenols	IPWQO	0.005		< 0.001	< 0.001	< 0.001			
BOD							6		
COD				177	91	105	16		
DOC			5	2.4	2	1.9	2.2		
TDS			500	193	198	196	231		
Total Sus. Solids							7610		
pH			6.5-8.5	8.05	8.1	8.1	8.1		
Ion Balance				0.893					
Field Measured									
Water Temp. (°C)			15	10.1	9.5				
Conductivity (microS/cm)				334	375				
pH (pH units)			6.5 - 8.5	8.2	8.2				

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1B					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Aug-97	Nov-98
Parameters	PWQO		ODWS						
Fluoride			1.5	0.04	0.08				
Chloride			250	2	6	2	12	12	12
N-NO2 - Nitrite			1						
N-NO3 -Nitrate			10	0.22	3.15		1.32	0.99	1.04
Bromide									
Phosphate				0.88	0.5		0.03		
Sulphate			500	60	70	51	12	15	15
Calcium				30	19	21	9	13	16
Magnesium				6	8	7	4	7	10
Sodium			200	13	18	17	14	8	9
Potassium				2	3	4	2	2	3
Aluminum	IPWQO	0.075	0.1			0.05	0.22		
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.03	0.05	0.02	0.02		
Beryllium	PWQO	b					0.01		
Boron	IPWQO	0.2	5		0.03	0.02			
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1			0.01			
Iron	PWQO	0.3	0.3	0.02		0.04	0.17	0.4	3.23
Lead	PWQO IPWQO	e	0.01		0.006				
Manganese			0.05	0.04				0.02	0.08
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				6.7	8.7	11.6	10.2		
Silver	PWQO	0.0001	0.05						
Strontium				0.1	0.18	0.12	0.07	0.076	0.108
Sulphur				24	26	20			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	100	80	81		61	
Alkalinity as CaCO3	IPWQO	a	30 - 500	56	38	56	43	57	49
TKN				0.24	0.34		0.31	0.13	0.22
N-NH3 - Ammonia									0.08
Organic Nitrogen			0.15	0.24	0.34		0.31	0.13	0.14
Phenols	IPWQO	0.005					nd		nd
BOD							2		
COD					13		5	11	5
DOC			5						
TDS			500	188	150	160	100		128
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							0.94	0.9	1.26
Field Measured									
Water Temp. (°C)			15	4	9	9	10	14.2	6.6
Conductivity (microS/cm)				290	366	366	170	180	190
pH (pH units)			6.5 - 8.5	7.6	6.9	6.1	7.03	7.97	6.37

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1B					
Date>				Sep-99	Aug-00	Aug-01	Dec-02	Aug-04	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	15	13	20	16	14	15
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	1.14	0.67	0.63	0.56	0.37	0.51
Bromide									
Phosphate									
Sulphate			500	12	11	11	14	11	9
Calcium				15	11	14	14	8	10
Magnesium				7	5	7	7	4	4
Sodium			200	10	14	11	11	11	17
Potassium				3	2	2	3	2	2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	<0.01	0.04	0.02	<0.05	0.02	0.02
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								167	172
Copper	PWQO IPWQO	0.005 d	1	<0.005	<0.01	0.001	<0.005	0.001	0.006
Iron	PWQO	0.3	0.3	0.68	0.25	0.05	0.03	0.06	0.03
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.087	0.07	0.089	0.072	0.062	0.069
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	48	50	53	60	51	53
TKN				0.28	0.2	0.51	0.29	0.15	0.21
N-NH3 - Ammonia				0.06	0.05	0.22	0.03	0.03	<0.02
Organic Nitrogen			0.15	0.22	0.15	0.29	0.26	0.12	<0.21
Phenols	IPWQO	0.005		0.001	0.003	<0.001	<0.001	<0.001	<0.001
BOD									
COD				10	8	19	<5	<5	<5
DOC			5						
TDS			500	108	140	120	121	109	112
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				1.07	0.99	0.96	0.92	N/A	N/A
Field Measured									
Water Temp. (°C)			15	10.8	12.5	13	3.8	12	9.4
Conductivity (microS/cm)				165	160	339	311	143	203
pH (pH units)			6.5 - 8.5	7.71	7.46	6.82	7.3	8.05	7.73

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1B					
Date>				Sep-06	Oct-07	Nov-08	Oct-09	Sep-10	Aug-15
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	17	48	52	41	40	28.3
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	< 0.1
N-NO3 -Nitrate			10	0.47	0.61	0.63	1.08	0.91	0.7
Bromide									
Phosphate									
Sulphate			500	10	8	11	12	11	8
Calcium				14	16	17	16	18	18
Magnesium				7	6	7	6	8	8.73
Sodium			200	12	19	24	18	15	16
Potassium				2	2	3	2	3	2.4
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025				<0.001	<0.001	0.0001
Barium			1				0.02	0.02	0.014
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.01	0.03	0.03	0.01	0.007
Cadmium	PWQO IPWQO	0.0002 c	0.005			<0.0001	<0.0001	<0.0001	< 0.00002
Chromium	PWQO	0.009	0.05				0.007	0.002	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				197	252	311	275	279	224
Copper	PWQO IPWQO	0.005 d	1	0.014	<0.001	<0.001	<0.001	0.001	< 0.002
Iron	PWQO	0.3	0.3	0.03	1.05	0.93	0.52	0.03	0.465
Lead	PWQO IPWQO	e	0.01				<0.001	<0.001	0.00011
Manganese			0.05	<0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.014
Mercury	PWQO	0.0002	0.001				<0.0001	<0.0001	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3				0.11	0.89	0.09	0.25
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.073	0.114	0.124	0.108		
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5			<0.01	<0.01	<0.01	< 0.005
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	55	41	50	49	55	49
TKN				<0.05	0.51	0.79	0.12	<0.10	0.7
N-NH3 - Ammonia				<0.02	0.43	0.65	0.04	<0.02	<0.01
Organic Nitrogen			0.15	<0.05	0.08	0.14	0.08		
Phenols	IPWQO	0.005		<0.001	0.013	0.039	<0.001	<0.001	< 0.001
BOD							<1		
COD				<5	5	13	<5	8	54
DOC			5				1.7	1.6	4.1
TDS			500	128	164	202	179	181	139
Total Sus. Solids							36		
pH			6.5-8.5				7.09	7.1	7.11
Ion Balance				N/A - LC	0.94	0.95			
Field Measured									
Water Temp. (°C)			15	12.2	10.3	7.7	11.7	12.4	11.9
Conductivity (microS/cm)				162	N/A	304	275	287	206
pH (pH units)			6.5 - 8.5	7.44	7.28	7.4	8.7	8.73	7.3

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1B					
Date>				Aug-16	Aug-17	Jul-18	Aug-19	Aug-20	Aug-21
Parameters	PWQO		ODWS						
Fluoride			1.5	No Sample	No Sample				
Chloride			250			28.9	33.5	28.7	22
N-NO2 - Nitrite			1			< 0.05	< 0.05	< 0.5	<0.10
N-NO3 -Nitrate			10			1.82	3.32	4.06	4.65
Bromide									
Phosphate									
Sulphate			500			8	8	8	7
Calcium						16.1	19	18.7	18
Magnesium						7.7	9.06	8.06	8
Sodium			200			15.3	14.3	15	20
Potassium						2.3	2.5	2.5	3
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025			< 0.0001	<0.0001	< 0.0001	<0.001
Barium			1			0.012	0.012	0.018	0.02
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5			0.01	0.009	0.013	0.01
Cadmium	PWQO IPWQO	0.0002 c	0.005			< 0.000015	0.000021	< 0.000015	<0.0001
Chromium	PWQO	0.009	0.05			< 0.002	< 0.001	< 0.001	<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)						207	237	243	240
Copper	PWQO IPWQO	0.005 d	1			0.002	0.0016	0.0027	0.002
Iron	PWQO	0.3	0.3			0.006	< 0.005	0.009	<0.03
Lead	PWQO IPWQO	e	0.01			0.00006	0.00005	0.00004	<0.001
Manganese			0.05			< 0.001	< 0.001	< 0.001	<0.01
Mercury	PWQO	0.0002	0.001			< 0.00002	< 0.00002	< 0.00002	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3				0.23	0.04	0.18	0.053
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5			< 0.005	0.006	0.005	<0.01
Hardness (as CaCO3)			500			72	85	80	78
Alkalinity as CaCO3	IPWQO	a	30 - 500			48	50	48	60
TKN						0.5	0.2	0.5	0.156
N-NH3 - Ammonia						0.14	0.03	0.02	<0.010
Organic Nitrogen			0.15				0.17	0.48	<0.156
Phenols	IPWQO	0.005				< 0.001	< 0.002	<0.002	<0.004
BOD									
COD						< 5	7	11	<5
DOC			5			2	1.7	2	1.5
TDS			500			107	116	110	156
Total Sus. Solids									
pH			6.5-8.5			7.21	7.23	7.14	7.12
Ion Balance						0.948	0.985	0.966	
Field Measured									
Water Temp. (°C)			15	14.3		12.0	10.1	9.6	10
Conductivity (microS/cm)				273		183	243	237	235
pH (pH units)			6.5 - 8.5	7.4		6.4	7.0	6.3	5.6

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1B					
Date>				Aug-22	Aug-23	Aug-23	Aug-24		Median
Parameters	PWQO		ODWS			DUP #1			last 10 Events
Fluoride			1.5						
Chloride			250	26	20	20	26		29
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10		
N-NO3 -Nitrate			10	4.31	3.94	3.92	4.11		3.63
Bromide									
Phosphate									
Sulphate			500	8	6	6	6		8
Calcium				20	17	16	18		
Magnesium				9	7	7	7		
Sodium			200	15	17	16	15		15
Potassium				3	2	2	3		3
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	<0.001		
Barium			1	0.02	0.03	0.01	0.01		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.01	0.04	0.02	0.02		0.01
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001		
Chromium	PWQO	0.009	0.05	<0.001	<0.001	<0.001	<0.001		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				200	194	191	193		231
Copper	PWQO IPWQO	0.005 d	1	<0.001	0.004	<0.001	0.002		
Iron	PWQO	0.3	0.3	<0.03	<0.03	<0.03	<0.03		0.03
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001		
Manganese			0.05	<0.01	<0.01	<0.01	<0.01		0.01
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.204	0.166	0.167	0.134		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01		
Hardness (as CaCO3)			500	87	71	69	74		
Alkalinity as CaCO3	IPWQO	a	30 - 500	58	62	60	57		53
TKN				0.649	0.307	0.335	0.377		
N-NH3 - Ammonia				0.031	0.096	0.059	0.041		
Organic Nitrogen			0.15	0.618	0.211	0.276	0.336		
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001		
BOD									
COD				<5	<5	<5	6		5
DOC			5	112.5	1.9	1.9	1.6		
TDS			500	130	126	124	125		128
Total Sus. Solids									
pH			6.5-8.5	6.67	6.93	6.79	6.91		
Ion Balance									
Field Measured									
Water Temp. (°C)			15	11.2	18.7		10.9		
Conductivity (microS/cm)				250	310		290		
pH (pH units)			6.5 - 8.5	6.0	6.6		8.2		

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1C					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Aug-00	Oct-09
Parameters	PWQO		ODWS						
Fluoride			1.5	No Sample	0.06		No Sample	No Sample	
Chloride			250	Collected			Collected	Collected	43
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10		0.48				1.56
Bromide									
Phosphate									
Sulphate			500			12			17
Calcium					21	19			51
Magnesium					1	2			7
Sodium			200		6	6			15
Potassium						1			1
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						<0.001
Barium			1						0.02
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5			0.03			0.03
Cadmium	PWQO IPWQO	0.0002 c	0.005						<0.0001
Chromium	PWQO	0.009	0.05						0.003
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1						0.002
Iron	PWQO	0.3	0.3		0.06	0.05			<0.03
Lead	PWQO IPWQO	e	0.01		0.003				<0.001
Manganese			0.05			0.04			<0.01
Mercury	PWQO	0.0002	0.001						0.0002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							2.07
Silicon					2.2	3.1			
Silver	PWQO	0.0001	0.05						
Strontium					0.07	0.04			0.152
Sulphur						5			
Thallium	IPWQO	0.0003							
Tin						0.07			
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						<0.01
Hardness (as CaCO3)			500		57	56			
Alkalinity as CaCO3	IPWQO	a	30 - 500		68	60			
TKN					0.36				0.3
N-NH3 - Ammonia					0.25				0.06
Organic Nitrogen			0.15		0.11				0.24
Phenols	IPWQO	0.005							<0.001
BOD									
COD					28				14
DOC			5						4.4
TDS			500		80	90			
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									
Field Measured									
Water Temp. (°C)			15		8	9.5			
Conductivity (microS/cm)					199	214			
pH (pH units)			6.5 - 8.5		7.5	6.2			

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-1C					
Date>				Sep-10	Jul-11	Aug-12	Aug-13	Jul-14	
Parameters	PWQO		ODWS						
Fluoride			1.5	No Sample	No Sample	No Sample	No Sample		
Chloride			250	Collected	Collected	Collected	Collected	25.2	
N-NO2 - Nitrite			1					< 0.10	
N-NO3 -Nitrate			10					0.4	
Bromide									
Phosphate									
Sulphate			500					5	
Calcium								58.1	
Magnesium								7.96	
Sodium			200					12.6	
Potassium								0.9	
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025					0.0002	
Barium			1					0.012	
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5					< 0.005	
Cadmium	PWQO IPWQO	0.0002 c	0.005					< 0.00002	
Chromium	PWQO	0.009	0.05					< 0.002	
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								352	
Copper	PWQO IPWQO	0.005 d	1					0.0015	
Iron	PWQO	0.3	0.3					0.008	
Lead	PWQO IPWQO	e	0.01					0.00005	
Manganese			0.05					0.008	
Mercury	PWQO	0.0002	0.001					< 0.00002	
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3						1.09	
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5					< 0.005	
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500					135	
TKN								0.6	
N-NH3 - Ammonia								< 0.01	
Organic Nitrogen			0.15					≤ 0.60	
Phenols	IPWQO	0.005						< 0.001	
BOD									
COD								12	
DOC			5					2.6	
TDS			500					193	
Total Sus. Solids									
pH			6.5-8.5					7.91	
Ion Balance								0.863	
Field Measured									
Water Temp. (°C)			15					14.8	
Conductivity (microS/cm)								334	
pH (pH units)			6.5 - 8.5					7.6	

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2A					
Date>				Sep-90	Jan-91	Nov-91	Nov-96	Aug-00	Oct-07
Parameters	PWQO		ODWS						
Fluoride			1.5		0.42	0.49	No Sample	No Sample	
Chloride			250		nd	3	Collected	Collected	2
N-NO2 - Nitrite			1		nd	nd			<0.10
N-NO3 -Nitrate			10		0.51	nd			<0.10
Bromide					nd	0.7			
Phosphate					0.43	0.59			
Sulphate			500		105	120			15
Calcium					22	26			18
Magnesium					17	19			16
Sodium			200		97	90			70
Potassium					11	15			10
Aluminum	IPWQO	0.075	0.1		0.13	0.31			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		0.04	0.04			
Beryllium	PWQO	b			nd	nd			
Boron	IPWQO	0.2	5		0.14	0.22			0.22
Cadmium	PWQO IPWQO	0.0002 c	0.005		nd	nd			
Chromium	PWQO	0.009	0.05		nd	nd			
Cobalt	PWQO	0.0009			nd	nd			
Conductivity (microS/cm)									504
Copper	PWQO IPWQO	0.005 d	1		nd	nd			0.008
Iron	PWQO	0.3	0.3		0.23	0.29			<0.03
Lead	PWQO IPWQO	e	0.01		0.002	0.002			
Manganese			0.05		0.03	0.04			0.03
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04			nd	0.08			
Nickel	PWQO	0.025			nd	nd			
Total Phosphorus	IPWQO	0.3			nd	nd			
Silicon					5.6	7			
Silver	PWQO	0.0001	0.05		nd	nd			
Strontium					0.33	0.4			0.237
Sulphur					37	40			
Thallium	IPWQO	0.0003			nd	nd			
Tin					nd	nd			
Titanium					nd	nd			
Vanadium	PWQO	0.006			nd	nd			
Zinc	PWQO IPWQO	0.03 0.02	5		nd	nd			
Hardness (as CaCO3)			500		125	143			
Alkalinity as CaCO3	IPWQO	a	30 - 500		244	258			253
TKN					0.2	nd			0.32
N-NH3 - Ammonia					nd	nd			0.23
Organic Nitrogen			0.15		0.2	nd			0.09
Phenols	IPWQO	0.005			nd	nd			<0.001
BOD					4	8			
COD					nd	13			<5
DOC			5						
TDS			500		422	380			328
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									1.03
Field Measured									
Water Temp. (°C)			15	7	1	9			9.7
Conductivity (microS/cm)				420	800	798			500
pH (pH units)			6.5 - 8.5	8.1	8	7.8			7.98

All values reported in mg/L unless otherwise noted
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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2A					
Date>				Nov-08	Oct-09	Sep-10	Jul-11	Aug-12	Aug-13
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	35	2	3	3	2	2
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	0.16	0.12	<0.10
Bromide									
Phosphate									
Sulphate			500	87	14	13	13	15	16
Calcium				83	17	15	15	20	18
Magnesium				36	15	13	15	16	16
Sodium			200	29	68	71	70	74	69
Potassium				6	10	9	10	12	10
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		0.002	<0.01	<0.01	<0.01	<0.01
Barium			1		0.01	0.01	0.02	0.05	0.02
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.11	0.19	0.16	0.19	0.19	0.2
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05		0.007	<0.001	0.001	0.007	0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				777	520	505	517	507	503
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001	<0.001	0.001	0.006	0.003
Iron	PWQO	0.3	0.3	3.33	<0.03	<0.03	0.35	3.05	0.63
Lead	PWQO IPWQO	e	0.01		<0.001	<0.001	<0.001	0.001	<0.001
Manganese			0.05	0.67	0.06	0.05	0.05	0.09	0.03
Mercury	PWQO	0.0002	0.001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		12.2	0.24	0.27	6.16	2.8	1.38
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.398	0.26				
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	289	271	260	272	264	257
TKN				0.76	0.2	0.27	0.25	0.18	0.12
N-NH3 - Ammonia				0.45	0.19	0.14	0.13	0.15	0.1
Organic Nitrogen			0.15	0.31	0.01	0.13	0.12		0.02
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD					3				
COD				25	<5	5	20	8	9
DOC			5		2.6	2	2.1	2.2	2.1
TDS			500	505	338	328	336	330	327
Total Sus. Solids					121				
pH			6.5-8.5		8.33	8.2	8.28	8.27	8.19
Ion Balance				1					
Field Measured									
Water Temp. (°C)			15	2.1	9.1	10.1	9.4	11	10.7
Conductivity (microS/cm)				549	555	508	388	433	474
pH (pH units)			6.5 - 8.5	8	8.4	7.9	8	7.8	7.9

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2A
Date>				Jul-14
Parameters	PWQO		ODWS	
Fluoride			1.5	
Chloride			250	2.1
N-NO2 - Nitrite			1	< 0.10
N-NO3 -Nitrate			10	< 0.10
Bromide				
Phosphate				
Sulphate			500	17
Calcium				18.4
Magnesium				16.4
Sodium			200	73.8
Potassium				10.4
Aluminum	IPWQO	0.075	0.1	
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0022
Barium			1	0.016
Beryllium	PWQO	b		
Boron	IPWQO	0.2	5	0.196
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.00003
Chromium	PWQO	0.009	0.05	< 0.002
Cobalt	PWQO	0.0009		
Conductivity (microS/cm)				514
Copper	PWQO IPWQO	0.005 d	1	0.0019
Iron	PWQO	0.3	0.3	0.234
Lead	PWQO IPWQO	e	0.01	0.00012
Manganese			0.05	0.02
Mercury	PWQO	0.0002	0.001	0.00005
Molybdenum	IPWQO	0.04		
Nickel	PWQO	0.025		
Total Phosphorus	IPWQO	0.3		0.65
Silicon				
Silver	PWQO	0.0001	0.05	
Strontium				
Sulphur				
Thallium	IPWQO	0.0003		
Tin				
Titanium				
Vanadium	PWQO	0.006		
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005
Hardness (as CaCO3)			500	
Alkalinity as CaCO3	IPWQO	a	30 - 500	249
TKN				0.22
N-NH3 - Ammonia				0.05
Organic Nitrogen			0.15	0.17
Phenols	IPWQO	0.005		<0.001
BOD				
COD				< 5
DOC			5	3.2
TDS			500	288
Total Sus. Solids				
pH			6.5-8.5	8.15
Ion Balance				0.935
Field Measured				
Water Temp. (°C)			15	8.8
Conductivity (microS/cm)				470
pH (pH units)			6.5 - 8.5	8.2

All values reported in mg/L unless otherwise noted
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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2B					
Date>				Sep-90	Jan-90	Nov-91	Nov-96	Sep-97	Nov-98
Parameters	PWQO		ODWS						
Fluoride			1.5		0.12	0.14			
Chloride			250		27	31	31	29	30
N-NO2 - Nitrite			1						
N-NO3 -Nitrate			10		0.62	0.35	0.26		0.26
Bromide					0.9				
Phosphate					0.1	0.25			
Sulphate			500		36	55	17	18	17
Calcium					57	46	30	37	39
Magnesium					23	23	15	19	20
Sodium			200		22	19	14	17	17
Potassium					4	3	2	2	3
Aluminum	IPWQO	0.075	0.1			0.05			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		0.06	0.03	0.02		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.02	0.03	0.01	0.03	
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009				0.03			
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1				0.008		
Iron	PWQO	0.3	0.3		nd	0.04	0.04	0.16	0.09
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05		0.01	0.05		0.1	0.05
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon					4.5	7.6	9.3		
Silver	PWQO	0.0001	0.05						
Strontium					0.25	0.23	0.132	0.195	0.153
Sulphur					13	18	3		
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5		0.02				
Hardness (as CaCO3)			500		237	209	137	171	
Alkalinity as CaCO3	IPWQO	a	30 - 500		196	168	100	161	146
TKN					0.33	nd	0.18	0.22	0.22
N-NH3 - Ammonia							0.05	0.09	0.08
Organic Nitrogen			0.15				0.13	0.13	0.14
Phenols	IPWQO	0.005							
BOD						2			
COD						13	3	11	10
DOC			5						
TDS			500		300	264	188	256	252
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							1.05	0.95	1.07
Field Measured									
Water Temp. (°C)			15	11	1	9	8.5	13.9	7
Conductivity (microS/cm)				600	490	615	325	480	420
pH (pH units)			6.5 - 8.5	7.5	6.7	6.4	7.99	7.55	7.7

All values reported in mg/L unless otherwise noted
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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2B					
Date>				Sep-99	Aug-00	Aug-01	Dec-02	Nov-03	Aug-04
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	40	36	41	48	59	57
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.48	<0.10	<0.10	0.54	0.39	<0.10
Bromide									
Phosphate									
Sulphate			500	17	17	16	18	17	16
Calcium				37	34	34	30	35	29
Magnesium				19	16	17	15	17	14
Sodium			200	17	15	16	16	18	18
Potassium				3	3	3	2	3	3
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	<0.01	0.06	0.03	<0.05	0.02	0.02
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								403	396
Copper	PWQO IPWQO	0.005 d	1	<0.005	<0.01	0.001	<0.005	<0.001	0.001
Iron	PWQO	0.3	0.3	0.2	0.27	<0.01	<0.01	0.01	<0.01
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.02	0.04	0.05	<0.005	0.02	<0.01
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.154	0.154	0.146	0.153	0.187	0.183
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	139	129	121	98	104	95
TKN				0.15	0.22	0.45	0.46	0.55	0.37
N-NH3 - Ammonia				0.02	0.04	0.24	<0.02	0.02	0.13
Organic Nitrogen			0.15	0.13	0.18	0.21		0.53	0.24
Phenols	IPWQO	0.005		<0.001	0.004	<0.001	<0.001	<0.001	<0.001
BOD									
COD				15	8	11	<5	5	<5
DOC			5						
TDS			500	264	268	232	246	262	257
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.98	0.95	0.99	0.93	0.97	0.9
Field Measured									
Water Temp. (°C)			15	13.1	13.7	13	4.9	6.1	13.4
Conductivity (microS/cm)				375	350	550	379	342	322
pH (pH units)			6.5 - 8.5	7.46	7.78	6.68	8.01	7.65	6.91

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2B					
Date>				Dec-05	Sep-06	Oct-07	Nov-08	Oct-09	Sep-10
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	71	67	83	2	116	109
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.24	0.2	0.37	0.34	<0.10	0.17
Bromide									
Phosphate									
Sulphate			500	14	14	16	5	16	12
Calcium				41	43	37	24	40	
Magnesium				19	21	17	15	18	15
Sodium			200	19	21	23	51	30	35
Potassium				3	3	3	8	2	3
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025					<0.001	<0.001
Barium			1					0.04	0.03
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.02	0.02	0.26	0.02	0.01
Cadmium	PWQO IPWQO	0.0002 c	0.005				<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05					0.004	0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				480	516	481	452	583	546
Copper	PWQO IPWQO	0.005 d	1	0.003	0.029	0.004	0.001	0.001	0.001
Iron	PWQO	0.3	0.3	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Lead	PWQO IPWQO	e	0.01					<0.001	<0.001
Manganese			0.05	0.01	0.02	0.01	0.05	<0.01	<0.01
Mercury	PWQO	0.0002	0.001					<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3					15	0.23	0.14
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.224	0.213	0.204	0.249	0.322	
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5				<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	109	127	93	247	80	71
TKN				0.3	0.15	0.16	1.05	0.2	<0.10
N-NH3 - Ammonia				0.19	0.02	0.03	0.79	<0.02	<0.02
Organic Nitrogen			0.15	0.11	0.13	0.13	0.26	0.18	<0.10
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD								<1	
COD				<5	<5	6	18	<5	5
DOC			5					2.8	2.1
TDS			500	312	335	313	294	379	355
Total Sus. Solids								443	
pH			6.5-8.5					7.32	7.04
Ion Balance				1.01	1.03	0.95	0.96		
Field Measured									
Water Temp. (°C)			15	8.2	12.3	11.6	6.6	11.7	13.6
Conductivity (microS/cm)				447	415	469	506	572	558
pH (pH units)			6.5 - 8.5	6.21	7.2	6.71	6.8	8.46	7.94

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-2B					
Date>				Jul-11	Aug-12	Aug-13	Jul-14		
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	127	150	151	169		
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	< 0.10		
N-NO3 -Nitrate			10	<0.10	0.29	0.2	0.2		
Bromide									
Phosphate									
Sulphate			500	15	13	27	34		
Calcium				46	52	64	83.8		
Magnesium				21	22	30	38		
Sodium			200	33	38	40	49.8		
Potassium				3	3	4	3.7		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	0.0002		
Barium			1	0.04	0.04	0.04	0.048		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.01	0.03	0.04		
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	0.00006		
Chromium	PWQO	0.009	0.05	0.002	0.002	0.005	< 0.002		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				665	690	814	892		
Copper	PWQO IPWQO	0.005 d	1	0.001	0.001	0.001	0.0025		
Iron	PWQO	0.3	0.3	0.07	0.19	<0.03	0.047		
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	0.00006		
Manganese			0.05	0.03	0.02	0.02	0.035		
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	0.00005		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.3	0.19	0.14	0.19		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	< 0.005		
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	107	86	144	151		
TKN				<0.10	<0.10	<0.10	0.23		
N-NH3 - Ammonia				<0.02	<0.02	<0.02	< 0.01		
Organic Nitrogen			0.15	<0.10	<0.10	<0.10	≤ 0.25		
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	< 0.001		
BOD									
COD				75	<5	<5	< 5		
DOC			5	3.5	1.9	2.5	2.6		
TDS			500	432	448	529	469		
Total Sus. Solids									
pH			6.5-8.5	7.12	6.88	6.95	7.07		
Ion Balance							0.887		
Field Measured									
Water Temp. (°C)			15	12.3	14.2	16.3	12.1		
Conductivity (microS/cm)				482	578	757	794		
pH (pH units)			6.5 - 8.5	7.2	6.5	6.5	6.6		

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-3A					
Date>				Sep-90	Jan-91	Nov-91	Nov-96		
Parameters	PWQO		ODWS						
Fluoride			1.5		0.37	0.3	No Sample		
Chloride			250		35	124	Collected		
N-NO2 - Nitrite			1						
N-NO3 -Nitrate			10		0.6	0.5			
Bromide						1.1			
Phosphate					0.31	0.57			
Sulphate			500		54	229			
Calcium					35	91			
Magnesium					30	73			
Sodium			200		97	146			
Potassium					13	15			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		0.07	0.1			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.28	0.48			
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1						
Iron	PWQO	0.3	0.3		0.03	0.09			
Lead	PWQO IPWQO	e	0.01		0.02	0.005			
Manganese			0.05		0.06	0.22			
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3			0.1				
Silicon					6.1	7.7			
Silver	PWQO	0.0001	0.05						
Strontium					0.29	0.72			
Sulphur					22	75			
Thallium	IPWQO	0.0003							
Tin						0.06			
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500		211	527			
Alkalinity as CaCO3	IPWQO	a	30 - 500		324	330			
TKN					0.55	0.45			
N-NH3 - Ammonia									
Organic Nitrogen			0.15		0.55	0.45			
Phenols	IPWQO	0.005							
BOD									
COD					11	26			
DOC			5						
TDS			500		526	860			
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									
Field Measured									
Water Temp. (°C)			15	10	7	11			
Conductivity (microS/cm)				550	950	1842			
pH (pH units)			6.5 - 8.5	7.8	7.9	7			

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-3B					
Date>				Sep-90	Jan-91	Nov-91			
Parameters	PWQO		ODWS						
Fluoride			1.5		0.13	0.19			
Chloride			250		401	372			
N-NO2 - Nitrite			1		nd	nd			
N-NO3 -Nitrate			10		1.07	0.28			
Bromide					1.8	0.7			
Phosphate					0.59	0.45			
Sulphate			500		564	560			
Calcium					291	189			
Magnesium					183	241			
Sodium			200		193	270			
Potassium					15	17			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		0.05	0.09			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.81	1.55			
Cadmium	PWQO IPWQO	0.0002 c	0.005			0.046			
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1						
Iron	PWQO	0.3	0.3						
Lead	PWQO IPWQO	e	0.01			0.176			
Manganese			0.05		0.35	1.03			
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon					6	8			
Silver	PWQO	0.0001	0.05						
Strontium					0.79	1.36			
Sulphur					185	190			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500		1478	1461			
Alkalinity as CaCO3	IPWQO	a	30 - 500		850	1160			
TKN					1.79	1.48			
N-NH3 - Ammonia					0.5	0.1			
Organic Nitrogen			0.15		1.29	1.38			
Phenols	IPWQO	0.005							
BOD					2	5			
COD					75	80			
DOC			5						
TDS			500		2364	2296			
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									
Field Measured									
Water Temp. (°C)			15	13	2	8			
Conductivity (microS/cm)				3200	2800	4634			
pH (pH units)			6.5 - 8.5	6.5	6.8	6.4			

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ODWS = Ontario Drinking Water Standards
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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4A					
Date>				Oct-90	Jan-91	Nov-91	Nov-96	Aug-00	Oct-07
Parameters	PWQO		ODWS						
Fluoride			1.5		0.53	0.59	No Sample	No Sample	
Chloride			250				Collected	Collected	3
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10		0.87				<0.10
Bromide									
Phosphate					0.88	1.2			
Sulphate			500		13	15			22
Calcium					23	25			26
Magnesium					12	13			14
Sodium			200		80	88			83
Potassium					7	7			8
Aluminum	IPWQO	0.075	0.1		0.1	0.1			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		0.05	0.04			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.22	0.33			0.33
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009				0.02			
Conductivity (microS/cm)									591
Copper	PWQO IPWQO	0.005 d	1						<0.001
Iron	PWQO	0.3	0.3		0.06	0.07			0.14
Lead	PWQO IPWQO	e	0.01			0.006			
Manganese			0.05		0.02	0.03			0.08
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon					6.6	7.8			
Silver	PWQO	0.0001	0.05						
Strontium					0.14	0.23			0.231
Sulphur					5	8			
Thallium	IPWQO	0.0003							
Tin						0.13			
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500		107	116			
Alkalinity as CaCO3	IPWQO	a	30 - 500		268	282			292
TKN					0.63	0.25			1.52
N-NH3 - Ammonia									0.99
Organic Nitrogen			0.15		0.63	0.25			0.53
Phenols	IPWQO	0.005							<0.001
BOD					1	2			
COD					13	27			19
DOC			5						
TDS			500		336	330			384
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									0.99
Field Measured									
Water Temp. (°C)			15	8	5	9			11.2
Conductivity (microS/cm)				600	550	746			563
pH (pH units)			6.5 - 8.5	7.9	7.7	7.9			9.08

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4A					
Date>				Nov-08	Oct-09	Aug-13	Jul-14	Aug-15	Aug-16
Parameters	PWQO		ODWS						
Fluoride			1.5		Well				
Chloride			250	3	Destroyed	1	1	1	0.7
N-NO2 - Nitrite			1	<0.10	No Sample	<0.10	0.1	< 0.1	0.2
N-NO3 -Nitrate			10	0.18	Collected	<0.10	0.1	< 0.1	0.1
Bromide									
Phosphate									
Sulphate			500	23		15	17	17	13
Calcium				30		25	26.8	25.1	23
Magnesium				14		13	13.8	14.1	12.3
Sodium			200	74		79	87.6	93.4	77.4
Potassium				7		9	9.3	9.2	7.1
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025			<0.01	0.0044	0.0032	0.0002
Barium			1			0.07	0.071	0.069	0.043
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.27		0.24	0.225	0.27	0.239
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001		<0.0001	0.00005	< 0.00002	< 0.00002
Chromium	PWQO	0.009	0.05			<0.001	< 0.002	< 0.002	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				589		565	571	567	450
Copper	PWQO IPWQO	0.005 d	1	<0.001		<0.001	0.0007	< 0.002	< 0.002
Iron	PWQO	0.3	0.3	0.19		0.03	0.196	0.16	0.149
Lead	PWQO IPWQO	e	0.01			<0.001	0.00029	0.00018	< 0.00002
Manganese			0.05	0.14		0.08	0.071	0.078	0.078
Mercury	PWQO	0.0002	0.001			<0.0001	< 0.00002	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		21.4		127	39.9	49.9	14.6
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.269					
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01		<0.01	< 0.005	< 0.005	< 0.005
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	302		294	278	296	235
TKN				0.71		5.72	2.68	3.4	3.2
N-NH3 - Ammonia				0.51		5.76	0.85	2.39	1.29
Organic Nitrogen			0.15	0.2		0.00	1.83	1.01	1.91
Phenols	IPWQO	0.005		<0.001		0.007	< 0.001	< 0.001	< 0.001
BOD									
COD				23		55	286	1070	99
DOC			5			8.3	7.7	9.8	7.5
TDS			500	383		367	325	381	302
Total Sus. Solids									
pH			6.5-8.5			8.04	8.25	8.15	8.1
Ion Balance				0.92			0.902		
Field Measured									
Water Temp. (°C)			15	7.3		12	9.6	9	11.3
Conductivity (microS/cm)				594		530	522	497	473
pH (pH units)			6.5 - 8.5	8.1		7.8	8.6	8.2	7.6

All values reported in mg/L unless otherwise noted

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4A					
Date>				Aug-17	Jul-18	Aug-19	Aug-20	Aug-21	Aug-22
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	0.9	1.6	0.9	1	3	2
N-NO2 - Nitrite			1	< 0.05	< 0.05	< 0.05	< 0.05	<0.10	<0.10
N-NO3 -Nitrate			10	< 0.05	0.06	0.16	< 0.05	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	10	14	20	18	25	12
Calcium				25.3	23.6	24.2	26.3	36	26
Magnesium				14.8	13.1	13.9	13.9	23	13
Sodium			200	90.3	93	93.2	86.4	91	84
Potassium				9.5	9.3	9.6	9.9	10	8
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0016	0.0015	0.0007	0.0013	0.001	<0.001
Barium			1	0.063	0.062	0.05	0.067	0.09	0.04
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.301	0.282	0.291	0.282	0.25	0.29
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.000014	< 0.000015	< 0.000015	< 0.000015	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.001	< 0.001	<0.001	<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				554	543	566	567	585	542
Copper	PWQO IPWQO	0.005 d	1	< 0.002	0.002	0.001	0.0012	0.002	<0.001
Iron	PWQO	0.3	0.3	0.014	0.016	0.037	0.058	0.09	0.16
Lead	PWQO IPWQO	e	0.01	0.00003	0.00003	0.00005	0.00005	<0.001	<0.001
Manganese			0.05	0.052	0.049	0.071	0.065	0.12	0.09
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		108	40.7	38.6	15.4	0.232	22.4
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	<0.005	<.0005	< 0.005	<0.01	<0.01
Hardness (as CaCO3)			500	124	113	118	123	172	118
Alkalinity as CaCO3	IPWQO	a	30 - 500	287	277	267	268	303	292
TKN				2.3	5.6	3.1	1.7	1.75	1.22
N-NH3 - Ammonia				1.64	1.66	1.66	1.02	0.453	0.416
Organic Nitrogen			0.15	0.66	3.94	1.44	0.68	1.297	0.804
Phenols	IPWQO	0.005		< 0.001	0.013	<0.002	< 0.01	<0.004	<0.001
BOD									
COD				91	300	490	460	14	31
DOC			5	7.9	8	7.8	8.8	6.1	45.3
TDS			500	323	323	324	318	380	352
Total Sus. Solids									
pH			6.5-8.5	8.35	8.47	8.18	8.29	8.12	7.99
Ion Balance					0.882	0.854	0.884		
Field Measured									
Water Temp. (°C)			15	9.7	9.4	8.7	8.8	9.1	11.2
Conductivity (microS/cm)				492	440	574	548	582	560
pH (pH units)			6.5 - 8.5	8.7	8.1	8.1	8	7.3	7.9

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4A					
Date>				Aug-23	Aug-24	Aug-24			
Parameters	PWQO		ODWS			DUP #1			
Fluoride			1.5						
Chloride			250	1	2	3			
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10			
N-NO3 -Nitrate			10	0.12	<0.10	<0.10			
Bromide									
Phosphate									
Sulphate			500	21	16	15			
Calcium				27	29	27			
Magnesium				15	15	14			
Sodium			200	77	82	84			
Potassium				7	8	8			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001			
Barium			1	0.05	0.04	0.04			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.25	0.30	0.32			
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001			
Chromium	PWQO	0.009	0.05	<0.001	<0.001	<0.001			
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				564	554	552			
Copper	PWQO IPWQO	0.005 d	1	0.001	<0.001	<0.001			
Iron	PWQO	0.3	0.3	0.31	0.21	0.19			
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001			
Manganese			0.05	0.15	0.10	0.11			
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001			
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		26.7	37.8	28.7			
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01			
Hardness (as CaCO3)			500	129	134	125			
Alkalinity as CaCO3	IPWQO	a	30 - 500	314	296	289			
TKN				1.23	0.967	1.1			
N-NH3 - Ammonia				0.496	0.359	0.481			
Organic Nitrogen			0.15	0.734	0.602	0.619			
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001			
BOD									
COD				11	36	19			
DOC			5	7.7	6.6	6.6			
TDS			500	367	360	359			
Total Sus. Solids									
pH			6.5-8.5	8.04	7.95	8.04			
Ion Balance									
Field Measured									
Water Temp. (°C)			15	11.1	11.1				
Conductivity (microS/cm)				670	610				
pH (pH units)			6.5 - 8.5	7.8	7.3				

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4B					
Date>				Jan-91	Nov-91	Nov-96	Nov-98	Sep-99	Aug-00
Parameters	PWQO		ODWS						
Fluoride			1.5	0.12	0.17				
Chloride			250	4		1	3	2	2
N-NO2 - Nitrite			1					<0.10	<0.10
N-NO3 -Nitrate			10		0.45			<0.10	<0.10
Bromide									
Phosphate				0.1	0.17				
Sulphate			500	98	65	48	75	70	52
Calcium				51	46	33	75	69	62
Magnesium				23	23	15	34	31	31
Sodium			200	15	15	11	23	30	20
Potassium				2	1		4	4	3
Aluminum	IPWQO	0.075	0.1	0.04	0.04	0.06			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.03	0.03	0.03			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.03	0.04	0.19	0.05	0.09
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1					<0.005	0.11
Iron	PWQO	0.3	0.3	0.09	0.05	0.06	0.12	0.97	0.04
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.03	0.12		nd	0.01	0.18
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				3.5	4.9	6.2			
Silver	PWQO	0.0001	0.05						
Strontium				0.1	0.21	0.125	0.255	0.245	0.214
Sulphur				35	21	16			
Thallium	IPWQO	0.0003							
Tin					0.08				
Titanium									
Vanadium	PWQO	0.006				0.01			
Zinc	PWQO IPWQO	0.03 0.02	5			0.01			
Hardness (as CaCO3)			500	222	209	144			
Alkalinity as CaCO3	IPWQO	a	30 - 500	124	154	108	284	297	281
TKN				0.21	0.4	0.27	0.32	0.26	0.24
N-NH3 - Ammonia						0.03	0.07	0.04	0.05
Organic Nitrogen			0.15	0.21	0.4	0.24	0.25	0.22	0.19
Phenols	IPWQO	0.005						<0.001	0.004
BOD									
COD				16	32	17	13	25	13
DOC			5						
TDS			500	264	250	180	376	400	360
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1.05	1.05	0.99	0.98
Field Measured									
Water Temp. (°C)			15	1	7.5	7.3	5.1	11.3	15.3
Conductivity (microS/cm)				330	798	340	680	590	530
pH (pH units)			6.5 - 8.5	7.6	7.3	8.04	7.71	6.97	6.59

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4B					
Date>				Aug-01	Dec-02	Nov-03	Dec-05	Sep-06	Oct-07
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	3	4	2	3	3	3
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	75	87	10	26	8	56
Calcium				63	60	15	21	16	65
Magnesium				28	30	5	8	5	28
Sodium			200	24	24	4	6	2	21
Potassium				4	4	<1	<1	<1	2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.05	<0.05	<0.01	<0.01	0.01	0.08
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)						128	201	132	617
Copper	PWQO IPWQO	0.005 d	1	0.002	0.005	0.002	0.007	0.001	0.008
Iron	PWQO	0.3	0.3	0.02	0.67	0.25	0.05	0.68	0.07
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.12	0.022	0.04	<0.01	0.11	0.14
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.234	0.226	0.133	0.175	0.172	0.233
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	271	267	54	71	55	277
TKN				0.35	0.35	0.6	0.49	0.47	0.27
N-NH3 - Ammonia				0.29	<0.02	0.04	0.02	0.06	0.03
Organic Nitrogen			0.15	0.06	<0.35	0.56	0.47	0.41	0.24
Phenols	IPWQO	0.005		0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD									
COD				97	15	46	14	18	14
DOC			5						
TDS			500	368	398	83	131	86	401
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.94	0.91	0.99	0.96	N/A - LC	0.96
Field Measured									
Water Temp. (°C)			15	21.4	4.1	4.6	5.4	13.8	13.5
Conductivity (microS/cm)				859	480	99	249	150	603
pH (pH units)			6.5 - 8.5	7.62	8.84	6.85	6.56	7.32	7.85

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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4B					
Date>				Nov-08	Oct-09	Sep-10	Jul-11	Jul-14	Aug-15
Parameters	PWQO		ODWS						
Fluoride			1.5				Well	Repaired	No Sample
Chloride			250	4	2	6	Destroyed	3.3	Collected
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	No Sample	< 0.10	
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10		< 0.10	
Bromide									
Phosphate									
Sulphate			500	18	21	52		17	
Calcium				27	31	69		61.1	
Magnesium				11	14	24		27	
Sodium			200	8	8	20		17.4	
Potassium				<1	<1	4		1.7	
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001	<0.001		0.0036	
Barium			1		0.04	0.12		0.05	
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.02	0.04		< 0.005	
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001		< 0.00002	
Chromium	PWQO	0.009	0.05		0.001	0.001		< 0.002	
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				252	313	593		524	
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001	0.002		< 0.0001	
Iron	PWQO	0.3	0.3	0.33	2.55	<0.03		4.46	
Lead	PWQO IPWQO	e	0.01		<0.001	<0.001		0.00017	
Manganese			0.05	0.1	0.11	0.2		0.382	
Mercury	PWQO	0.0002	0.001		<0.0001	<0.0001		< 0.00002	
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.2	1.16	107		0.96	
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.13	0.175				
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01		< 0.005	
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	113	141	270		256	
TKN				0.28	0.45	2.63		1.62	
N-NH3 - Ammonia				0.02	0.18	1.39		< 0.01	
Organic Nitrogen			0.15	0.26	0.27	1.24		≤ 1.62	
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001		0.006	
BOD									
COD				15	16	925		137	
DOC			5		6.4	17.2		7.9	
TDS			500	164	203	385		287	
Total Sus. Solids					1500				
pH			6.5-8.5		7.37	7.68		7.47	
Ion Balance				0.95				0.882	
Field Measured									
Water Temp. (°C)			15	4.6	12.3	13		13.9	15.7
Conductivity (microS/cm)				314	500	611		487	520
pH (pH units)			6.5 - 8.5	6.8	7.2	9		7	7.5

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4B					
Date>				Aug-16	Aug-17	Jul-18	Aug-19	Aug-20	Aug-21
Parameters	PWQO		ODWS						
Fluoride			1.5	No Sample		No Sample	No Sample	No Sample	
Chloride			250	Collected	1.9	Collected	Collected	Collected	5
N-NO2 - Nitrite			1		< 0.05				<0.10
N-NO3 -Nitrate			10		< 0.05				<0.10
Bromide									
Phosphate									
Sulphate			500		4				11
Calcium					45.5				47
Magnesium					22.8				23
Sodium			200		11.9				14
Potassium					0.5				1
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		0.0008				<0.001
Barium			1		0.037				0.03
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.032				0.01
Cadmium	PWQO IPWQO	0.0002 c	0.005		< 0.000014				<0.0001
Chromium	PWQO	0.009	0.05		< 0.002				<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)					395				374
Copper	PWQO IPWQO	0.005 d	1		< 0.002				0.001
Iron	PWQO	0.3	0.3		6.38				0.54
Lead	PWQO IPWQO	e	0.01		< 0.00002				<0.001
Manganese			0.05		0.204				0.08
Mercury	PWQO	0.0002	0.001		< 0.00002				<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3			0.13				0.051
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5		< 0.005				<0.01
Hardness (as CaCO3)			500		207				212
Alkalinity as CaCO3	IPWQO	a	30 - 500		206				194
TKN					0.6				0.152
N-NH3 - Ammonia					0.03				<0.010
Organic Nitrogen			0.15						<0.152
Phenols	IPWQO	0.005			< 0.001				<0.004
BOD									
COD					31				<5
DOC			5		10.6				5.2
TDS			500		217				243
Total Sus. Solids									
pH			6.5-8.5		7.5				7.23
Ion Balance									
Field Measured									
Water Temp. (°C)			15	18.5	15.9				15.3
Conductivity (microS/cm)				723	385				335
pH (pH units)			6.5 - 8.5	7.6	7.3				7

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-4B					
Date>				Aug-22	Aug-23	Aug-24			
Parameters	PWQO		ODWS						
Fluoride			1.5	No Sample		No Sample			
Chloride			250	Collected	3	Collected			
N-NO2 - Nitrite			1		<0.10				
N-NO3 -Nitrate			10		<0.10				
Bromide									
Phosphate									
Sulphate			500		9				
Calcium					47				
Magnesium					23				
Sodium			200		13				
Potassium					<1				
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001				
Barium			1		0.06				
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.03				
Cadmium	PWQO IPWQO	0.0002 c	0.005		<0.0001				
Chromium	PWQO	0.009	0.05		<0.001				
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)					454				
Copper	PWQO IPWQO	0.005 d	1		<0.001				
Iron	PWQO	0.3	0.3		0.86				
Lead	PWQO IPWQO	e	0.01		<0.001				
Manganese			0.05		0.13				
Mercury	PWQO	0.0002	0.001		<0.0001				
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3			0.248				
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5		<0.01				
Hardness (as CaCO3)			500		212				
Alkalinity as CaCO3	IPWQO	a	30 - 500		267				
TKN					0.346				
N-NH3 - Ammonia					0.077				
Organic Nitrogen			0.15		0.269				
Phenols	IPWQO	0.005			<0.001				
BOD									
COD					41				
DOC			5		5.6				
TDS			500		295				
Total Sus. Solids									
pH			6.5-8.5		7.17				
Ion Balance									
Field Measured									
Water Temp. (°C)			15		15.5				
Conductivity (microS/cm)					7.5				
pH (pH units)			6.5 - 8.5		540				

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-5A					
Date>				Oct-90	Jan-91	Nov-91	Nov-96	Oct-07	
Parameters	PWQO		ODWS						
Fluoride			1.5		0.75	0.8	No Sample		
Chloride			250				Collected	1	
N-NO2 - Nitrite			1		0.13	0.12		<0.10	
N-NO3 -Nitrate			10		0.38			0.15	
Bromide									
Phosphate					1.41	2.06			
Sulphate			500		25	40		9	
Calcium					7	11		5	
Magnesium					5	5		4	
Sodium			200		134	157		143	
Potassium					11	15		8	
Aluminum	IPWQO	0.075	0.1		0.56	6.75			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1		nd	0.08			
Beryllium	PWQO	b			nd	nd			
Boron	IPWQO	0.2	5		0.37	0.48		0.46	
Cadmium	PWQO IPWQO	0.0002 c	0.005		nd	nd			
Chromium	PWQO	0.009	0.05		nd	nd			
Cobalt	PWQO	0.0009			nd	nd			
Conductivity (microS/cm)								629	
Copper	PWQO IPWQO	0.005 d	1		nd	nd		<0.001	
Iron	PWQO	0.3	0.3		0.45	5.8		0.06	
Lead	PWQO IPWQO	e	0.01		nd	0.009			
Manganese			0.05		0.03	0.11		0.01	
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04			nd	nd			
Nickel	PWQO	0.025			nd	0.01			
Total Phosphorus	IPWQO	0.3			nd	nd			
Silicon					6.7	20.8			
Silver	PWQO	0.0001	0.05		nd	nd			
Strontium					nd	0.11		0.076	
Sulphur					4	15			
Thallium	IPWQO	0.0003			nd	nd			
Tin					nd	nd			
Titanium					0.03	0.43			
Vanadium	PWQO	0.006			nd	nd			
Zinc	PWQO IPWQO	0.03 0.02	5		nd	0.02			
Hardness (as CaCO3)			500		38	48			
Alkalinity as CaCO3	IPWQO	a	30 - 500		334	370		325	
TKN					0.14	1.03		0.92	
N-NH3 - Ammonia					0.13	0.6		0.47	
Organic Nitrogen			0.15		0.01	0.43		0.45	
Phenols	IPWQO	0.005			nd	nd		<0.001	
BOD					nd	2			
COD					51	37		21	
DOC			5						
TDS			500		400	420		409	
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance								1.05	
Field Measured									
Water Temp. (°C)			15	11	5	8.5		9.8	
Conductivity (microS/cm)				700	700	908		598	
pH (pH units)			6.5 - 8.5	8.1	8	8.2		8.68	

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-5A					
Date>				Nov-08	Oct-09	Jul-11	Aug-12	Aug-13	Jul-14
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	1	1	2	<1	1	0.8
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	< 0.10
N-NO3 -Nitrate			10	0.15	<0.10	0.12	0.41	0.16	< 0.10
Bromide									
Phosphate									
Sulphate			500	8	7	5	11	9	10
Calcium				4	5		5	6	6.24
Magnesium				4	4	4	4	6	5.51
Sodium			200	131	137	129	147	140	156
Potassium				7	8	9	10	9	9.9
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001	<0.01	<0.01	<0.01	0.0019
Barium			1		<0.01	<0.01	0.01	0.03	0..029
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.46	0.26	0.36	0.49	0.46	0.394
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00003
Chromium	PWQO	0.009	0.05		0.002	0.002	0.004	0.006	0.005
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				623	627	635	654	657	637
Copper	PWQO IPWQO	0.005 d	1	0.002	<0.001	0.01	0.008	0.004	0.0061
Iron	PWQO	0.3	0.3	0.07	0.11	0.18	0.83	2.87	2.61
Lead	PWQO IPWQO	e	0.01		<0.001	<0.001	<0.001	0.001	0.00125
Manganese			0.05	0.01	0.02	<0.01	0.03	0.07	0.063
Mercury	PWQO	0.0002	0.001		<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.76	0.95	1.59	0.62	1.04	1.19
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.068	0.059				
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	0.01	0.014
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	336	349	353	347	354	322
TKN				0.51	0.75	1.22	0.54	0.64	1.2
N-NH3 - Ammonia				0.31	0.48	0.7	0.38	0.45	0.11
Organic Nitrogen			0.15	0.2	0.27	0.52	0.16	0.19	1.09
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001
BOD					6				
COD				25	22	20	25	37	171
DOC			5		8.5	8.9	10.3	10.5	10.2
TDS			500	405	408	413	425	427	386
Total Sus. Solids					103				
pH			6.5-8.5		7.84	8.43	8.43	8.34	8.24
Ion Balance				0.93					0.843
Field Measured									
Water Temp. (°C)			15	2.8	9.3	10.9	9.3	9.6	9.2
Conductivity (microS/cm)				676	380	476	549	609	603
pH (pH units)			6.5 - 8.5	8.2	8.5	8.1	8.1	8.3	8.5

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-5B					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Nov-98	Sep-99
Parameters	PWQO		ODWS						
Fluoride			1.5	0.12	0.13				
Chloride			250	2	3	1	6	12	14
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10	0.14	0.65				0.12
Bromide									
Phosphate				0.13	0.22				
Sulphate			500	51	75	43	49	68	62
Calcium				69	49	42	49	56	60
Magnesium				25	21	22	23	25	25
Sodium			200	19	15	14	21	23	27
Potassium				4	2	2	2	3	3
Aluminum	IPWQO	0.075	0.1			0.14			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.05	0.06	0.04	0.05		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.03	0.04	nd	0.04	0.02	0.04
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1			0.2			<0.005
Iron	PWQO	0.3	0.3	1.29	2.3	1.35	0.07	0.29	0.81
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.49	0.3	0.33	0.09	0.11	0.21
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.13	0.18	0.12	0.167	0.173	0.185
Sulphur				20	25	14	15		
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	275	209	195	217		
Alkalinity as CaCO3	IPWQO	a	30 - 500	230	154	160	195	181	224
TKN				0.53	0.31		0.37	0.39	0.51
N-NH3 - Ammonia				0.15			0.04	0.06	0.13
Organic Nitrogen			0.15	0.38	0.31		0.33	0.33	0.38
Phenols	IPWQO	0.005		0.005					<0.001
BOD					1				
COD				19	43		28	26	35
DOC			5						
TDS			500	350	250	210	272	320	336
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							1.04	1.1	1.02
Field Measured									
Water Temp. (°C)			15	2	8	6.5	7.7	6.9	11.5
Conductivity (microS/cm)				460	609	487	470	550	540
pH (pH units)			6.5 - 8.5	7	7.1	6.1	8.24	7.89	7.37

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-5B					
Date>				Aug-00	Aug-01	Dec-02	Nov-03	Aug-04	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	19	17	13	17	15	19
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	0.11	<0.10	0.11	<0.10
Bromide									
Phosphate									
Sulphate			500	73	49	137	80	45	65
Calcium				57	61	74	38	59	48
Magnesium				26	26	28	17	22	22
Sodium			200	24	31	32	18	34	19
Potassium				3	3	4	2	4	2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.09	0.06	<0.05	0.02	0.09	0.03
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)							388	601	480
Copper	PWQO IPWQO	0.005 d	1	<0.01	0.002	<0.005	0.005	0.01	0.009
Iron	PWQO	0.3	0.3	0.25	0.38	0.02	0.19	3.01	0.07
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.36	0.36	0.036	0.17	0.57	0.12
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.178	0.198	0.233	0.135	0.215	0.167
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	212	260	244	123	256	154
TKN				0.44	1.22	0.47	0.59	0.59	0.34
N-NH3 - Ammonia				0.09	0.24	0.03	0.04	0.2	0.03
Organic Nitrogen			0.15	0.35	0.98	0.44	0.55	0.39	0.31
Phenols	IPWQO	0.005		0.005	<0.001	<0.001	<0.001	<0.001	<0.001
BOD									
COD				31	34	26	28	20	15
DOC			5						
TDS			500	372	384	470	252	391	312
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.97	0.99	0.92	0.9	0.98	1.02
Field Measured									
Water Temp. (°C)			15	15.1	14.6	3.8	6	13.7	6.2
Conductivity (microS/cm)				490	619	609	311	494	462
pH (pH units)			6.5 - 8.5	6.46	7.07	8.3	6.94	7.12	6.5

All values reported in mg/L unless otherwise noted

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PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-5B					
Date>				Sep-06	Oct-07	Nov-08	Oct-09	Sep-10	Jul-11
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	20	17	18	14	2	14
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	49	55	66	51	5	43
Calcium				48	61	62	50	5	43
Magnesium				20	24	26	21	4	20
Sodium			200	21	27	30	23	136	21
Potassium				2	3	3	3	9	2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025				0.001	<0.001	<0.001
Barium			1				0.06	<0.01	0.06
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.05	0.08	0.06	0.05	0.32	0.04
Cadmium	PWQO IPWQO	0.0002 c	0.005			<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05				0.003	0.002	0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				490	572	581	519	631	466
Copper	PWQO IPWQO	0.005 d	1	0.001	0.002	<0.001	<0.001	<0.001	0.003
Iron	PWQO	0.3	0.3	2.29	2.13	1.48	2.24	0.11	0.04
Lead	PWQO IPWQO	e	0.01				<0.001	<0.001	<0.001
Manganese			0.05	0.5	0.46	0.48	0.36	0.02	0.2
Mercury	PWQO	0.0002	0.001				<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3				0.13	0.12	0.48	0.51
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.195	0.175	0.171	0.179		
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5			<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	168	224	227	203	337	178
TKN				0.33	0.51	0.31	0.6	9.24	0.42
N-NH3 - Ammonia				0.06	0.1	0.02	0.11	7.59	0.09
Organic Nitrogen			0.15	0.27	0.41	0.29	0.49	1.65	0.33
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	0.008	<0.001
BOD							2		
COD				11	26	35	26	48	5
DOC			5				10.6	13.7	9.5
TDS			500	319	372	378	337	410	303
Total Sus. Solids							148		
pH			6.5-8.5				7.66	7.93	7.77
Ion Balance				1.01	1.03	1.03			
Field Measured									
Water Temp. (^{o}C)			15	13	12.6	6.4	12.1	9	12.5
Conductivity (microS/cm)				483	593	587	618	646	393
pH (pH units)			6.5 - 8.5	7.02	7.35	7.3	7.24	8.94	8.1

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-5B					
Date>				Aug-12	Aug-13	Jul-14			
Parameters	PWQO		ODWS						
Fluoride			1.5	No Sample					
Chloride			250	Collected	13	11.1			
N-NO2 - Nitrite			1		<0.10	< 0.10			
N-NO3 -Nitrate			10		<0.10	< 0.10			
Bromide									
Phosphate									
Sulphate			500		55	49			
Calcium					60	57.7			
Magnesium					22	22			
Sodium			200		32	27.5			
Potassium					3	2.8			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001	0.001			
Barium			1		0.07	0.057			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5		0.07	0.012			
Cadmium	PWQO IPWQO	0.0002 c	0.005		<0.0001	< 0.00002			
Chromium	PWQO	0.009	0.05		0.002	< 0.002			
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)					591	516			
Copper	PWQO IPWQO	0.005 d	1		0.002	< 0.0001			
Iron	PWQO	0.3	0.3		0.62	0.816			
Lead	PWQO IPWQO	e	0.01		<0.001	0.00005			
Manganese			0.05		0.41	0.382			
Mercury	PWQO	0.0002	0.001		<0.0001	< 0.00002			
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3			0.91	1.07			
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5		<0.01	0.025			
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500		243	207			
TKN					0.41	0.97			
N-NH3 - Ammonia					0.12	0.01			
Organic Nitrogen			0.15		0.29	0.96			
Phenols	IPWQO	0.005			<0.001	< 0.001			
BOD									
COD					41	72			
DOC			5		12.2	11			
TDS			500		384	295			
Total Sus. Solids									
pH			6.5-8.5		7.77	7.7			
Ion Balance						0.907			
Field Measured									
Water Temp. (°C)			15		14.6	13.2			
Conductivity (microS/cm)					550	488			
pH (pH units)			6.5 - 8.5		7.1	7.3			

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-6A					
Date>				Jan-91	Nov-91	Nov-96	Nov-08	Oct-09	Sep-10
Parameters	PWQO		ODWS						
Fluoride			1.5	0.54	0.63	0.48			
Chloride			250			2	5	4	4
N-NO2 - Nitrite			1				<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.45	0.34	0.69	0.28	0.12	0.32
Bromide					0.6				
Phosphate				1.88	1.01	0.92	0.92		
Sulphate			500	13	12	5	4	4	4
Calcium				15	11	13	13	14	12
Magnesium				11	10	11	11	11	9
Sodium			200	71	83	82	80	73	78
Potassium				7	9	8	8	8	7
Aluminum	IPWQO	0.075	0.1	0.23		0.33			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025					<0.001	<0.001
Barium			1			0.01		<0.01	<0.01
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.17	0.24	0.21	0.25	0.22	0.17
Cadmium	PWQO IPWQO	0.0002 c	0.005				<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05					0.002	0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)							466	482	443
Copper	PWQO IPWQO	0.005 d	1				0.002	0.002	0.002
Iron	PWQO	0.3	0.3	0.21	0.12	0.24	0.94	<0.03	<0.03
Lead	PWQO IPWQO	e	0.01	0.002	0.008			<0.001	<0.001
Manganese			0.05		0.02	0.03	0.05	0.03	0.03
Mercury	PWQO	0.0002	0.001					<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3					7.46	1.45	3.48
Silicon				8	8.3	9.7			
Silver	PWQO	0.0001	0.05						
Strontium				0.09	0.16	0.168	0.148	0.164	
Sulphur				5	6				
Thallium	IPWQO	0.0003							
Tin									
Titanium				0.01		0.01			
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5				0.01	<0.01	<0.01
Hardness (as CaCO3)			500	83	69				
Alkalinity as CaCO3	IPWQO	a	30 - 500	236	254	251	249	257	229
TKN				0.42	0.38	0.34	0.69	0.12	0.28
N-NH3 - Ammonia				0.27	0.38	0.06	0.47	0.12	0.2
Organic Nitrogen			0.15	0.15	0	0.28	0.22	0	0.08
Phenols	IPWQO	0.005					<0.001	<0.001	<0.001
BOD								5	
COD				5	21	11	28	<5	10
DOC			5					4	3
TDS			500	302	290	284	303	313	288
Total Sus. Solids								3460	
pH			6.5-8.5					8.32	8.17
Ion Balance						1.02	1.01		
Field Measured									
Water Temp. (°C)			15	4	9	11.5	4.8	10.7	10
Conductivity (microS/cm)				490	680	490	607	561	478
pH (pH units)			6.5 - 8.5	8.3	7.8	7.39	7.6	8.4	9.19

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ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-6A					
Date>				Jul-11	Aug-12	Aug-13	Jul-14		
Parameters	PWQO		ODWS						
Fluoride			1.5				No Sample		
Chloride			250	5	4	4	Collected		
N-NO2 - Nitrite			1	<0.10	0.11	<0.10			
N-NO3 -Nitrate			10	0.6	0.48	0.34			
Bromide									
Phosphate									
Sulphate			500	5	5	5			
Calcium				12	14	13			
Magnesium				11	11	11			
Sodium			200	82	82	80			
Potassium				8	9	8			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.01	<0.01			
Barium			1	0.02	0.02	0.02			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.16	0.2	0.2			
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.001	<0.0001			
Chromium	PWQO	0.009	0.05	0.004	0.006	0.003			
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				488	485	475			
Copper	PWQO IPWQO	0.005 d	1	0.005	0.006	0.006			
Iron	PWQO	0.3	0.3	1.58	2.04	1.32			
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001			
Manganese			0.05	0.06	0.08	0.06			
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001			
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		2.32	2.18	1.6			
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	0.02	<0.01			
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	258	256	251			
TKN				0.18	0.36	0.29			
N-NH3 - Ammonia				0.1	0.24	0.19			
Organic Nitrogen			0.15	0.08	0.12	0.1			
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001			
BOD									
COD				30	5	23			
DOC			5	3.2	3.3	3.2			
TDS			500	317	315	309			
Total Sus. Solids									
pH			6.5-8.5	8.34	8.3	8.27			
Ion Balance									
Field Measured									
Water Temp. (°C)			15	8.8	11.7	12.1	11.5		
Conductivity (microS/cm)				368	403	443	393		
pH (pH units)			6.5 - 8.5	7.7	7.6	8.1	8.5		

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-6B					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Nov-08	Oct-09
Parameters	PWQO		ODWS						
Fluoride			1.5	Frozen	0.2				
Chloride			250		40	44	42	111	116
N-NO2 - Nitrite			1					<0.10	<0.10
N-NO3 -Nitrate			10					<0.10	<0.10
Bromide									
Phosphate					0.24		0.03	0.03	
Sulphate			500		30	22	22	7	6
Calcium					36	33	26	38	44
Magnesium					21	21	14	21	23
Sodium			200		14	14	15	34	42
Potassium					1	1		1	1
Aluminum	IPWQO	0.075	0.1				0.32		
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						<0.001
Barium			1		0.01	0.02	0.02		0.03
Beryllium	PWQO	b					0.01		
Boron	IPWQO	0.2	5		0.02			0.01	0.01
Cadmium	PWQO IPWQO	0.0002 c	0.005					<0.0001	<0.0001
Chromium	PWQO	0.009	0.05						0.005
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								605	677
Copper	PWQO IPWQO	0.005 d	1			0.01		<0.001	0.023
Iron	PWQO	0.3	0.3		0.15	0.03	0.16	<0.03	0.12
Lead	PWQO IPWQO	e	0.01			0.003			0.005
Manganese			0.05					0.05	0.17
Mercury	PWQO	0.0002	0.001						<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3						4.62	3.7
Silicon					7.7	9.5	8.1		
Silver	PWQO	0.0001	0.05						
Strontium					0.16	0.14	0.124	0.214	0.235
Sulphur					10	9			
Thallium	IPWQO	0.0003							
Tin						0.06			
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5					<0.01	<0.01
Hardness (as CaCO3)			500		176	169			
Alkalinity as CaCO3	IPWQO	a	30 - 500		92	116	91	113	131
TKN					0.21		0.29	0.23	0.43
N-NH3 - Ammonia								<0.02	0.06
Organic Nitrogen			0.15		0.21				0.37
Phenols	IPWQO	0.005						<0.001	<0.001
BOD									1
COD					16		5	18	18
DOC			5						5.7
TDS			500		234	250	208	393	440
Total Sus. Solids									17000
pH			6.5-8.5						7.41
Ion Balance							0.9	0.93	
Field Measured									
Water Temp. (°C)			15		7	6	5.7	6.6	
Conductivity (microS/cm)					564	545	340	470	684
pH (pH units)			6.5 - 8.5		6.6	6.5	7.79	8.2	8

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-6B					
Date>				Jul-11	Aug-12	Aug-13	Jul-14		
Parameters	PWQO		ODWS						
Fluoride			1.5		No Sample	No Sample			
Chloride			250	56	Collected	Collected	98.7		
N-NO2 - Nitrite			1	<0.10	Dry	Dry	< 0.10		
N-NO3 -Nitrate			10	<0.10			< 0.10		
Bromide									
Phosphate									
Sulphate			500	9			5		
Calcium				27			35		
Magnesium				14			17.3		
Sodium			200	39			54		
Potassium				<1			1.6		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001			0.0003		
Barium			1	0.03			0.05		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02			< 0.005		
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001			0.00003		
Chromium	PWQO	0.009	0.05	0.002			0.005		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				464			561		
Copper	PWQO IPWQO	0.005 d	1	0.001			0.0019		
Iron	PWQO	0.3	0.3	0.23			1.49		
Lead	PWQO IPWQO	e	0.01	<0.001			0.00043		
Manganese			0.05	0.14			0.111		
Mercury	PWQO	0.0002	0.001	<0.0001			0.00005		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		15.8			10.8		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01			< 0.005		
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	135			131		
TKN				0.51			3.54		
N-NH3 - Ammonia				0.03			< 0.01		
Organic Nitrogen			0.15	0.48			≤ 3.54		
Phenols	IPWQO	0.005		<0.001			< 0.001		
BOD									
COD				58			15		
DOC			5	14.6			4.6		
TDS			500	302			289		
Total Sus. Solids									
pH			6.5-8.5	7.04			6.97		
Ion Balance							0.963		
Field Measured									
Water Temp. (°C)			15	14.8			14.5		
Conductivity (microS/cm)				333			516		
pH (pH units)			6.5 - 8.5	6.6			6.7		

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7A					
Date>				Jan-91	Nov-91	Nov-96	Nov-96	Nov-08	Oct-09
Parameters	PWQO		ODWS						
Fluoride			1.5	0.6	0.67				
Chloride			250				79	3	73
N-NO2 - Nitrite			1		0.46		<0.10	<0.10	<0.10
N-NO3 -Nitrate			10		2.3		0.18	0.17	0.12
Bromide									
Phosphate				0.91	2.13				
Sulphate			500	18	35		221	7	227
Calcium				15	16		108	11	100
Magnesium				9	9		50	7	48
Sodium			200	105	113		67	105	59
Potassium				9	9		7	8	6
Aluminum	IPWQO	0.075	0.1	0.98					
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						<0.001
Barium			1	0.03	0.03				0.1
Beryllium	PWQO	b		nd	nd				
Boron	IPWQO	0.2	5	0.24	0.35		0.11	0.4	0.12
Cadmium	PWQO IPWQO	0.0002 c	0.005	nd	nd			<0.0001	<0.0001
Chromium	PWQO	0.009	0.05	nd	nd				0.004
Cobalt	PWQO	0.0009		nd	nd				
Conductivity (microS/cm)							1160	565	1210
Copper	PWQO IPWQO	0.005 d	1	nd	nd		0.003	<0.001	0.002
Iron	PWQO	0.3	0.3	0.77	0.7		0.19	<0.03	0.16
Lead	PWQO IPWQO	e	0.01	nd	0.008				<0.001
Manganese			0.05	0.03	0.03		1.17	0.03	1.1
Mercury	PWQO	0.0002	0.001						<0.0001
Molybdenum	IPWQO	0.04		nd	nd				
Nickel	PWQO	0.025		nd	nd				
Total Phosphorus	IPWQO	0.3		nd	nd			22.6	1.45
Silicon				8	9.3				
Silver	PWQO	0.0001	0.05	nd	nd				
Strontium				0.09	0.19		0.614	0.161	0.667
Sulphur				nd	12				
Thallium	IPWQO	0.0003		nd	nd				
Tin				nd	nd				
Titanium				0.05	nd				
Vanadium	PWQO	0.006		nd	nd				
Zinc	PWQO IPWQO	0.03 0.02	5	nd	nd			<0.01	<0.01
Hardness (as CaCO3)			500	74	77				
Alkalinity as CaCO3	IPWQO	a	30 - 500	282	370		289	308	303
TKN				1.84	0.36		0.74	1.23	0.88
N-NH3 - Ammonia				1.63	0.36		0.28	0.93	0.26
Organic Nitrogen			0.15	0.21	0		0.46	0.46	0.62
Phenols	IPWQO	0.005		nd	nd		<0.001	<0.001	<0.001
BOD				2	3				6
COD				37	35		22	40	28
DOC			5						10.2
TDS			500	320	342		754	367	787
Total Sus. Solids									1910
pH			6.5-8.5						7.98
Ion Balance							1	0.93	
Field Measured									
Water Temp. (°C)			15	3	9		9.4	4.2	10.9
Conductivity (microS/cm)				550	719		485	551	1219
pH (pH units)			6.5 - 8.5	8.6	8.3		8.72	8.4	8.13

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7A					
Date>				Sep-09	Jul-11	Aug-12	Aug-13	Jul-14	Jul-14
Parameters	PWQO		ODWS						DUP
Fluoride			1.5						
Chloride			250	68	2	3	4	2.8	2.8
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	< 0.10	< 0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	0.13	0.1	0.1
Bromide									
Phosphate									
Sulphate			500	190	8	7	13	11	11
Calcium				97	16	18	18	19.2	18.9
Magnesium				47	10	10	11	11	10.8
Sodium			200	67	96	104	100	108	107
Potassium				7	8	9	9	8.4	8.3
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.01	<0.01	<0.01	0.0034	0.0034
Barium			1	0.09	0.06	0.05	0.08	0.063	0.065
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.1	0.28	0.34	0.26	0.257	0.255
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	0.00002	< 0.00002
Chromium	PWQO	0.009	0.05	0.003	0.001	0.004	0.005	0.003	0.029
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1110	584	588	579	589	590
Copper	PWQO IPWQO	0.005 d	1	0.001	0.005	0.002	0.001	0.0025	0.0009
Iron	PWQO	0.3	0.3	0.97	0.03	1.19	1.91	0.977	0.206
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001	0.00086	0.00034
Manganese			0.05	1.01	0.02	0.06	0.08	0.064	0.034
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		2.23	79	59.6	26	45.5	33.5
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	0.01	0.01	0.005	0.005
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	280	319	315	299	285	288
TKN				0.52	2.31	1.78	2.19	1.99	1.62
N-NH3 - Ammonia				0.19	1.14	1.3	1.58	0.4	0.44
Organic Nitrogen			0.15	0.33	1.17	0.48	0.61	1.59	1.18
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	0.002	< 0.001	< 0.001
BOD									
COD				28	<5	29	66	448	1140
DOC			5	10.5	9.4	9.9	12	11	10.7
TDS			500	722	380	382	376	333	333
Total Sus. Solids									
pH			6.5-8.5	7.59	8.46	8.49	8.44	8.36	8.39
Ion Balance								0.877	0.904
Field Measured									
Water Temp. (°C)			15	12.1	9.3	9.9	10.4	9.5	--
Conductivity (microS/cm)				1226	421	470	492	514	--
pH (pH units)			6.5 - 8.5	8.4	8.6	8.3	7.8	8.8	--

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7A					
Date>				Aug-15	Aug-16	Aug-17	Jul-18	Aug-19	Aug-20
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	2.5	2.9	3	4.1	2.1	3.8
N-NO2 - Nitrite			1	< 0.1	< 0.1	< 0.05	< 0.05	0.18	< 0.05
N-NO3 -Nitrate			10	0.1	< 0.1	< 0.05	0.06	0.41	< 0.05
Bromide									
Phosphate									
Sulphate			500	9	7	6	8	7	9
Calcium				15.7	19.1	18.2	18.2	8.94	12.5
Magnesium				10.3	11.4	11.3	11.1	6.61	8.38
Sodium			200	116	112	111	112	113	111
Potassium				9.7	8.7	9.2	9.1	8.8	9.8
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0042	0.0024	0.0032	0.0025	0.0021	0.002
Barium			1	0.057	0.062	0.071	0.067	0.03	0.038
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.308	0.319	0.332	0.305	0.337	0.336
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.00002	< 0.00002	< 0.000014	< 0.000015	< 0.000015	< 0.000015
Chromium	PWQO	0.009	0.05	0.012	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				554	573	577	558	553	582
Copper	PWQO IPWQO	0.005 d	1	< 0.002	< 0.002	< 0.002	< 0.002	0.0011	0.0014
Iron	PWQO	0.3	0.3	0.817	0.007	0.011	0.011	< 0.005	0.02
Lead	PWQO IPWQO	e	0.01	0.00093	0.00005	< 0.00002	0.00003	0.00006	0.00008
Manganese			0.05	0.05	0.029	0.026	0.028	0.019	0.026
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		2.29	10.1	147	87.5	128	62.9
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Hardness (as CaCO3)			500			92	91	50	66
Alkalinity as CaCO3	IPWQO	a	30 - 500	298	312	300	298	274	273
TKN				16.9	4.7	3.7	5.6	6.1	11.1
N-NH3 - Ammonia				2.47	2.12	2.19	1.77	1.95	1.37
Organic Nitrogen			0.15	14.43	2.58	1.51	3.83	4.15	9.73
Phenols	IPWQO	0.005		< 0.001	< 0.001	< 0.001	0.016	< 0.002	< 0.01
BOD									
COD				1990	700	620	475	57	1450
DOC			5	13	10.5	10.7	10.3	10.6	12.1
TDS			500	372	385	339	344	313	321
Total Sus. Solids									
pH			6.5-8.5	8.33	8.43	8.44	7.78	8.38	8.42
Ion Balance							0.885	0.911	0.893
Field Measured									
Water Temp. (°C)			15	9.6	10	9.9	8.0	9.5	10.2
Conductivity (microS/cm)				346	599	548	448	547	527
pH (pH units)			6.5 - 8.5	8.5	8.4	9.0	8.0	8.6	8.2

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7A					
Date>				Aug-21	Aug-22	Aug-23	Aug-24		
Parameters	PWQO		ODWS						
Fluoride			1.5			No Sample			
Chloride			250	7	3	Collected	4		
N-NO2 - Nitrite			1	<0.10	<0.10		<0.10		
N-NO3 -Nitrate			10	<0.10	<0.10		<0.10		
Bromide									
Phosphate									
Sulphate			500	11	7		6		
Calcium				22	13		13		
Magnesium				14	10		9		
Sodium			200	126	114		115		
Potassium				13	13		10		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.002	0.004		0.002		
Barium			1	0.06	0.06		0.04		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.3	0.33		0.38		
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001		<0.0001		
Chromium	PWQO	0.009	0.05	<0.001	<0.001		<0.001		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				584	558		557		
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001		<0.001		
Iron	PWQO	0.3	0.3	0.05	<0.03		0.05		
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001		<0.001		
Manganese			0.05	0.04	0.03		0.03		
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001		<0.0001		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		4.23	31.5		79.2		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01		<0.01		
Hardness (as CaCO3)			500	113	74		70		
Alkalinity as CaCO3	IPWQO	a	30 - 500	312	303		299		
TKN				2.18	2.58		1.52		
N-NH3 - Ammonia				0.425	0.626		0.32		
Organic Nitrogen			0.15	1.755	1.954		1.2		
Phenols	IPWQO	0.005		<0.004	<0.001		<0.001		
BOD									
COD				46	86		57		
DOC			5	9.1	54		9.2		
TDS			500	380	363		362		
Total Sus. Solids									
pH			6.5-8.5	8.36	8.22		8.17		
Ion Balance									
Field Measured									
Water Temp. (°C)			15	9.7	11.3		10.0		
Conductivity (microS/cm)				552	540		590.0		
pH (pH units)			6.5 - 8.5	7.6	8.3		7.3		

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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7B					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Sep-97	Nov-98
Parameters	PWQO		ODWS						
Fluoride			1.5	0.18	0.17				
Chloride			250	35	50	55	84	59	75
N-NO2 - Nitrite			1						
N-NO3 -Nitrate			10	0.28	0.22		0.11	0.16	
Bromide									
Phosphate				0.21	0.25				
Sulphate			500	180	215	216	242	196	238
Calcium				90	104	105	111	91	119
Magnesium				46	57	59	59	46	57
Sodium			200	41	55	53	53	74	57
Potassium				6	5	6		6	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.09	0.1	0.09	0.12		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.07	0.09	0.09	0.09	0.12	0.08
Cadmium	PWQO IPWQO	0.0002 c	0.005						nd
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1			0.02			
Iron	PWQO	0.3	0.3	0.08	0.08	0.1	0.22	0.6	nd
Lead	PWQO IPWQO	e	0.01		0.003				
Manganese			0.05	0.72	0.49	0.88	0.66	0.47	0.44
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04		0.04					
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				4.7	6.3	8	8.4		
Silver	PWQO	0.0001	0.05						
Strontium				0.33	0.57	0.44	0.541	0.469	0.512
Sulphur				63	71	64	69		
Thallium	IPWQO	0.0003							
Tin					0.13				
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5				0.01		
Hardness (as CaCO3)			500	414	494	510	520	417	
Alkalinity as CaCO3	IPWQO	a	30 - 500	254	392	290	273	297	272
TKN				0.32	0.38		0.43	0.5	0.41
N-NH3 - Ammonia				0.2	nd		0.14	0.22	0.16
Organic Nitrogen			0.15	0.12	0.38		0.29	0.28	0.25
Phenols	IPWQO	0.005							nd
BOD					2				
COD				21	32		25	31	21
DOC			5						
TDS			500	578	604	620	664	628	732
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							1	1	1.06
Field Measured									
Water Temp. (°C)			15	1	8.5	7	7.9	12.8	6.6
Conductivity (microS/cm)				956	1316	1478	1100	970	1000
pH (pH units)			6.5 - 8.5	7.4	7.1	6.6	7.48	7.64	8.06

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7B					
Date>				Sep-99	Aug-00	Aug-01	Dec-02	Nov-03	Aug-04
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	80	91	84	83	125	97
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.21	<0.10	<0.10	0.22	<0.10	0.16
Bromide									
Phosphate									
Sulphate			500	212	238	226	244	276	264
Calcium				113	117	106	105	129	113
Magnesium				55	57	56	57	65	62
Sodium			200	61	55	59	57	58	63
Potassium				7	7	6	6	8	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.08	0.13	0.09	0.06	0.06	0.11
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								1240	1250
Copper	PWQO IPWQO	0.005 d	1	<0.005	<0.01	0.001	<0.005	0.003	0.004
Iron	PWQO	0.3	0.3	0.59	0.23	0.45	0.08	0.22	0.16
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.79	0.68	0.72	0.193	0.82	0.6
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.491	0.504	0.537	0.52	0.589	0.59
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	288	283	285	287	268	279
TKN				0.44	0.56	0.89	0.43	0.36	0.52
N-NH3 - Ammonia				0.11	0.14	0.3	0.08	0.18	0.28
Organic Nitrogen			0.15	0.33	0.42	0.59	0.35	0.18	0.24
Phenols	IPWQO	0.005		<0.001	0.005	<0.001	<0.001	<0.001	<0.001
BOD									
COD				25	23	26	20	31	<5
DOC			5						
TDS			500	788	872	832	787	806	813
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				1.04	0.99	0.99	0.95	0.99	0.99
Field Measured									
Water Temp. (°C)			15	10.7	13.3	12.7	4.2	6.4	10.6
Conductivity (microS/cm)				1000	1050	1315	1071	978	1010
pH (pH units)			6.5 - 8.5	6.95	7.55	7.51	9.08	7.17	7.56

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7B					
Date>				Dec-05	Sep-06	Oct-07	Nov-08	Oct-09	Sep-10
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	96	92	2	83	2	2
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	0.17	0.19	0.24
Bromide									
Phosphate									
Sulphate			500	241	246	5	221	6	5
Calcium				122	121	11	105	12	10
Magnesium				60	60	8	52	7	6
Sodium			200	59	60	98	68	85	77
Potassium				6	7	9	6	7	6
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025					0.002	<0.01
Barium			1					0.03	0.03
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.09	0.1	0.31	0.12	0.27	0.17
Cadmium	PWQO IPWQO	0.0002 c	0.005				<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05					0.002	0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1230	1270	521	1180	474	421
Copper	PWQO IPWQO	0.005 d	1	0.004	0.002	0.001	0.003	<0.001	<0.001
Iron	PWQO	0.3	0.3	0.15	0.27	<0.03	0.16	0.04	<0.03
Lead	PWQO IPWQO	e	0.01					<0.001	<0.001
Manganese			0.05	0.5	1	0.03	0.58	0.03	0.02
Mercury	PWQO	0.0002	0.001					<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3					1.21	13.1	27
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.577	0.614	0.161	0.565	0.144	
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5				<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	282	272	280	303	253	219
TKN				0.36	0.63	1.71	0.61	1.14	1.2
N-NH3 - Ammonia				0.09	0.24	0.89	0.13	0.8	0.59
Organic Nitrogen			0.15	0.25	0.39	0.82	0.48	0.34	0.61
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD								6	
COD				27	17	37	30	28	25
DOC			5					8.6	6.3
TDS			500	800	825	339	767	308	274
Total Sus. Solids								83300	
pH			6.5-8.5					8.36	8.25
Ion Balance				1.03	1.05	1	0.97		
Field Measured									
Water Temp. (°C)			15	7.1	12.6	11.2	6.2	10	9.9
Conductivity (microS/cm)				1138	1020	1141	1208	598	531
pH (pH units)			6.5 - 8.5	6.41	7.03	7.52	7.8	8.47	8.72

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7B					
Date>				Jul-11	Aug-12	Aug-13	Jul-14	Aug-15	Aug-16
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	80	84	75	79.9	77.2	85.5
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	< 0.10	< 0.1	< 0.1
N-NO3 -Nitrate			10	0.14	0.12	0.15	0.2	0.1	0.2
Bromide									
Phosphate									
Sulphate			500	239	254	231	225	223	243
Calcium				104	118	109	115	117	121
Magnesium				53	55	53	57.3	59.9	63.1
Sodium			200	58	69	65	69	72.7	73
Potassium				6	7	7	6.5	6.9	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	0.0006	0.0008	0.0006
Barium			1	0.1	0.1	0.09	0.094	0.092	0.11
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.08	0.12	0.1	0.063	0.1	0.108
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002
Chromium	PWQO	0.009	0.05	0.003	0.003	0.004	< 0.002	< 0.002	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1250	1250	1190	1200	1140	1200
Copper	PWQO IPWQO	0.005 d	1	0.002	0.003	0.002	0.0014	< 0.002	< 0.002
Iron	PWQO	0.3	0.3	0.35	0.78	0.52	0.128	0.301	0.282
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	0.00006	0.00012	< 0.00002
Manganese			0.05	0.38	0.45	0.82	0.435	1.05	1.01
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		9.4	1.04	1.31	2.57	0.71	1.01
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	< 0.005	< 0.005	0.015
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	303	304	303	287	299	311
TKN				0.76	0.36	0.45	0.73	0.6	0.9
N-NH3 - Ammonia				0.1	0.08	0.24	< 0.01	0.2	0.26
Organic Nitrogen			0.15	0.66	0.28	0.21	≤ 0.73		
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001
BOD									
COD				60	26	24	98	122	81
DOC			5	13	10.2	10.3	9.3	5.4	9
TDS			500	812	812	774	725	775	816
Total Sus. Solids									
pH			6.5-8.5	7.8	7.79	7.95	7.79	7.97	7.92
Ion Balance							0.93		
Field Measured									
Water Temp. (°C)			15	10.3	11.5	12.1	9.4	11.8	12.2
Conductivity (microS/cm)				907	1042	1030	1091	931	1269
pH (pH units)			6.5 - 8.5	7.5	7	7.8	7.4	7.9	7.3

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7B					
Date>				Aug-17	Jul-18	Aug-19	Aug-20	Aug-21	Aug-22
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	72.2	81.4	84.5	80.7	89	72
N-NO2 - Nitrite			1	< 0.05	< 0.05	< 0.05	< 0.05	<0.10	<0.10
N-NO3 -Nitrate			10	< 0.05	0.09	0.12	0.07	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	206	238	221	242	227	222
Calcium				109	112	107	109	124	105
Magnesium				61.2	58.1	55	52.8	66	52
Sodium			200	74.4	72.6	79.5	75.2	80	77
Potassium				6.9	6.9	7.9	7.7	7	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0005	0.0003	0.0003	0.0003	<0.001	<0.001
Barium			1	0.099	0.09	0.086	0.096	0.12	0.09
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.12	0.1	0.145	0.137	0.1	0.15
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.000014	< 0.000015	< 0.000015	< 0.000015	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.001	< 0.001	<0.001	<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1210	1170	1160	1190	1220	1110
Copper	PWQO IPWQO	0.005 d	1	< 0.002	0.002	0.0021	0.0081	0.003	0.001
Iron	PWQO	0.3	0.3	0.077	0.57	0.007	0.086	0.84	<0.03
Lead	PWQO IPWQO	e	0.01	< 0.00002	< 0.00002	0.00012	0.00003	<0.001	<0.001
Manganese			0.05	0.929	0.98	0.775	0.824	1.06	0.85
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.0002	< 0.00002	< 0.00002	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.98	0.27	0.41	0.43	0.103	5.79
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005	<0.01	<0.01
Hardness (as CaCO3)			500	524	519	494	490	581	476
Alkalinity as CaCO3	IPWQO	a	30 - 500	295	275	288	281	308	318
TKN				0.6	0.6	0.7	0.7	0.65	0.771
N-NH3 - Ammonia				0.2	0.22	0.25	0.24	0.123	0.139
Organic Nitrogen			0.15			0.45	0.46	0.527	0.632
Phenols	IPWQO	0.005		< 0.001	< 0.001	< 0.002	< 0.002	<0.004	<0.001
BOD									
COD				75	33	38	27	23	39
DOC			5	10.5	10.3	10.2	9.2	10.5	54
TDS			500	708	736	729	737	793	722
Total Sus. Solids									
pH			6.5-8.5	7.8	7.78	7.76	7.92	7.76	7.65
Ion Balance					0.927	0.939	0.972		
Field Measured									
Water Temp. (°C)			15	12	10.5	11.2	12.5	11.6	12.4
Conductivity (microS/cm)				1132	769	1113	1093	1101	1060
pH (pH units)			6.5 - 8.5	7.6	7.5	7.5	7.4	7.3	7.1

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-7B						
Date>				Aug-23	Aug-24					
Parameters	PWQO		ODWS							
Fluoride			1.5	No Sample						
Chloride			250	Collected	88					
N-NO2 - Nitrite			1							
N-NO3 -Nitrate			10		<0.50					
Bromide										
Phosphate										
Sulphate			500		234					
Calcium					109					
Magnesium					54					
Sodium			200		77					
Potassium					7					
Aluminum	IPWQO	0.075	0.1							
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001					
Barium			1		0.09					
Beryllium	PWQO	b								
Boron	IPWQO	0.2	5		0.16					
Cadmium	PWQO IPWQO	0.0002 c	0.005		<0.0001					
Chromium	PWQO	0.009	0.05		<0.001					
Cobalt	PWQO	0.0009								
Conductivity (microS/cm)					1150					
Copper	PWQO IPWQO	0.005 d	1		0.002					
Iron	PWQO	0.3	0.3		0.44					
Lead	PWQO IPWQO	e	0.01		<0.001					
Manganese			0.05		1.19					
Mercury	PWQO	0.0002	0.001		<0.0001					
Molybdenum	IPWQO	0.04								
Nickel	PWQO	0.025								
Total Phosphorus	IPWQO	0.3			7.19					
Silicon										
Silver	PWQO	0.0001	0.05							
Strontium										
Sulphur										
Thallium	IPWQO	0.0003								
Tin										
Titanium										
Vanadium	PWQO	0.006								
Zinc	PWQO IPWQO	0.03 0.02	5		<0.01					
Hardness (as CaCO3)			500		495					
Alkalinity as CaCO3	IPWQO	a	30 - 500		321					
TKN					0.646					
N-NH3 - Ammonia					0.191					
Organic Nitrogen			0.15		0.455					
Phenols	IPWQO	0.005			<0.001					
BOD										
COD					36					
DOC			5		10.2					
TDS			500		748					
Total Sus. Solids										
pH			6.5-8.5		7.7					
Ion Balance										
Field Measured										
Water Temp. (^{o}C)			15		13.5					
Conductivity (microS/cm)					1120					
pH (pH units)			6.5 - 8.5		7.1					

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8A					
Date>				Jan-91	Nov-91	Nov-96	Oct-07	Nov-08	Oct-09
Parameters	PWQO		ODWS						
Fluoride			1.5	0.46	0.5	No Sample			
Chloride			250			Collected	36	2	25
N-NO2 - Nitrite			1	1.55			<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.95	2.4		<0.10	<0.10	0.16
Bromide					0.8				
Phosphate				0.81	0.76				
Sulphate			500	13			92	15	62
Calcium				26	27		82	16	60
Magnesium				16	15		33	14	25
Sodium			200	53	56		27	68	21
Potassium				8	8		6	9	5
Aluminum	IPWQO	0.075	0.1	0.24					
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						<0.001
Barium			1	0.04	0.05				0.17
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.17	0.24		0.11	0.21	0.1
Cadmium	PWQO IPWQO	0.0002 c	0.005					<0.0001	<0.0001
Chromium	PWQO	0.009	0.05						0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)							773	509	630
Copper	PWQO IPWQO	0.005 d	1				0.001	0.002	<0.001
Iron	PWQO	0.3	0.3	0.26	0.19		4.28	<0.03	3.86
Lead	PWQO IPWQO	e	0.01		0.007				<0.001
Manganese			0.05	0.05	0.06		0.69	0.02	0.62
Mercury	PWQO	0.0002	0.001						<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3						0.4	11.5
Silicon				7.8	8.5				
Silver	PWQO	0.0001	0.05						
Strontium				0.18	0.26		0.432	0.240	0.44
Sulphur					3				
Thallium	IPWQO	0.0003							
Tin					0.02				
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5					<0.01	<0.01
Hardness (as CaCO3)			500	131	129				
Alkalinity as CaCO3	IPWQO	a	30 - 500	228	240		274	266	233
TKN					0.13		0.86	0.19	1.65
N-NH3 - Ammonia					0.1		0.42	0.11	0.94
Organic Nitrogen			0.15		0.03		0.44	0.08	0.71
Phenols	IPWQO	0.005					<0.001	<0.001	0.002
BOD					4				8
COD					6		6	18	24
DOC			5						7.8
TDS			500	292	300		502	331	410
Total Sus. Solids									41900
pH			6.5-8.5						7.83
Ion Balance							0.97	0.91	
Field Measured									
Water Temp. (°C)			15	4.0	10.0		11.2	8.3	11.3
Conductivity (microS/cm)				400	567		757	742	655
pH (pH units)			6.5 - 8.5	8.5	8.1		7.5	7.6	8.4

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8A					
Date>				Sep-10	Jul-11	Aug-12	Aug-12	Aug-13	Jul-14
Parameters	PWQO		ODWS				DUP BH 18		
Fluoride			1.5						
Chloride			250	22	1	<1	<1	1	0.9
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	0.1
N-NO3 -Nitrate			10	0.51	<0.10	<0.10	<0.10	<0.10	0.2
Bromide									
Phosphate									
Sulphate			500	60	6	5	5	5	5
Calcium				58	24	27	26	26	26.8
Magnesium				24	15	15	15	16	15.7
Sodium			200	20	50	54	53	52	54.7
Potassium				5	9	9	9	10	9
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.01	<0.01	<0.01	<0.01	0.0022
Barium			1	0.15	0.06	0.04	0.04	0.07	0.044
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.08	0.2	0.22	0.21	0.19	0.191
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002
Chromium	PWQO	0.009	0.05	0.002	0.002	0.003	0.002	0.004	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				557	469	462	461	459	460
Copper	PWQO IPWQO	0.005 d	1	<0.001	0.003	<0.001	<0.001	0.005	0.0009
Iron	PWQO	0.3	0.3	2.77	0.03	0.73	0.64	1.56	0.71
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001	0.002	0.00146
Manganese			0.05	0.50	0.03	0.08	0.07	0.08	0.084
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		16.4	99.0	94.6	100	95.5	54.2
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	<0.01	0.006
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	195	260	253	253	260	232
TKN				1.52	2.62	2.68	2.56	2.53	2.18
N-NH3 - Ammonia				0.81	1.71	1.62	1.58	1.89	0.49
Organic Nitrogen			0.15	0.71	0.91	1.06	0.98	0.67	1.69
Phenols	IPWQO	0.005		0.016	<0.001	<0.001	<0.001	<0.001	< 0.001
BOD									
COD				20	15	27	23	45	1050
DOC			5	8.8	3.8	2.8	2.8	2.9	7.9
TDS			500	362	305	300	300	298	254
Total Sus. Solids									
pH			6.5-8.5	7.64	8.44	8.48	8.45	8.49	8.31
Ion Balance									0.899
Field Measured									
Water Temp. (°C)			15	12.7	10.1	11.2		10.9	9.4
Conductivity (microS/cm)				832	266	296		392	397
pH (pH units)			6.5 - 8.5	8.5	8.4	8.2		8.3	8.6

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8A					
Date>				Aug-15	Aug-15	Aug-16	Aug-16	Aug-17	Jul-18
Parameters	PWQO		ODWS		DUP BH 16		DUP BH 16		
Fluoride			1.5						
Chloride			250	0.7	0.7	0.6	0.6	0.8	1.5
N-NO2 - Nitrite			1	0.1	< 0.1	0.2	0.2	< 0.05	< 0.05
N-NO3 -Nitrate			10	0.1	0.1	< 0.1	0.1	< 0.05	0.06
Bromide									
Phosphate									
Sulphate			500	4	4	5	5	3	4
Calcium				27	27.1	26.5	27.4	24.7	26.2
Magnesium				16.7	16.8	16.9	16.9	16.1	15.8
Sodium			200	57.1	57.3	57	57.3	56.7	56
Potassium				9.7	9.8	9.6	9.3	9.9	9.2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0041	0.004	0.003	0.0024	0.0034	0.0019
Barium			1	0.062	0.065	0.058	0.055	0.056	0.051
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.236	0.229	0.24	0.242	0.246	0.23
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.00002	0.00002	< 0.00002	< 0.00002	< 0.000014	< 0.000015
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				444	434	455	463	442	474
Copper	PWQO IPWQO	0.005 d	1	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002
Iron	PWQO	0.3	0.3	0.469	0.505	0.015	0.014	0.016	0.047
Lead	PWQO IPWQO	e	0.01	0.00072	0.00066	0.00004	0.00003	< 0.00002	< 0.00002
Manganese			0.05	0.079	0.068	0.055	0.058	0.049	0.058
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	0.00004	0.00007	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		9.4	9.18	52.3	10.1	121	89.5
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Hardness (as CaCO3)			500					128	130
Alkalinity as CaCO3	IPWQO	a	30 - 500	244	243	269	252	242	228
TKN				11.7	11.4	13.9	10	2.8	9.7
N-NH3 - Ammonia				2.62	2.46	2.84	2.82	2.44	1.68
Organic Nitrogen			0.15						
Phenols	IPWQO	0.005		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.015
BOD									
COD				4000	2350	1260	1760	332	585
DOC			5	4.8	3.5	2.8	2.9	2.8	3.1
TDS			500	298	291	305	311	257	252
Total Sus. Solids									
pH			6.5-8.5	8.2	8.25	8.34	8.29	8.37	8.42
Ion Balance									0.867
Field Measured									
Water Temp. (°C)			15	9.8	--	10.3	--	9.8	9
Conductivity (microS/cm)				8.2	--	451	--	418	338
pH (pH units)			6.5 - 8.5	351	--	8.3	--	8.7	8.1

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8A					
Date>				Jul-18	Aug-19	Aug-19	Aug-20	Aug-21	Aug-21
Parameters	PWQO		ODWS	Dup BH 16		Dup BH 16			Dup #1
Fluoride			1.5						QA/QC
Chloride			250	1.5	0.5	0.7	0.7	3	3
N-NO2 - Nitrite			1	0.05	< 0.05	0.08	< 0.05	<0.10	<0.10
N-NO3 -Nitrate			10	0.06	0.1	0.12	< 0.05	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	4	5	5	5	4	4
Calcium				26.1	25.8	26.4	26.4	29	29
Magnesium				15.8	16.1	16.4	15.7	18	18
Sodium			200	55.7	55.2	55.9	52	61	63
Potassium				9.1	9.7	9.5	10.5	12	12
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0017	0.0023	0.0014	0.0032	0.004	0.003
Barium			1	0.049	0.045	0.04	0.063	0.05	0.05
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.226	0.239	0.249	0.229	0.24	0.29
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.000015	< 0.000015	< 0.000015	< 0.000015	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05	< 0.002	< 0.001	< 0.001	< 0.001	<0.001	<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				450	447	451	456	450	449
Copper	PWQO IPWQO	0.005 d	1	< 0.002	0.0007	0.001	0.0019	<0.001	<0.001
Iron	PWQO	0.3	0.3	0.038	< 0.005	0.006	< 0.005	0.05	0.05
Lead	PWQO IPWQO	e	0.01	0.00005	0.00005	0.00008	0.00017	<0.001	<0.001
Manganese			0.05	0.057	0.048	0.052	0.037	0.06	0.07
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		82.4	187	82	289	4.98	7.16
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005	<0.01	<0.01
Hardness (as CaCO3)			500	129	131	133	131	147	147
Alkalinity as CaCO3	IPWQO	a	30 - 500	226	229	229	222	251	250
TKN				95.50	9.1	4.8	29.5	2.23	3.24
N-NH3 - Ammonia				2.27	2.32	2.62	1.61	0.566	0.602
Organic Nitrogen			0.15		6.78	2.18	27.89	1.664	2.638
Phenols	IPWQO	0.005		0.017	< 0.002	< 0.002	< 0.01	<0.004	<0.004
BOD									
COD				855	2200	980	4500	28	26
DOC			5	2.8	6.5	5.2	3.5	2.6	2.8
TDS			500	251	252	255	246	292	292
Total Sus. Solids									
pH			6.5-8.5	8.4	8.45	8.4	8.4	8.33	8.38
Ion Balance				0.863	0.865	0.852	0.873		
Field Measured									
Water Temp. (°C)			15		9.3	10.1		9.9	9.9
Conductivity (microS/cm)					396	392		381	381
pH (pH units)			6.5 - 8.5		8.5	8.4		7.3	7.3

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8A					
Date>				Aug-22	Aug-22	Aug-23	Aug-24		
Parameters	PWQO		ODWS		DUP 1				
Fluoride			1.5		QA/QC				
Chloride			250	<1	1	<1	1		
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10		
N-NO3 -Nitrate			10	0.12	0.1	<0.10	<0.10		
Bromide									
Phosphate									
Sulphate			500	4	4	4	4		
Calcium				26	26	21	27		
Magnesium				16	16	14	16		
Sodium			200	54	53	54	54		
Potassium				10	10	10	9		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.002	0.003	<0.001	<0.001		
Barium			1	0.04	0.04	0.05	0.03		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.25	0.26	0.25	0.27		
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001		
Chromium	PWQO	0.009	0.05	<0.001	<0.001	<0.001	<0.001		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				447	451	338	461		
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001	0.001	0.002		
Iron	PWQO	0.3	0.3	0.06	0.05	0.06	0.06		
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001		
Manganese			0.05	0.06	0.06	0.05	0.05		
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		62.8	33.1	73.6	91.2		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01		
Hardness (as CaCO3)			500	131	131	110	133		
Alkalinity as CaCO3	IPWQO	a	30 - 500	248	250	265	246		
TKN				2.93	2.4	1.85	2.62		
N-NH3 - Ammonia				0.619	0.636	0.499	0.498		
Organic Nitrogen			0.15	2.311	1.764	1.35	2.12		
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001		
BOD									
COD				14	49	21	46		
DOC			5	36.4	36	3.2	2.3		
TDS			500	291	293	220	300		
Total Sus. Solids									
pH			6.5-8.5	8.13	8.14	8.33	8.28		
Ion Balance									
Field Measured									
Water Temp. (°C)			15	10.1	10.1	11.3	10		
Conductivity (microS/cm)				450	450	500	480		
pH (pH units)			6.5 - 8.5	7.1	7.1	6.6	7.2		

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8B					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Aug-97	Nov-98
Parameters	PWQO		ODWS						
Fluoride			1.5	0.200	0.220				
Chloride			250		1	1	10	12	17
N-NO2 - Nitrite			1						
N-NO3 -Nitrate			10	0.72	0.18			0.27	0.28
Bromide					0.800				
Phosphate				0.350	0.280				
Sulphate			500	36	42	38	46	47	60
Calcium				62	58	66	65	60	74
Magnesium				27	26	32	30	27	34
Sodium			200	17	23	21	22	24	24
Potassium				4	5	4	5	5	5
Aluminum	IPWQO	0.075	0.1	0.040			0.150		
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.080	0.110	0.120	0.120		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.06	0.10	0.08	0.08	0.08	0.07
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1						
Iron	PWQO	0.3	0.3	1.26	1.24	1.82	0.75	2.31	0.76
Lead	PWQO IPWQO	e	0.01		0.003				
Manganese			0.05	0.51	0.46	0.47	0.46	0.48	0.47
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04		0.040					
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				8.10	10.60	12.40	12.20		
Silver	PWQO	0.0001	0.05						
Strontium				0.200	0.310	0.260	0.321	0.306	0.340
Sulphur				12.00	14.00	11.00	14.00		
Thallium	IPWQO	0.0003							
Tin					0.050	0.060			
Titanium									
Vanadium	PWQO	0.006			0.010				
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	266	252	296	286	261	
Alkalinity as CaCO3	IPWQO	a	30 - 500	236	254	268	262	277	266
TKN				0.30	0.29		0.47	0.67	1.74
N-NH3 - Ammonia				0.25	0.29		0.30	0.24	0.47
Organic Nitrogen			0.15	0.05	0.00		0.17	0.43	1.27
Phenols	IPWQO	0.005							nd
BOD					4.0				
COD				11	14		23	31	56
DOC			5						
TDS			500	302	300	330	340		428
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							1.05	0.93	1.09
Field Measured									
Water Temp. (°C)			15	0.0	9.0	7.0	8.3	13.0	6.4
Conductivity (microS/cm)				450	798	739	590	580	480
pH (pH units)			6.5 - 8.5	7.4	7.1	6.7	7.8	7.4	8.3

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8B					
Date>				Sep-99	Aug-00	Aug-01	Dec-02	Nov-03	Aug-04
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	21	23	30	32	39	41
N-NO2 - Nitrite			1	0.12	<0.10	0.12	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.26	0.13	0.20	0.23	0.20	0.16
Bromide									
Phosphate									
Sulphate			500	58	65	86	94	98	102
Calcium				70	70	72	73	85	83
Magnesium				31	31	36	34	37	37
Sodium			200	26	26	25	24	27	26
Potassium				5	5	5	5	7	6
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.08	0.11	0.09	0.06	0.08	0.10
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								746	808
Copper	PWQO IPWQO	0.005 d	1	<0.005	<0.01	<0.001	<0.005	<0.001	<0.001
Iron	PWQO	0.3	0.3	0.55	0.66	0.63	0.35	2.85	1.56
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.40	0.40	0.44	0.41	0.55	0.49
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.315	0.324	0.361	0.364	0.416	0.427
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	279	279	270	275	275	275
TKN				0.42	0.46	0.69	0.59	0.87	0.64
N-NH3 - Ammonia				0.23	0.16	0.28	0.12	0.48	0.63
Organic Nitrogen			0.15	0.19	0.30	0.41	0.47	0.43	0.01
Phenols	IPWQO	0.005		<0.001	0.002	<0.001	<0.001	<0.001	<0.001
BOD									
COD				20	16	29	15	40	16
DOC			5						
TDS			500	392	416	456	493	485	525
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.99	0.96	0.97	0.91	1.00	0.98
Field Measured									
Water Temp. (°C)			15	11.9	13.0	13.1	3.6	7.1	12.3
Conductivity (microS/cm)				620	600	890	603	623	645
pH (pH units)			6.5 - 8.5	7.7	7.0	7.4	9.2	7.2	7.1

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Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8B					
Date>				Dec-05	Sep-06	Oct-07	Nov-08	Oct-09	Sep-10
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	2	36	1	100	2	1
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	0.30	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	5	95	7	18	4	4
Calcium				24	87	25	38	23	25
Magnesium				15	36	15	16	14	14
Sodium			200	52	27	50	27	48	55
Potassium				9	6	10	2	8	8
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025					0.003	<0.001
Barium			1					0.04	0.03
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.23	0.10	0.23	0.02	0.22	0.18
Cadmium	PWQO IPWQO	0.0002 c	0.005				<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05					0.001	0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				447	798	441	504	460	454
Copper	PWQO IPWQO	0.005 d	1	0.010	0.044	<0.001	0.001	<0.001	<0.001
Iron	PWQO	0.3	0.3	<0.03	3.56	<0.03	<0.03	<0.03	0.05
Lead	PWQO IPWQO	e	0.01					<0.001	<0.001
Manganese			0.05	0.05	0.63	0.04	<0.01	0.05	0.05
Mercury	PWQO	0.0002	0.001					<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3					0.26	18.3	48
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.252	0.452	0.253	0.245	0.278	
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5				<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	251	275	235	87	253	243
TKN				1.66	0.36	1.95	0.28	1.28	1.69
N-NH3 - Ammonia				1.07	0.39	0.99	<0.02	0.93	0.99
Organic Nitrogen			0.15	0.59	0.00	0.96	0.26	0.35	0.70
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD								4	
COD				5	19	16	8	20	10
DOC			5					3.8	3.6
TDS			500	291	519	287	328	299	295
Total Sus. Solids								104000	
pH			6.5-8.5					8.39	8.30
Ion Balance				0.97	1.02	1.02	0.90		
Field Measured									
Water Temp. (°C)			15	7.0	12.6	10.4	7.9	9.4	11.3
Conductivity (microS/cm)				214	666	238	402	448	441
pH (pH units)			6.5 - 8.5	7.0	7.2	8.5	8.2	8.4	8.6

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8B					
Date>				Jul-11	Aug-12	Aug-13	Jul-14	Aug-15	Aug-16
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	36	36	31	30.7	27.9	28.2
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	< 0.10	< 0.1	< 0.1
N-NO3 -Nitrate			10	0.12	<0.10	<0.10	0.4	< 0.1	< 0.1
Bromide									
Phosphate									
Sulphate			500	95	99	84	93	87	89
Calcium				83	91	85	90.3	90.5	89.8
Magnesium				36	36	36	37.2	38.7	38.9
Sodium			200	25	27	29	28.6	31.2	30.9
Potassium				5	6	6	6.1	6	6.3
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	0.0005	0.0005	0.0005
Barium			1	0.160	0.15	0.170	0.162	0.187	0.191
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.08	0.11	0.09	0.062	0.099	0.103
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002
Chromium	PWQO	0.009	0.05	0.002	0.003	0.002	< 0.002	< 0.002	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				819	816	769	788	738	755
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001	<0.001	0.0001	< 0.002	< 0.002
Iron	PWQO	0.3	0.3	1.60	1.41	2.28	1.69	2.45	3.26
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	0.00012	0.00003	0.00003
Manganese			0.05	0.55	0.52	0.55	0.583	0.674	0.689
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		34	10.9	11.8	6.54	6.62	10.7
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	< 0.005	< 0.005	< 0.005
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	302	295	295	270	290	293
TKN				0.90	0.47	0.68	0.81	2.4	13.4
N-NH3 - Ammonia				0.48	0.28	0.39	0.03	0.54	1.02
Organic Nitrogen			0.15	0.42	0.19	0.29	0.78		
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001
BOD									
COD				70	16	27	201	850	307
DOC			5	11	7	6.7	9.6	7.3	7.5
TDS			500	532	530	500	452	502	507
Total Sus. Solids									
pH			6.5-8.5	8	7.80	8	7.8	7.89	7.91
Ion Balance							0.904		
Field Measured									
Water Temp. (°C)			15	10.6	12.1	12.3	10.5	11.6	12.9
Conductivity (microS/cm)				614	682	715	707	652	807
pH (pH units)			6.5 - 8.5	7.6	7.0	7.2	7.4	7.1	6.9

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Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8B					
Date>				Aug-17	Jul-18	Aug-19	Aug-20	Aug-20 Dup 1	Aug-21
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	23.8	26.3	29.4	26.7	26.8	24
N-NO2 - Nitrite			1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.10
N-NO3 -Nitrate			10	< 0.05	0.07	0.08	0.05	< 0.05	<0.10
Bromide									
Phosphate									
Sulphate			500	68	78	78	82	82	75
Calcium				83.2	84.9	88	88.3	87.4	87
Magnesium				37.9	37.5	39.5	36.6	36.6	40
Sodium			200	32.2	29.4	30.9	26.9	26.8	34
Potassium				6.7	5.9	6.9	6.3	6.3	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0006	0.0003	0.004	0.0004	0.0005	<0.001
Barium			1	0.213	0.18	0.191	0.192	0.192	0.19
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.119	0.95	0.114	0.098	0.102	0.09
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.000014	< 0.000015	< 0.000015	< 0.000015	< 0.000015	<0.0001
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.001	0.002	0.002	<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				752	726	748	758	760	741
Copper	PWQO IPWQO	0.005 d	1	< 0.002	0.002	0.0015	0.0023	0.0011	0.003
Iron	PWQO	0.3	0.3	1.89	1.96	1.42	0.005	0.006	3.36
Lead	PWQO IPWQO	e	0.01	0.00014	< 0.00002	0.00013	0.00023	0.00025	<0.001
Manganese			0.05	0.604	0.65	0.625	0.542	0.546	0.68
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		91	13.4	22.3	11.2	9.49	1.8
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.01
Hardness (as CaCO3)			500	364	366	382	371	369	382
Alkalinity as CaCO3	IPWQO	a	30 - 500	288	275	278	271	276	308
TKN				3.5	3.2	22.6	3.6	2.4	0.74
N-NH3 - Ammonia				0.59	0.66	1.33	0.52	0.49	0.298
Organic Nitrogen			0.15			21.27	3.08	1.91	0.442
Phenols	IPWQO	0.005		< 0.001	<0.004	0.003	< 0.002	< 0.01	<0.004
BOD									
COD				247	113	530	172	83	15
DOC			5	7.4	7.8	9.4	9.1	9.8	6.8
TDS			500	428	431	444	431	433	482
Total Sus. Solids									
pH			6.5-8.5	7.85	7.84	7.62	7.8	7.79	7.72
Ion Balance					0.882	0.857	0.896	0.911	
Field Measured									
Water Temp. (°C)			15	12	11	12.0	11.8		11.5
Conductivity (microS/cm)				740	540	741	720		725
pH (pH units)			6.5 - 8.5	7.6	7.1	6.9	7.2		6

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Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-8B					
Date>				Aug-22	Aug-23	Aug-24			
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	24	20	24			
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10			
N-NO3 -Nitrate			10	0.11	<0.10	<0.10			
Bromide									
Phosphate									
Sulphate			500	75	69	71			
Calcium				83	75	79			
Magnesium				36	34	34			
Sodium			200	27	28	27			
Potassium				6	5	6			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001			
Barium			1	0.16	0.2	0.14			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.1	0.11	0.11			
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001			
Chromium	PWQO	0.009	0.05	<0.001	<0.001	<0.001			
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				721	716	695			
Copper	PWQO IPWQO	0.005 d	1	<0.001	0.001	<0.001			
Iron	PWQO	0.3	0.3	3.19	3.01	3.42			
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001			
Manganese			0.05	0.59	0.59	0.56			
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001			
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		14.9	17.3	34.8			
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01			
Hardness (as CaCO3)			500	356	327	337			
Alkalinity as CaCO3	IPWQO	a	30 - 500	305	322	293			
TKN				0.937	1.08	0.83			
N-NH3 - Ammonia				0.274	0.267	0.223			
Organic Nitrogen			0.15	0.663	0.813	0.607			
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001			
BOD									
COD				21	30	75			
DOC			5	50	7.8	6.5			
TDS			500	469	465	452			
Total Sus. Solids									
pH			6.5-8.5	7.54	7.54	7.71			
Ion Balance									
Field Measured									
Water Temp. (°C)			15	12.4		12.0			
Conductivity (microS/cm)				740		830			
pH (pH units)			6.5 - 8.5	7.1		6.0			

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 9A					
Date>				Jan-91	Nov-91	Nov-96	Sep-97	Oct-07	Nov-08
Parameters	PWQO		ODWS						
Fluoride			1.5	0.2	0.22	No Sample			
Chloride			250			Collected		1	1
N-NO2 - Nitrite			1					<0.10	<0.10
N-NO3 -Nitrate			10	0.39	0.41		0.48	0.3	0.27
Bromide					1				
Phosphate				0.23	0.5				
Sulphate			500	20	30		19	17	19
Calcium				46	48		43	42	44
Magnesium				36	34		32	28	31
Sodium			200	14	14		13	13	13
Potassium				8	8		7	8	8
Aluminum	IPWQO	0.075	0.1	0.08	0.21				
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.01	0.02				
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.07	0.13		0.1	0.14	0.14
Cadmium	PWQO IPWQO	0.0002 c	0.005						<0.0001
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								480	497
Copper	PWQO IPWQO	0.005 d	1					<0.001	0.001
Iron	PWQO	0.3	0.3	0.07	0.18		0.22	<0.03	<0.03
Lead	PWQO IPWQO	e	0.01		0.003				
Manganese			0.05	0.02	0.04		0.03	0.04	0.02
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							2.59
Silicon				8.6	1				
Silver	PWQO	0.0001	0.05						
Strontium				0.67	0.8		0.738	0.712	0.707
Sulphur				7	10				
Thallium	IPWQO	0.0003							
Tin					0.06				
Titanium					0.02				
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						<0.01
Hardness (as CaCO3)			500	263	259		239		
Alkalinity as CaCO3	IPWQO	a	30 - 500	262	262		261	243	262
TKN				0.4	0.18		0.22	0.51	0.21
N-NH3 - Ammonia				nd	0.14		0.11	0.4	0.18
Organic Nitrogen			0.15	0.4	0.04		0.11	0.11	0.03
Phenols	IPWQO	0.005						<0.001	<0.001
BOD									
COD					9		11	<5	13
DOC			5						
TDS			500	296	290		296	312	323
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							0.98	0.99	0.97
Field Measured									
Water Temp. (°C)			15	3	10		11.3	11.7	6.2
Conductivity (microS/cm)				550	722		450	450	511
pH (pH units)			6.5 - 8.5	8.1	7.5		8.7	8.6	8.2

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 9A					
Date>				Oct-09	Sep-10	Jul-11	Aug-12	Aug-12	Aug-13
Parameters	PWQO		ODWS					DUP BH 16	
Fluoride			1.5						
Chloride			250	1	2	34	1	1	1
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.13	0.1	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	18	18	62	19	19	19
Calcium				42	48	90	48	47	45
Magnesium				29	31	35	30	30	31
Sodium			200	13	13	31	14	13	14
Potassium				8	8	3	9	9	8
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium			1	0.02	0.02	0.07	0.02	0.02	0.02
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.11	0.08	0.07	0.12	0.12	0.1
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05	0.002	0.001	0.004	0.001	0.001	0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				505	496	800	501	502	498
Copper	PWQO IPWQO	0.005 d	1	0.001	0.001	0.007	<0.001	<0.001	<0.001
Iron	PWQO	0.3	0.3	<0.03	0.21	0.34	0.25	0.16	0.09
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese			0.05	0.01	0.06	0.1	0.03	0.03	0.04
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.98	1.45	25.4	0.91	1.1	0.47
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.762					
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	263	252	319	264	265	262
TKN				0.33	0.31	0.76	0.31	0.39	0.23
N-NH3 - Ammonia				0.13	0.31	0.1	0.31	0.33	0.28
Organic Nitrogen			0.15	0.2	0.00	0.66	0.00	0.06	0
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD				5					
COD				6	13	135	<5	<5	7
DOC			5	3.4	3.8	24.8	3.6	3.6	3.8
TDS			500	328	322	520	326	326	324
Total Sus. Solids				1740					
pH			6.5-8.5	8.25	8.12	7.55	8.26	8.26	8.18
Ion Balance									
Field Measured									
Water Temp. (°C)			15	9.7	9	8.8	9.8		10.1
Conductivity (microS/cm)				597	506	376	--		458
pH (pH units)			6.5 - 8.5	8.5	8.2	7.9	7.9		8.0

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 9A
Date>				Jul-14
Parameters	PWQO		ODWS	
Fluoride			1.5	
Chloride			250	1.4
N-NO2 - Nitrite			1	0.2
N-NO3 -Nitrate			10	0.3
Bromide				
Phosphate				
Sulphate			500	19
Calcium				47.8
Magnesium				32.8
Sodium			200	13.9
Potassium				9.3
Aluminum	IPWQO	0.075	0.1	
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0003
Barium			1	0.04
Beryllium	PWQO	b		
Boron	IPWQO	0.2	5	0.105
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.00002
Chromium	PWQO	0.009	0.05	0.002
Cobalt	PWQO	0.0009		
Conductivity (microS/cm)				491
Copper	PWQO IPWQO	0.005 d	1	0.0023
Iron	PWQO	0.3	0.3	1.51
Lead	PWQO IPWQO	e	0.01	0.00062
Manganese			0.05	0.07
Mercury	PWQO	0.0002	0.001	0.00005
Molybdenum	IPWQO	0.04		
Nickel	PWQO	0.025		
Total Phosphorus	IPWQO	0.3		4.42
Silicon				
Silver	PWQO	0.0001	0.05	
Strontium				
Sulphur				
Thallium	IPWQO	0.0003		
Tin				
Titanium				
Vanadium	PWQO	0.006		
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005
Hardness (as CaCO3)			500	
Alkalinity as CaCO3	IPWQO	a	30 - 500	245
TKN				0.95
N-NH3 - Ammonia				0.04
Organic Nitrogen			0.15	0.91
Phenols	IPWQO	0.005		< 0.001
BOD				
COD				7
DOC			5	4.4
TDS			500	274
Total Sus. Solids				
pH			6.5-8.5	8.18
Ion Balance				0.892
Field Measured				
Water Temp. (°C)			15	10.2
Conductivity (microS/cm)				450
pH (pH units)			6.5 - 8.5	8.3

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-9B					
Date>				Jan-91	Nov-91	Nov-92	Nov-96	Sep-97	Oct-07
Parameters	PWQO		ODWS						
Fluoride			1.5	0.14	0.16		No Sample		
Chloride			250	209	216	199	Collected	125	48
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10	0.16				0.77	<0.10
Bromide				2.2	1.1				
Phosphate				0.25	0.35				
Sulphate			500	440	433	381		289	99
Calcium				211	205	172		152	103
Magnesium				104	115	100		82	44
Sodium			200	30	36	45		57	39
Potassium				6	6	5		6	4
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.13	0.16	0.14			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02			0.1	0.03	0.1
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.005					
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									988
Copper	PWQO IPWQO	0.005 d	1			0.03		0.015	0.008
Iron	PWQO	0.3	0.3	0.03	0.08	0.04		0.02	0.07
Lead	PWQO IPWQO	e	0.01		0.015			nd	
Manganese			0.05	0.03	0.06	0.04		0.21	0.21
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							0
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				3.5	4.9	6.2			
Silver	PWQO	0.0001	0.05						
Strontium				0.98	1.23	1.04	0.738	0.964	0.614
Sulphur				156	140	118			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	0.03					
Hardness (as CaCO3)			500	954	984	840		718	
Alkalinity as CaCO3	IPWQO	a	30 - 500	182	262	308		407	389
TKN				0.33	0.49			0.84	0.84
N-NH3 - Ammonia					0.16			0.07	0.08
Organic Nitrogen			0.15	0.33	0.33			0.77	0.76
Phenols	IPWQO	0.005							<0.001
BOD									
COD				24	37		11	47	45
DOC			5						
TDS			500	1380	1304	890	296	1076	642
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance							0.98	0.96	0.94
Field Measured									
Water Temp. (°C)			15	2	8	7		12.5	12.4
Conductivity (microS/cm)				1100	2383	2486		1170	877
pH (pH units)			6.5 - 8.5	7.1	6.6	6.5		7.4	7.4

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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-9B					
Date>				Nov-08	Oct-09	Sep-10	Jul-11	Aug-12	Aug-13
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	39	26	33	2	50	42
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	0.27	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	95	42	78	16	120	123
Calcium				97	72	80	48	113	93
Magnesium				43	30	34	30	54	40
Sodium			200	40	28	28	13	42	40
Potassium				4	3	3	9	7	4
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		<0.001	<0.001	<0.001	<0.001	<0.001
Barium			1		0.06	0.07	0.02	0.10	0.07
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.11	0.11	0.07	0.09	0.10	0.09
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05		0.006	0.003	0.018	0.005	0.003
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				906	710	725	496	1060	886
Copper	PWQO IPWQO	0.005 d	1	0.005	0.004	0.012	<0.001	0.014	0.011
Iron	PWQO	0.3	0.3	0.16	0.16	<0.03	0.28	1.03	0.11
Lead	PWQO IPWQO	e	0.01		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese			0.05	0.13	0.15	0.09	0.03	0.38	0.08
Mercury	PWQO	0.0002	0.001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.488	18	39	1.52	23.0	5.00
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.488	0.849				
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	362	306	255	261	401	299
TKN				0.83	0.83	0.84	0.24	0.62	0.68
N-NH3 - Ammonia				0.06	0.10	0.08	0.2	0.10	0.04
Organic Nitrogen			0.15	0.77	0.73	0.76	0.02	0.52	0.64
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD					<1				
COD				48	55	103	60	94	51
DOC			5		23.1	31.4	4.1	13.7	19.8
TDS			500	589	462	471	322	689	576
Total Sus. Solids					18900				
pH			6.5-8.5		7.32	7.25	8.25	7.51	7.33
Ion Balance				0.99					
Field Measured									
Water Temp. (°C)			15	7.8	11.9	13	11	13.0	12.6
Conductivity (microS/cm)				898	835	748	638	887	807
pH (pH units)			6.5 - 8.5	6.9	8.1	7.7	7.1	6.7	6.8

All values reported in mg/L unless otherwise noted

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-9B
Date>				Jul-14
Parameters	PWQO		ODWS	
Fluoride			1.5	
Chloride			250	35.6
N-NO2 - Nitrite			1	< 0.10
N-NO3 -Nitrate			10	0.1
Bromide				
Phosphate				
Sulphate			500	103
Calcium				91.7
Magnesium				40.7
Sodium			200	40.4
Potassium				47.1
Aluminum	IPWQO	0.075	0.1	
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0006
Barium			1	0.075
Beryllium	PWQO	b		
Boron	IPWQO	0.2	5	0.088
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.00006
Chromium	PWQO	0.009	0.05	< 0.002
Cobalt	PWQO	0.0009		
Conductivity (microS/cm)				916
Copper	PWQO IPWQO	0.005 d	1	0.0105
Iron	PWQO	0.3	0.3	0.427
Lead	PWQO IPWQO	e	0.01	0.00022
Manganese			0.05	0.137
Mercury	PWQO	0.0002	0.001	0.00005
Molybdenum	IPWQO	0.04		
Nickel	PWQO	0.025		
Total Phosphorus	IPWQO	0.3		20.6
Silicon				
Silver	PWQO	0.0001	0.05	
Strontium				
Sulphur				
Thallium	IPWQO	0.0003		
Tin				
Titanium				
Vanadium	PWQO	0.006		
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005
Hardness (as CaCO3)			500	
Alkalinity as CaCO3	IPWQO	a	30 - 500	343
TKN				1.61
N-NH3 - Ammonia				< 0.01
Organic Nitrogen			0.15	≤ 1.61
Phenols	IPWQO	0.005		< 0.001
BOD				
COD				48
DOC			5	17.8
TDS			500	522
Total Sus. Solids				
pH			6.5-8.5	7.51
Ion Balance				1.02
Field Measured				
Water Temp. (°C)			15	12
Conductivity (microS/cm)				828
pH (pH units)			6.5 - 8.5	7.1

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-10A					
Date>				Jan-91	Nov-91	Nov-96	Sep-99	Dec-02	Dec-02
Parameters	PWQO		ODWS						
Fluoride			1.5	0.35	0.37	0.4			
Chloride			250	5	1	9	7	14	12
N-NO2 - Nitrite			1				<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.91	0.8	1.01	0.79	0.84	0.2
Bromide									
Phosphate				0.56	0.91	0.31			
Sulphate			500	35	45	46	31	47	28
Calcium				39	35	41	39	38	39
Magnesium				38	34	36	35	36	34
Sodium			200	92	107	107	105	100	101
Potassium				11	13	14	14	13	14
Aluminum	IPWQO	0.075	0.1	0.74		0.65			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.03	0.02	0.04			
Beryllium	PWQO	b				0.01			
Boron	IPWQO	0.2	5	0.22	0.35	0.26	0.26	0.24	0.29
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									824
Copper	PWQO IPWQO	0.005 d	1				<0.005	<0.005	0.005
Iron	PWQO	0.3	0.3	0.56	0.1	0.67	0.84	<0.01	<0.03
Lead	PWQO IPWQO	e	0.01	0.006	0.006				
Manganese			0.05	0.13	0.09	0.03	0.06	0.024	0.11
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				9.1	9.7	9.7			
Silver	PWQO	0.0001	0.05						
Strontium				0.37	0.51	0.515	0.444	0.485	0.489
Sulphur				12	15	4			
Thallium	IPWQO	0.0003							
Tin					0.07				
Titanium				0.04		0.02			
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	253	227				
Alkalinity as CaCO3	IPWQO	a	30 - 500	388	422	425	447	423	432
TKN				0.39	0.42	0.55	0.92	0.79	1.01
N-NH3 - Ammonia				0.12	0.4	0.08	0.63	0.31	0.56
Organic Nitrogen			0.15	0.27	0.02	0.47	0.29	0.48	
Phenols	IPWQO	0.005					<0.001	<0.001	<0.001
BOD				1	2	1			
COD				21	26	25	20	24	30
DOC			5						
TDS			500	470	470	524	508	573	536
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1.03	1	0.97	1
Field Measured									
Water Temp. (°C)			15	5	9	8.8	8.9	4.5	7.7
Conductivity (microS/cm)				800	1177	920	760	706	757
pH (pH units)			6.5 - 8.5	8.1	7.3	7.8	7.8	8.7	7.2

All values reported in mg/L unless otherwise noted
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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-10A					
Date>				Oct-07	Nov-08	Oct-09	Sep-10	Jul-11	Aug-12
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	15	14	16	15	66	66
N-NO2 - Nitrite			1	0.19	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.38	0.41	0.23	0.45	0.56	0.35
Bromide									
Phosphate									
Sulphate			500	36	32	53	45	156	164
Calcium				41	42	41	44	101	92
Magnesium				33	36	32	35	66	63
Sodium			200	91	105	90	93	98	99
Potassium				12	13	11	11	13	14
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025			<0.001	<0.001	<0.01	<0.01
Barium			1			0.02	0.02	0.04	0.04
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.31	0.3	0.24	0.22	0.17	0.24
Cadmium	PWQO IPWQO	0.0002 c	0.005		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05			0.003	0.003	0.004	0.003
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				831	799	925	823	1340	1310
Copper	PWQO IPWQO	0.005 d	1	<0.001	0.023	<0.001	0.001	0.002	0.004
Iron	PWQO	0.3	0.3	0.08	9.01	<0.03	<0.03	0.17	0.21
Lead	PWQO IPWQO	e	0.01			<0.001	<0.001	<0.001	<0.001
Manganese			0.05	0.15	0.4	0.19	0.15	0.33	0.34
Mercury	PWQO	0.0002	0.001			<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3			2.54	1.31	0.99	1.83	0.76
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.501	0.211	0.55			
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5		0.03	<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	405	403	444	384	485	472
TKN				1.22	0.75	0.97	0.68	0.42	0.47
N-NH3 - Ammonia				0.65	0.54	0.54	0.30	0.17	0.24
Organic Nitrogen			0.15	0.57	0.21	0.43	0.38	0.25	
Phenols	IPWQO	0.005		<0.001	0.003	<0.001	<0.001	<0.001	<0.001
BOD						6			
COD				16	30	43	25	70	28
DOC			5			9.1	8.2	9.8	9.8
TDS			500	540	519	601	535	871	852
Total Sus. Solids						1360			
pH			6.5-8.5			8.2	7.99	8.05	7.99
Ion Balance				0.98	1.09				
Field Measured									
Water Temp. (°C)			15	11.1	5.9	9.1	9.6	9.8	9.8
Conductivity (microS/cm)				781	717	1100	893	1055	1074
pH (pH units)			6.5 - 8.5	8.3	7.8	8.1	8.5	7.6	7.4

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-10A					
Date>				Aug-13	Jul-14				
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	80	79				
N-NO2 - Nitrite			1	<0.10	< 0.10				
N-NO3 -Nitrate			10	0.18	0.2				
Bromide									
Phosphate									
Sulphate			500	213	203				
Calcium				105	105				
Magnesium				72	73.6				
Sodium			200	97	102				
Potassium				14	13.6				
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.01	0.0013				
Barium			1	0.05	0.029				
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.19	0.26				
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	< 0.00002				
Chromium	PWQO	0.009	0.05	0.004	< 0.002				
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1430	1360				
Copper	PWQO IPWQO	0.005 d	1	0.003	0.0043				
Iron	PWQO	0.3	0.3	0.2	0.447				
Lead	PWQO IPWQO	e	0.01	<0.001	0.00028				
Manganese			0.05	0.43	0.234				
Mercury	PWQO	0.0002	0.001	<0.0001	0.00005				
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.62	0.37				
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	< 0.005				
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	480	430				
TKN				0.64	0.83				
N-NH3 - Ammonia				0.36	0.18				
Organic Nitrogen			0.15	0.28	0.65				
Phenols	IPWQO	0.005		<0.001	< 0.001				
BOD									
COD				26	31				
DOC			5	10.8	10.9				
TDS			500	930	836				
Total Sus. Solids									
pH			6.5-8.5	7.8	7.84				
Ion Balance					0.934				
Field Measured									
Water Temp. (°C)			15	10.8	11.1				
Conductivity (microS/cm)				957	850				
pH (pH units)			6.5 - 8.5	7.5	8.1				

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 10B					
Date>				Aug-00	Aug-01	Dec-02	Nov-03	Aug-04	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	216	202	199	223	201	157
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	654	522	544	650	586	521
Calcium				282	264	247	268	225	239
Magnesium				126	131	123	133	111	109
Sodium			200	109	107	105	117	119	101
Potassium				7	7	7	10	8	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.07	0.04	<0.05	0.04	0.06	0.07
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)							2340	2300	2120
Copper	PWQO IPWQO	0.005 d	1	<0.01	0.008	0.013	0.008	0.006	0.011
Iron	PWQO	0.3	0.3	0.02	<0.01	<0.01	0.01	<0.01	<0.03
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.190	0.140	0.103	0.090	0.150	0.060
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				1.010	1.040	0.919	1.140	1.020	0.941
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	509	512	515	471	470	476
TKN				0.75	0.68	0.87	0.52	0.99	0.67
N-NH3 - Ammonia				0.15	0.23	0.03	0.07	0.50	0.10
Organic Nitrogen			0.15	0.60	0.45	0.84	0.45	0.49	0.57
Phenols	IPWQO	0.005		0.002	<0.001	<0.001	<0.001	<0.001	<0.001
BOD									
COD				39	40	37	47	39	36
DOC			5						
TDS			500	1952	1880	1780	1760	1730	1590
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.98	1.07	1.00	1.01	0.95	1.03
Field Measured									
Water Temp. (°C)			15	12.8	12.3	4.6	7.1	11.1	8.2
Conductivity (microS/cm)				2000	2250	1887	1850	1870	1938
pH (pH units)			6.5 - 8.5	6.3	6.7	8.6	6.9	6.9	6.7

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 10B					
Date>				Sep-06	Oct-07	Nov-08	Oct-09	Sep-10	Jul-11
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	142	129	124	101	111	122
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	469	378	317	303	302	288
Calcium				218	211	193	180	188	216
Magnesium				100	87	92	85	87	90
Sodium			200	100	95	97	96	101	97
Potassium				7	6	6	6	6	7
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025				0.001	<0.001	<0.001
Barium			1				0.1	0.1	0.09
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.08	0.10	0.11	0.16	0.18	0.13
Cadmium	PWQO IPWQO	0.0002 c	0.005			<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05				0.009	0.005	0.031
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				2070	1850	1810	1750	1770	1830
Copper	PWQO IPWQO	0.005 d	1	0.039	0.009	0.002	0.004	0.005	0.003
Iron	PWQO	0.3	0.3	0.06	<0.03	0.06	<0.03	<0.03	0.1
Lead	PWQO IPWQO	e	0.01				<0.001	<0.001	<0.001
Manganese			0.05	0.220	0.220	0.430	0.25	0.18	0.16
Mercury	PWQO	0.0002	0.001				<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04				<0.0001			
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3				2.550	2.3	2.98	3.58
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.857	0.781	0.718	0.849		
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5			<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	471	495	537	534	548	575
TKN				0.89	0.56	0.52	0.64	0.53	0.77
N-NH3 - Ammonia				0.09	0.05	0.10	0.06	<0.02	0.07
Organic Nitrogen			0.15	0.80	0.49	0.42	0.58	≤ 0.53	0.7
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD							<1		
COD				31	43	45	36	35	90
DOC			5				13.7	14.3	14.9
TDS			500	1450	1300	1270	1230	1240	1190
Total Sus. Solids							4400		
pH			6.5-8.5				7.48	7.26	7.65
Ion Balance				1.02	1.03	1.04			
Field Measured									
Water Temp. (°C)			15	12.6	14.3	8.2	11.6	12.6	11.5
Conductivity (microS/cm)				1688	1782	1817	1773	1891	1306
pH (pH units)			6.5 - 8.5	7.2	7.3	6.9	8.1	7.6	7.1

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 10B					
Date>				Aug-12	Aug-13	Jul-14			
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	137	130	130			
N-NO2 - Nitrite			1	<0.10	<0.10	< 0.10			
N-NO3 -Nitrate			10	<0.10	<0.10	< 0.10			
Bromide									
Phosphate									
Sulphate			500	351	352	347			
Calcium				200	179	173			
Magnesium				92	85	83.2			
Sodium			200	99	94	95.7			
Potassium				8	6	6			
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.01	<0.001	0.0007			
Barium			1	0.09	0.09	0.086			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.2	0.2	0.219			
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.0002	0.0001	0.00015			
Chromium	PWQO	0.009	0.05	0.005	0.005	< 0.002			
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1940	1800	1730			
Copper	PWQO IPWQO	0.005 d	1	0.01	0.005	0.0058			
Iron	PWQO	0.3	0.3	0.09	0.09	0.147			
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	0.0001			
Manganese			0.05	0.19	0.11	0.145			
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	0.00006			
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		2.2	1.18	2.11			
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	< 0.005			
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	570	486	440			
TKN				0.33	0.37	0.71			
N-NH3 - Ammonia				0.04	0.03	< 0.01			
Organic Nitrogen			0.15	0.29	0.34	≤ 0.71			
Phenols	IPWQO	0.005		<0.001	<0.001	< 0.001			
BOD									
COD				33	33	28			
DOC			5	13.8	13.3	10.6			
TDS			500	1360	1260	1100			
Total Sus. Solids									
pH			6.5-8.5	7.45	7.39	7.39			
Ion Balance						0.994			
Field Measured									
Water Temp. (°C)			15	11.4	12.2	11			
Conductivity (microS/cm)				1623	1675	1536			
pH (pH units)			6.5 - 8.5	6.9	6.9	7			

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Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 11A					
Date>				Jan-91	Nov-91	Nov-96	Sep-99	Dec-02	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5	0.58	1	0.78			
Chloride			250	1		2	2	3	7
N-NO2 - Nitrite			1				<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.33	0.41	0.53	0.44	0.63	0.18
Bromide					0.9				
Phosphate				0.81	1.57	1.41			
Sulphate			500	16	9	5	4	9	5
Calcium				16	12	13	15	12	12
Magnesium				12	12	12	14	12	11
Sodium			200	118	127	144	154	134	134
Potassium				9	10	11	14	10	11
Aluminum	IPWQO	0.075	0.1	0.32	0.39	0.13			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.01	0.01	0.02			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.26	0.38	0.36	0.36	0.36	0.36
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009				0.01			
Conductivity (microS/cm)									675
Copper	PWQO IPWQO	0.005 d	1				0.021	<0.005	0.007
Iron	PWQO	0.3	0.3	0.26	0.4	0.08	10.8	0.02	<0.03
Lead	PWQO IPWQO	e	0.01	0.002	0.006				
Manganese			0.05	0.03	0.04	0.03	0.26	0.021	0.03
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				7.5	7.9	8.7			
Silver	PWQO	0.0001	0.05						
Strontium				0.1	0.19	0.183	0.211	0.156	0.184
Sulphur				6	4				
Thallium	IPWQO	0.0003							
Tin									
Titanium				0.02					
Vanadium	PWQO	0.006			0.02				
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	89	79				
Alkalinity as CaCO3	IPWQO	a	30 - 500	336	370	375	405	381	381
TKN				0.39	0.65	1.07	0.83	0.47	1.22
N-NH3 - Ammonia				0.14	0.6	0.24	0.83	0.22	0.69
Organic Nitrogen			0.15	0.25	0.05	0.83	0.00	0.25	0.53
Phenols	IPWQO	0.005					<0.001	<0.001	<0.001
BOD						3			
COD				8	24	31	20	8	19
DOC			5						
TDS			500	428	420	408	536	457	439
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1.06	1.09	0.97	0.97
Field Measured									
Water Temp. (°C)			15	5	9	9	9.3	5.5	5
Conductivity (microS/cm)				700	955	720	630	736	578
pH (pH units)			6.5 - 8.5	8.3	8.1	7.8	8.3	8.9	7.3

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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 11A					
Date>				Nov-08	Oct-09	Sep-10	Jul-11	Aug-12	Aug-13
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	7	6	12	8	7	7
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.31	0.13	0.12	0.52	0.31	0.54
Bromide									
Phosphate									
Sulphate			500	7	5	9	7	6	6
Calcium				15	14	16	13	14	14
Magnesium				14	12	13	12	12	13
Sodium			200	138	130	144	132	140	131
Potassium				11	10	9	10	11	10
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025		0.002	<0.01	<0.01	<0.01	<0.01
Barium			1		0.02	0.01	0.02	0.03	0.03
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.41	0.33	0.37	0.35	0.37	0.4
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05		0.003	0.002	0.004	0.007	0.005
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				711	730	730	728	717	709
Copper	PWQO IPWQO	0.005 d	1	0.003	<0.001	0.001	0.005	0.008	0.01
Iron	PWQO	0.3	0.3	<0.03		<0.03	0.8	2.64	1.51
Lead	PWQO IPWQO	e	0.01			<0.001	<0.001	0.001	<0.001
Manganese			0.05	0.04	0.04	0.05	0.07	0.1	0.07
Mercury	PWQO	0.0002	0.001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		19.4	8.5	5.96	4.23	2.84	1.52
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.206	0.224				
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	0.02	0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	388	395	380	393	391	384
TKN				1.06	0.59	0.60	0.44	0.36	0.40
N-NH3 - Ammonia				0.74	0.37	0.33	0.16	0.27	0.25
Organic Nitrogen			0.15	0.32	0.21	0.27	0.28	0.09	0.15
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD					5				
COD				35	19	15	30		14
DOC			5		4.3	4.4	4.4	5	5.7
TDS			500	462	475	475	473	466	461
Total Sus. Solids					20700				
pH			6.5-8.5		8.32	8.16	8.38	8.36	8.24
Ion Balance				1.01					
Field Measured									
Water Temp. (°C)			15	6.5	10.9	11.0	9.6	11.1	8.0
Conductivity (microS/cm)				710	713	737	537	599	621
pH (pH units)			6.5 - 8.5	8.2	8.1	8.8	8.4	8.0	8.2

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 11A					
Date>				Jul-14					
Parameters	PWQO		ODWS						
Fluoride			1.5	DRY					
Chloride			250						
N-NO2 - Nitrite			1						
N-NO3 -Nitrate			10						
Bromide									
Phosphate									
Sulphate			500						
Calcium									
Magnesium									
Sodium			200						
Potassium									
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5						
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1						
Iron	PWQO	0.3	0.3						
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05						
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500						
TKN									
N-NH3 - Ammonia									
Organic Nitrogen			0.15						
Phenols	IPWQO	0.005							
BOD									
COD									
DOC			5						
TDS			500						
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance									
Field Measured									
Water Temp. (^{o}C)			15						
Conductivity (microS/cm)									
pH (pH units)			6.5 - 8.5						

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-11B					
Date>				Jan-91	Nov-91	Nov-96	Sep-97	Aug-01	Dec-02
Parameters	PWQO		ODWS						
Fluoride			1.5	0.17	0.2				
Chloride			250	362	365	173	146	106	86
N-NO2 - Nitrite			1					<0.10	<0.10
N-NO3 -Nitrate			10					<0.10	<0.10
Bromide				3.1	0.8	0.9			
Phosphate				0.15	0.52	0.03			
Sulphate			500	657	722	289	287	246	184
Calcium				275	299	249	208	305	234
Magnesium				181	251	154	128	126	110
Sodium			200	164	216	170	171	114	100
Potassium				11	7	11	11	17	14
Aluminum	IPWQO	0.075	0.1			0.66			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.06	0.1	0.09			
Beryllium	PWQO	b				0.01			
Boron	IPWQO	0.2	5	0.54	0.87	1.26	1.37	1.33	1.44
Cadmium	PWQO IPWQO	0.0002 c	0.005		0.006				
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1				0.006	0.002	<0.005
Iron	PWQO	0.3	0.3				0.09	0.16	0.07
Lead	PWQO IPWQO	e	0.01		0.045				
Manganese			0.05	0.03	0.19	0.88	0.78	1.55	1.22
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				5	6.2	6.7			
Silver	PWQO	0.0001	0.05						
Strontium				0.92	1.36	0.913	0.805	1.13	0.946
Sulphur				239	220	69			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	1430	1777		1050		
Alkalinity as CaCO3	IPWQO	a	30 - 500	620	980	1052	1023	1080	1010
TKN				0.5	2.61	2.08	1.04	1.74	1.97
N-NH3 - Ammonia				0.2		0.12	0.22	0.61	1.17
Organic Nitrogen			0.15	0.3	2.61	1.96	0.82	1.13	0.8
Phenols	IPWQO	0.005						<0.001	<0.001
BOD				nd	3	1			
COD				37	61	67	47	51	33
DOC			5						
TDS			500	2344	2400	1480	1580	1650	1390
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1.03	0.94	1.04	0.96
Field Measured									
Water Temp. (°C)			15	2	7.5	6.9	14.2	13.6	4.4
Conductivity (microS/cm)				2400	4669	2400	2050	2340	1653
pH (pH units)			6.5 - 8.5	6.8	6.3	7.3	8.1	6.8	7.6

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-11B					
Date>				Nov-03	Aug-04	Dec-05	Sep-06	Oct-07	Nov-08
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	120	163	196	235	265	293
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	180	113	84	80	70	93
Calcium				245	251	294	280	275	292
Magnesium				115	112	124	116	99	99
Sodium			200	111	145	135	141	147	166
Potassium				24	24	21	28	28	34
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	1.79	3.04	4.05	3.19	3.45	2.9
Cadmium	PWQO IPWQO	0.0002 c	0.005						<0.0001
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				2160	2570	2700	2850	2870	2950
Copper	PWQO IPWQO	0.005 d	1	0.002	0.002	0.003	0.003	0.003	0.002
Iron	PWQO	0.3	0.3	0.09	0.09	0.17	0.22	0.44	0.35
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	1.67	2.26	2.87	3.47	4.94	4.95
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							0.03
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				1.26	1.67	2.9	4.4	5.08	8.77
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	1070	1220	1310	1250	1220	1230
TKN				3.49	4.6	6.81	9.14	15.2	19.9
N-NH3 - Ammonia				2.41	4.1	4.99	7.55	11.9	19.3
Organic Nitrogen			0.15	1.08	0.5	1.82	1.59	3.3	0.6
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD									
COD				43	43	55	55	60	58
DOC			5						
TDS			500	1400	1670	1760	1850	1870	1920
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.96	0.92	0.95	0.93	0.9	0.93
Field Measured									
Water Temp. (°C)			15	7.6	13.5	7	12.6	12.5	7.8
Conductivity (microS/cm)				1768	2050	2510	2350	2840	3070
pH (pH units)			6.5 - 8.5	7.0	6.8	6.4	6.1	7.6	6.8

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-11B					
Date>				Oct-09	Sep-10	Jul-11	Aug-12	Aug-13	Jul-14
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	297	298	303	344	366	432
N-NO2 - Nitrite			1	<0.10	0.12	<0.10	<0.10	<0.10	< 0.10
N-NO3 -Nitrate			10	0.19	4.03	<0.10	0.37	0.18	0.4
Bromide									
Phosphate									
Sulphate			500	76	101	75	82	82	84
Calcium				279	299	252	302	314	277
Magnesium				104	102	95	103	110	117
Sodium			200	167	182	161	205	207	224
Potassium				42	47	48	58	58	66.1
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.002	<0.01	<0.001	<0.01	<0.01	0.002
Barium			1	0.27	0.3	0.32	0.33	0.42	0.368
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	3.2	3.7	3.2	3.9	3.5	3.81
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.001	<0.0001	0.0006	0.0009	0.00119
Chromium	PWQO	0.009	0.05	0.014	<0.005	0.01	0.009	0.010	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				3040	2590	3060	3190	3300	3430
Copper	PWQO IPWQO	0.005 d	1	0.002	<0.01	0.002	0.006	0.017	0.0054
Iron	PWQO	0.3	0.3	0.44	<0.3	0.32	0.23	0.17	0.242
Lead	PWQO IPWQO	e	0.01	<0.001	<0.01	<0.001	<0.001	<0.001	0.00022
Manganese			0.05	5.58	4.5	5.02	4.79	4.93	5.2
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00004
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		1.99	2.21	4.85	2.14	4.55	2.09
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				15					
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.1	<0.01	0.01	<0.01	< 0.005
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	1258	1120	1210	1240	1230	1110
TKN				26.1	25.4	34.1	32.7	34.00	40.6
N-NH3 - Ammonia				24.8	24.8	32.4	31.7	32.40	38.9
Organic Nitrogen			0.15	1.3	0.6	1.7	1.00	1.60	1.7
Phenols	IPWQO	0.005		<0.001	<0.001	<0.0001	<0.001	<0.001	< 0.001
BOD				11				18	16
COD				68	60	22	65	69	83
DOC			5	20.4	21.0	22.2	24.6	25.3	16.5
TDS			500	1980	1920	1990	2070	2140	1930
Total Sus. Solids				3730				3950	2000
pH			6.5-8.5	7.29	7.14	7.61	7.17	7.2	7.41
Ion Balance									0.958
Field Measured									
Water Temp. (°C)			15	11.4	13.0	11.2	13.5	11.6	12
Conductivity (microS/cm)				2880	3120	2170	2680	2990	3080
pH (pH units)			6.5 - 8.5	7.2	7.5	7.1	6.7	6.9	7.1

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Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-11B					
Date>				Aug-15	Aug-16	Aug-17	Jul-18	Aug-19	Aug-20
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	558	627	516	790	786	796
N-NO2 - Nitrite			1	< 0.1	< 0.5	< 0.5	< 1	< 0.5	< 0.5
N-NO3 -Nitrate			10	0.1	1.1	< 0.5	< 1	< 0.5	< 0.5
Bromide									
Phosphate									
Sulphate			500	74	83	71	65	73	84
Calcium				299	301	285	303	301	332
Magnesium				128	139	144	145	153	156
Sodium			200	286	315	348	414	426	426
Potassium				74.4	76.3	83.7	90.2	91.3	80.8
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0027	0.0014	0.0022	0.0012	0.0005	< 0.0005
Barium			1	0.452	0.465	0.483	0.552	0.516	0.582
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	4.26	4.37	4.94	4.02	4.38	4.21
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.00248	0.00138	0.00432	0.00423	0.00534	0.00143
Chromium	PWQO	0.009	0.05	0.002	< 0.002	< 0.002	< 0.002	0.001	< 0..001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				3670	3900	4090	4420	4410	4570
Copper	PWQO IPWQO	0.005 d	1	0.005	0.016	0.003	0.004	0.0079	0.0172
Iron	PWQO	0.3	0.3	0.224	0.094	0.039	0.065	0.0011	0.018
Lead	PWQO IPWQO	e	0.01	0.00051	0.0003	0.00058	0.000033	0.00051	0.00041
Manganese			0.05	5.93	5.62	5.79	0.057	5.53	4.68
Mercury	PWQO	0.0002	0.001	< 0.00002	0.00003	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		1.68	0.72	10.2	2.92	2.07	1.55
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	0.006	0.007	0.007	0.005
Hardness (as CaCO3)			500			1300	1350	1380	1470
Alkalinity as CaCO3	IPWQO	a	30 - 500	1490	1360	1510	1320	1240	1280
TKN				52.5	51.7	69.6	62.6	60.5	60.2
N-NH3 - Ammonia				49.7	47.2	48.1	59.4	52.3	51.1
Organic Nitrogen			0.15			21.5	3.20	8.2	59.1
Phenols	IPWQO	0.005		< 0.001	0.009	< 0.001	< 0.01	< 0.002	< 0.01
BOD				5	33	7	6	15	12
COD				272	89	192	116	160	178
DOC			5	6.9	7.4	11.7	12.4	12.7	14.1
TDS			500	2753	2930	2362	2608	2650	2716
Total Sus. Solids				2440	560	2580	1800	1200	1980
pH			6.5-8.5	7.66	7.72	7.67	7.51	7.3	7.63
Ion Balance							1.05	0.928	0.927
Field Measured									
Water Temp. (°C)			15	12.3	13.3	12.3	12	12.8	13.2
Conductivity (microS/cm)				3150	3970	4010	2160	4370	4530
pH (pH units)			6.5 - 8.5	7.0	7.0	7.4	7.0	7.1	7.2

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-11B					
Date>				Aug-21	Aug-22	Aug-23	Aug-24	MIN	MAX
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	620	680	540	690	86	796
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10		
N-NO3 -Nitrate			10	<0.10	1.26	1.79	<0.10		
Bromide									
Phosphate									
Sulphate			500	62	73	58	57	62	722
Calcium				300	274	228	269		
Magnesium				160	148	132	141		
Sodium			200	462	425	395	427	100	462
Potassium				92	81	83	88	7	92
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.001	<0.001	<0.001	0.001		
Barium			1	0.58	0.51	0.46	0.48		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	4.8	3.9	4.18	5.4	0.54	4.94
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.002	0.001	0.0002	0.0009		
Chromium	PWQO	0.009	0.05	<0.001	0.001	<0.001	0.001		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				4520	4190	3800	4080	2160	4570
Copper	PWQO IPWQO	0.005 d	1	0.006	0.008	0.004	0.003	0.002	0.0172
Iron	PWQO	0.3	0.3	0.04	0.04	0.08	0.08	0.0011	0.44
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001		
Manganese			0.05	5.23	5.37	5.93	6.34	0.03	5.93
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.291	7.22	6.59	2.42	0.03	10.2
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01		
Hardness (as CaCO3)			500	1410	1290	1110	1250		
Alkalinity as CaCO3	IPWQO	a	30 - 500	1400	1430	1530	1500	620	1510
TKN				53.9	57.8	56	61		
N-NH3 - Ammonia				53.3	51.1	52.3	56.6		
Organic Nitrogen			0.15	0.6	6.7	3.7	4.4		
Phenols	IPWQO	0.005		0.016	0.002	0.001	0.001		
BOD									
COD				81	124	78	103	22	272
DOC			5	34	250	30	34		
TDS			500	2940	2720	2470	2650	1390	2940
Total Sus. Solids									
pH			6.5-8.5	7.3	7.25	7.28	7.49		
Ion Balance									
Field Measured									
Water Temp. (°C)			15	12.9	13.5	14.2	13.3		
Conductivity (microS/cm)				4070	4300	4040	3370		
pH (pH units)			6.5 - 8.5	6.7	6.8	6.9	7.2		

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ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12A					
Date>				Jan-91	Nov-91	Nov-96	Sep-99	Dec-02	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5	0.2	0.2	0.24			
Chloride			250	35	37	61	76	86	86
N-NO2 - Nitrite			1				<0.10	<0.10	<0.10
N-NO3 -Nitrate			10		0.27	0.24	0.15	0.28	<0.10
Bromide					1				
Phosphate				0.68	0.57	0.21			
Sulphate			500	42	48	57	73	91	102
Calcium				57	56	62	76	79	88
Magnesium				45	52	49	61	65	66
Sodium			200	17	16	19	22	22	25
Potassium				9	10	12	12	14	13
Aluminum	IPWQO	0.075	0.1			0.25			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.01	0.02	0.03			
Beryllium	PWQO	b				0.01			
Boron	IPWQO	0.2	5	0.05	0.1	0.1	0.09	0.13	0.12
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1				<0.005	<0.005	0.003
Iron	PWQO	0.3	0.3			0.08	0.39	<0.01	<0.03
Lead	PWQO IPWQO	e	0.01	0.003					
Manganese			0.05	0.08	0.1	0.04	0.08	0.055	0.12
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04		0.03					
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				8.8	9.5	10.2			
Silver	PWQO	0.0001	0.05						
Strontium				0.56	0.71	0.746	0.775	0.815	0.978
Sulphur				16	20	15			
Thallium	IPWQO	0.0003							
Tin					0.06				
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	327	353				
Alkalinity as CaCO3	IPWQO	a	30 - 500	268	276	279	309	308	345
TKN					0.16	0.27	0.33	0.2	0.45
N-NH3 - Ammonia					0.1	0.03	0.23	0.05	0.26
Organic Nitrogen			0.15		0.06	0.24	0.1	0.2	0.19
Phenols	IPWQO	0.005					<0.001	<0.001	<0.001
BOD						1			
COD					16		5	<5	<5
DOC			5						
TDS			500	418	410	460	540	627	689
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						0.97	1.02	1.02	0.98
Field Measured									
Water Temp. (°C)			15	3	9	11.3	9.6	4	7
Conductivity (microS/cm)				750	863	830	815	911	990
pH (pH units)			6.5 - 8.5	7.8	7.3	7.9	7.5	9.2	7.1

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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12A					
Date>				Oct-07	Nov-08	Oct-09	Sep-10	Jul-11	Aug-12
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	193	184	50	60	86	84
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	0.42	<0.10	0.17	<0.10
Bromide									
Phosphate									
Sulphate			500	44	39	66	79	98	94
Calcium				342	327	57	73	89	86
Magnesium				138	133	42	59	62	63
Sodium			200	82	97	18	25	23	25
Potassium				33	33	10	11	12	14
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025			<0.001	<0.001	<0.001	<0.01
Barium			1			0.03	0.03	0.04	0.04
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.67	0.75	0.09	0.13	0.12	0.13
Cadmium	PWQO IPWQO	0.0002 c	0.005		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05			0.003	0.003	0.005	0.003
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				2930	2750	743	863	1070	1010
Copper	PWQO IPWQO	0.005 d	1	0.008	0.004	0.001	0.001	0.001	0.001
Iron	PWQO	0.3	0.3	0.22	0.31	<0.03	<0.03	0.14	0.22
Lead	PWQO IPWQO	e	0.01			<0.001	<0.001	<0.001	<0.001
Manganese			0.05	6.63	7.34	0.07	0.06	0.05	0.08
Mercury	PWQO	0.0002	0.001			<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3			4.39	0.42	0.26	0.97	0.49
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				1.71	1.99	0.723			
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5		<0.01	<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	1460	1418	255	300	353	338
TKN				1.74	1.76	0.3	0.32	0.13	0.14
N-NH3 - Ammonia				0.45	0.55	0.2	0.06	0.12	0.17
Organic Nitrogen			0.15	1.29	1.29	0.1	0.26	0.01	0
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD						2			
COD				66	13	<5	8	15	<5
DOC			5			2.4	2.9	3.1	2.9
TDS			500	1900	1790	483	561	696	656
Total Sus. Solids						315			
pH			6.5-8.5			8.13	7.98	8.22	8.11
Ion Balance				0.92	0.94				
Field Measured									
Water Temp. (°C)			15	14.5	6.6	10.6	13.5	9.8	10.8
Conductivity (microS/cm)				2860	2820	960	903	792	858
pH (pH units)			6.5 - 8.5	6.9	6.9	8.4	9.3	8.0	7.7

All values reported in mg/L unless otherwise noted
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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12A					
Date>				Aug-13	Jul-14				
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	86	78				
N-NO2 - Nitrite			1	<0.10	< 0..10				
N-NO3 -Nitrate			10	0.13	0.2				
Bromide									
Phosphate									
Sulphate			500	97	95				
Calcium				83	87.5				
Magnesium				65	68.7				
Sodium			200	24	25.9				
Potassium				13	13.8				
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	0.0012				
Barium			1	0.04	0.041				
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.11	0.118				
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	< 0.00002				
Chromium	PWQO	0.009	0.05	0.004	< 0.002				
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1030	957				
Copper	PWQO IPWQO	0.005 d	1	0.002	0.0014				
Iron	PWQO	0.3	0.3	0.27	0.441				
Lead	PWQO IPWQO	e	0.01	<0.001	0.00015				
Manganese			0.05	0.06	0.095				
Mercury	PWQO	0.0002	0.001	<0.0001	0.00004				
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.51	0.43				
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	< 0.005				
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	338	304				
TKN				0.18	0.45				
N-NH3 - Ammonia				0.16	0.06				
Organic Nitrogen			0.15	0.02	0.39				
Phenols	IPWQO	0.005		<0.001	< 0.001				
BOD									
COD				8	< 5				
DOC			5	3.0	4.2				
TDS			500	670	553				
Total Sus. Solids									
pH			6.5-8.5	8.0	8.08				
Ion Balance					0.89				
Field Measured									
Water Temp. (°C)			15	9.7	11.5				
Conductivity (microS/cm)				952	810				
pH (pH units)			6.5 - 8.5	7.8	8.1				

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12B					
Date>				Jan-91	Nov-91	Nov-96	Aug-97	Nov-98	Sep-99
Parameters	PWQO		ODWS						
Fluoride			1.5	0.11	0.16				
Chloride			250	436	379	197	159	183	147
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10					0.2	0.17
Bromide				3.2	1.5	1.4			
Phosphate				0.17	0.41	0.03			
Sulphate			500	1034	910	574	517	512	347
Calcium				386	400	248	324	306	247
Magnesium				185	233	173	141	144	113
Sodium			200	230	282	209	205	169	159
Potassium				19	14	40	61	43	41
Aluminum	IPWQO	0.075	0.1			0.8			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.07	0.1	0.12			
Beryllium	PWQO	b				nd			
Boron	IPWQO	0.2	5	1.23	1.74	1.52	1.61	1.36	1.51
Cadmium	PWQO IPWQO	0.0002 c	0.005		0.012				
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1				0.016		0.005
Iron	PWQO	0.3	0.3			0.03	0.05	nd	0.24
Lead	PWQO IPWQO	e	0.01		0.046				
Manganese			0.05	0.1	0.57		1.06	0.48	0.34
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				5.3	6.7	10.2			
Silver	PWQO	0.0001	0.05						
Strontium				1.6	2.2	1.63	1.41	1.41	1.12
Sulphur				348	302	157			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	1724	1955		1430		
Alkalinity as CaCO3	IPWQO	a	30 - 500	730	920	1054	1002	872	824
TKN				1.16	1.61	2.53	1.85	1.34	1.45
N-NH3 - Ammonia				0.15	0.1	0.74	0.74	0.6	0.39
Organic Nitrogen			0.15	1.01	1.51	1.79	1.11	0.74	1.06
Phenols	IPWQO	0.005				0.002		nd	<0.001
BOD					2	5			
COD				11	69	55	53	56	38
DOC			5						
TDS			500	3108	2880	1704		1708	1530
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						0.95	1.06	1.07	1.06
Field Measured									
Water Temp. (°C)			15	1	6.5		15.6	6.1	12.2
Conductivity (microS/cm)				3100	4465	2400	2400	2100	2050
pH (pH units)			6.5 - 8.5	6.8	6.3		6.9	7.0	7.1

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12B					
Date>				Aug-00	Aug-01	Dec-02	Nov-03	Aug-04	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	118	115	104	120	286	307
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	0.44	<0.10	2.12	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	236	219	181	154	88	55
Calcium				236	208	252	252	320	397
Magnesium				63	113	118	117	158	176
Sodium			200	140	143	109	107	127	100
Potassium				51	51	47	56	50	33
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	1.43	1.56	1.18	1.29	1.28	0.95
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)							2150	3190	3440
Copper	PWQO IPWQO	0.005 d	1	<0.01	0.016	0.017	0.008	0.014	0.01
Iron	PWQO	0.3	0.3	0.03	<0.01	<0.01	0.02	<0.01	<0.03
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.67	0.98	0.228	0.7	1.67	2.38
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				1.02	1.16	1	1.13	1.54	2.17
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	953	1010	975	1060	1420	1680
TKN				1.81	1.54	1.63	1.11	1.94	2.02
N-NH3 - Ammonia				0.67	0.73	0.25	0.32	0.16	0.34
Organic Nitrogen			0.15	1.14	0.81	1.38	0.79	1.78	1.68
Phenols	IPWQO	0.005		0.002	<0.001	<0.001	<0.001	<0.001	<0.001
BOD									
COD				44	51	32	47	45	73
DOC			5						
TDS			500	1532	1560	1456	1400	2070	2240
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				1.02	0.97	1.07	1.02	0.93	0.91
Field Measured									
Water Temp. (°C)			15	13.9	14.5	4.1	5.2	13.7	4.2
Conductivity (microS/cm)				2000	2270	1716	1728	2350	2760
pH (pH units)			6.5 - 8.5	6.6	6.8	7.6	7.1	6.6	6.5

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12B					
Date>				Sep-06	Oct-07	Nov-08	Oct-09	Sep-10	Jul-11
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	210	68	72	170	190	137
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	0.18	0.14	0.12	0.22	<0.10
Bromide									
Phosphate									
Sulphate			500	36	93	94	29	30	16
Calcium				344	73	76	282	335	349
Magnesium				148	56	63	107	130	100
Sodium			200	79	23	25	84	120	102
Potassium				33	12	13	26	35	26
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025				0.003	<0.01	<0.01
Barium			1				0.13	0.1	0.14
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.59	0.16	0.16	1.0	1.0	0.7
Cadmium	PWQO IPWQO	0.0002 c	0.005			<0.0001	0.0001	<0.001	<0.0001
Chromium	PWQO	0.009	0.05				<0.005	<0.005	0.008
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				3080	920	909	2720	2720	2610
Copper	PWQO IPWQO	0.005 d	1	0.029	0.003	0.001	0.003	<0.01	0.002
Iron	PWQO	0.3	0.3	0.11	<0.03	<0.03	0.46	0.4	0.91
Lead	PWQO IPWQO	e	0.01				<0.001	<0.01	<0.001
Manganese			0.05	3.42	0.12	0.07	6.93	6.3	9.11
Mercury	PWQO	0.0002	0.001				<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3				0.63	10.3	2.53	15.6
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				2.81	0.965	0.875	5.65		
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5			<0.01	<0.01	<0.1	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	1520	310	317	1410	1363	1430
TKN				1.74	0.47	0.3	1.89	2.35	4.56
N-NH3 - Ammonia				0.27	0.23	0.11	0.62	0.91	2.31
Organic Nitrogen			0.15	1.47	0.24	0.19	1.27	2.44	2.25
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD							3		
COD				69	7	13	76	68	20
DOC			5				27	25.5	27.9
TDS			500	2000	598	591	1770	1770	1700
Total Sus. Solids							12500		
pH			6.5-8.5				7.64	7.16	7.55
Ion Balance				0.91	0.95	1.01			
Field Measured									
Water Temp. (°C)			15	12.8	12.5	8.3	10.9	12.9	11.9
Conductivity (microS/cm)				2440	889	929	2710	2940	1840
pH (pH units)			6.5 - 8.5	6.3	8.6	Not Measured	7.5	7.5	7.0

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-12B					
Date>				Aug-12	Aug-13	Aug-13	Jul-14		
Parameters	PWQO		ODWS			DUP BH 16			
Fluoride			1.5						
Chloride			250	208	175	168	148		
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	< 0.10		
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	0.2		
Bromide									
Phosphate									
Sulphate			500	29	23	22	15		
Calcium				359	318	346	289		
Magnesium				125	112	114	109		
Sodium			200	123	114	116	111		
Potassium				36	32	33	32.1		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.01	<0.01	<0.01	0.0017		
Barium			1	0.15	0.17	0.16	0.135		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	1.2	1.0	1.0	0.9		
Cadmium	PWQO IPWQO	0.0002 c	0.005	0.0004	0.0002	0.0002	0.00012		
Chromium	PWQO	0.009	0.05	0.007	0.009	0.008	< 0.002		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				2850	2670	2650	2460		
Copper	PWQO IPWQO	0.005 d	1	0.002	0.006	0.005	0.0038		
Iron	PWQO	0.3	0.3	0.48	0.15	0.17	0.107		
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	0.00019		
Manganese			0.05	8.42	10.3	10.1	10.9		
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	0.00004		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.86	0.69	0.82	0.95		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	< 0.005		
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	1490	1380	1430	1150		
TKN				3.40	4.67	5.17	6.31		
N-NH3 - Ammonia				2.95	4.30	4.73	3.75		
Organic Nitrogen			0.15	0.45	0.37	0.44	2.56		
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	< 0.001		
BOD									
COD				76	66	70	66		
DOC			5	27.7	27.7	28.0	21.5		
TDS			500	1850	1740	1720	1410		
Total Sus. Solids									
pH			6.5-8.5	7.16	7.13	7.13	7.38		
Ion Balance							0.92		
Field Measured									
Water Temp. (°C)			15	13.5	12.0		12		
Conductivity (microS/cm)				2380	2360		2180		
pH (pH units)			6.5 - 8.5	6.5	6.7		6.8		

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PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH -13					
Date>				Nov-91	Nov-92	Nov-96	Aug-97	Oct-07	Nov-08
Parameters	PWQO		ODWS						
Fluoride			1.5	0.12					
Chloride			250	2		1	2	3	5
N-NO2 - Nitrite			1					<0.10	<0.10
N-NO3 -Nitrate			10					<0.10	<0.10
Bromide				0.9					
Phosphate				0.3					
Sulphate			500	35	15	10	11	15	12
Calcium				56	51	46	45	55	49
Magnesium				17	19	17	17	20	17
Sodium			200	7	6	7	7	7	6
Potassium				3	2	1	2	3	2
Aluminum	IPWQO	0.075	0.1			0.07			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.02	0.01	0.02			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.02	0.01	0.01	0.03	0.04
Cadmium	PWQO IPWQO	0.0002 c	0.005						<0.0001
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)								431	379
Copper	PWQO IPWQO	0.005 d	1			0.011		0.001	<0.001
Iron	PWQO	0.3	0.3	0.08	0.03	0.09	0.17	0.26	0.16
Lead	PWQO IPWQO	e	0.01	0.002					
Manganese			0.05	0.04	0.07		0.04	0.07	0.09
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							3.67
Silicon				6.5	8.9	8.1			
Silver	PWQO	0.0001	0.05						
Strontium				0.23	0.19	0.169	0.158	0.265	0.195
Sulphur				12	6				
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006				0.01			
Zinc	PWQO IPWQO	0.03 0.02	5						0.01
Hardness (as CaCO3)			500	210	205	185	182		
Alkalinity as CaCO3	IPWQO	a	30 - 500	202	198	178	208	216	190
TKN						0.13	0.15	0.55	0.3
N-NH3 - Ammonia								0.14	0.16
Organic Nitrogen			0.15					0.41	0.14
Phenols	IPWQO	0.005						<0.001	<0.001
BOD									
COD				9		8	11	15	15
DOC			5						
TDS			500	242	250	196		280	246
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1.06	0.9	1.01	0.99
Field Measured									
Water Temp. (°C)			15	9	6.5	7.3	13.9	13.1	4.9
Conductivity (microS/cm)				536	568	360	450	360	380
pH (pH units)			6.5 - 8.5	6.9	6.0	8.1	7.6	7.3	8.5

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-13					
Date>				Oct-09	Sep-10	Jul-11	Jul-11	Aug-12	Aug-13
Parameters	PWQO		ODWS				DUP BH 16		
Fluoride			1.5						
Chloride			250	3	3	3	3	3	2
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	9	12	10	10	13	11
Calcium				37	42	36	34	53	41
Magnesium				12	12	12	10	17	15
Sodium			200	5	5	5	5	6	5
Potassium				1	2	2	1	3	2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium			1	0.02	0.02	0.02	0.02	0.02	0.01
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.01	<0.01	<0.01	0.02	0.01
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05	0.002	<0.001	0.001	0.002	0.002	<0.001
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				317	287	248	233	367	328
Copper	PWQO IPWQO	0.005 d	1	<0.001	0.001	<0.001	<0.001	0.003	0.001
Iron	PWQO	0.3	0.3	0.14	0.05	0.19	0.12	1.03	0.08
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese			0.05	0.1	0.07	0.09	0.06	0.02	0.05
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		2.06	2.45	1.41	2.46	1.44	0.21
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.167					
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	157	138	121	112	183	164
TKN				0.47	0.14	0.34	0.30	0.16	<0.10
N-NH3 - Ammonia				0.09	0.06	0.04	0.06	0.03	<0.02
Organic Nitrogen			0.15	0.38	0.08	0.30	0.24	0.13	<0.10
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD				1					
COD				10	13	45	65	5	10
DOC			5	5.1	5.3	5.4	5.8	3.8	4.2
TDS			500	206	187	161	151	239	213
Total Sus. Solids				2520					
pH			6.5-8.5	7.37	7.22	7.08	7.09	7.38	7.28
Ion Balance									
Field Measured									
Water Temp. (°C)			15	11.5	13.6	12.5		13.6	14.2
Conductivity (microS/cm)				388	344	208		336	280
pH (pH units)			6.5 - 8.5	7.8	8.0	7.1		6.9	6.6

All values reported in mg/L unless otherwise noted

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PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-13
Date>				Jul-14
Parameters	PWQO		ODWS	
Fluoride			1.5	
Chloride			250	2.1
N-NO2 - Nitrite			1	< 0.10
N-NO3 -Nitrate			10	0.1
Bromide				
Phosphate				
Sulphate			500	12
Calcium				41.8
Magnesium				14.2
Sodium			200	6.8
Potassium				2.1
Aluminum	IPWQO	0.075	0.1	
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0003
Barium			1	0.012
Beryllium	PWQO	b		
Boron	IPWQO	0.2	5	< 0.005
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.00002
Chromium	PWQO	0.009	0.05	< 0.002
Cobalt	PWQO	0.0009		
Conductivity (microS/cm)				341
Copper	PWQO IPWQO	0.005 d	1	0.0014
Iron	PWQO	0.3	0.3	0.09
Lead	PWQO IPWQO	e	0.01	0.00025
Manganese			0.05	0.056
Mercury	PWQO	0.0002	0.001	< 0.00002
Molybdenum	IPWQO	0.04		
Nickel	PWQO	0.025		
Total Phosphorus	IPWQO	0.3		0.55
Silicon				
Silver	PWQO	0.0001	0.05	
Strontium				
Sulphur				
Thallium	IPWQO	0.0003		
Tin				
Titanium				
Vanadium	PWQO	0.006		
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005
Hardness (as CaCO3)			500	
Alkalinity as CaCO3	IPWQO	a	30 - 500	164
TKN				0.54
N-NH3 - Ammonia				< 0.01
Organic Nitrogen			0.15	≤ 0.54
Phenols	IPWQO	0.005		<0.001
BOD				
COD				10
DOC			5	4
TDS			500	178
Total Sus. Solids				
pH			6.5-8.5	7.77
Ion Balance				1
Field Measured				
Water Temp. (°C)			15	12.9
Conductivity (microS/cm)				309
pH (pH units)			6.5 - 8.5	7.1

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 14					
Date>				Nov-91	Nov-92	Sep-97	Nov-98	Aug-00	Aug-01
Parameters	PWQO		ODWS						
Fluoride			1.5	0.34					
Chloride			250	31	25	18	23	24	25
N-NO2 - Nitrite			1					<0.10	<0.10
N-NO3 -Nitrate			10					<0.10	<0.10
Bromide									
Phosphate				0.33					
Sulphate			500	95	51	36	42	30	29
Calcium				53	63	68	57	52	51
Magnesium				35	46	47	40	36	36
Sodium			200	44	47	50	40	42	36
Potassium				5	2	4	3	2	3
Aluminum	IPWQO	0.075	0.1	0.16					
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.03	0.03				
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.04	0.03	0.05	0.28	0.06	0.04
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1		0.02	0.01		<0.01	<0.001
Iron	PWQO	0.3	0.3	0.16	0.03	0.78	0.13	0.14	<0.01
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.02	0.02	0.09	nd	0.07	<0.01
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				5.9	8.1				
Silver	PWQO	0.0001	0.05						
Strontium				0.28	0.29	0.338	0.286	0.245	0.25
Sulphur				32	17				
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500	276	346	363			
Alkalinity as CaCO3	IPWQO	a	30 - 500	248		406	293	313	297
TKN				0.12		0.28	0.2	0.22	0.47
N-NH3 - Ammonia						0.15	0.03	0.07	0.05
Organic Nitrogen			0.15	0.12		0.13	0.17	0.15	0.42
Phenols	IPWQO	0.005						0.003	<0.001
BOD									
COD				19		16	15	23	13
DOC			5						
TDS			500	426	490	500	368	420	388
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1.02	1.08	0.98	0.99
Field Measured									
Water Temp. (°C)			15	7	6	13.6	7.6	13.7	14
Conductivity (microS/cm)				1008	1130	760	1025	590	692
pH (pH units)			6.5 - 8.5	6.9	6.3	7.7	7.2	6.7	7.0

All values reported in mg/L unless otherwise noted

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PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH - 14					
Date>				Nov-03	Aug-04	Dec-05	Sep-06	Oct-07	Nov-08
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	33	27	30	33	35	36
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	40	31		24	30	23
Calcium				43	44	46	47	51	47
Magnesium				31	33	31	31	34	33
Sodium			200	34	36	32	32	34	31
Potassium				2	3	2	2	2	2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.02	0.08	0.03	0.05	0.05	0.04
Cadmium	PWQO IPWQO	0.0002 c	0.005						<0.0001
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				565	640	580	610	668	611
Copper	PWQO IPWQO	0.005 d	1	0.001	0.002	0.003	0.017	0.003	<0.001
Iron	PWQO	0.3	0.3	0.02	0.15	<0.03	0.39	<0.03	0.23
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	<0.01	0.06	0.03	0.12	0.02	0.08
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							1.95
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.219	0.253	0.236	0.24	0.253	0.233
Sulphur						28			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	228	277	245	249	273	258
TKN				0.2	0.35	0.27	0.42	0.22	<0.10
N-NH3 - Ammonia				0.04	0.02	0.02	0.13	0.06	0.02
Organic Nitrogen			0.15	0.16	0.33	0.25	0.29	0.16	0.16
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	0.001	<0.001	<0.001
BOD									
COD				19	<5	7	12	11	15
DOC			5						
TDS			500	367	416	377	397	434	397
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.99	0.94	0.99	0.99	0.97	0.97
Field Measured									
Water Temp. (°C)			15	6	12.9	6.1	13	12.4	5.7
Conductivity (microS/cm)				500	549	538	519	637	617
pH (pH units)			6.5 - 8.5	7.2	6.8	6.3	7.2	7.0	7.1

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-14					
Date>				Oct-09	Sep-10	Jul-11	Aug-12	Aug-13	Jul-14
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	35	33	29	Dry	46	58.7
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	NS	<0.10	<0.1
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10		<0.10	0.1
Bromide									
Phosphate									
Sulphate			500	27	32	27		26	22
Calcium				46	49	42		42	50.4
Magnesium				31	33	28		29	32.7
Sodium			200	30	33	25		29	34.6
Potassium				2	3	2		3	3.2
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001		<0.001	0.0003
Barium			1	0.03	0.03	0.03		0.03	0.025
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.05	0.04	0.04		0.05	0.012
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001		<0.0001	< 0.00002
Chromium	PWQO	0.009	0.05	0.003	0.002	0.001		0.003	< 0.002
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				640	650	551		563	607
Copper	PWQO IPWQO	0.005 d	1	<0.001	<0.001	0.001		0.003	0.0007
Iron	PWQO	0.3	0.3	0.55	0.16	0.26		0.28	0.263
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001		<0.001	0.00009
Manganese			0.05	0.12	0.07	0.08		0.02	0.039
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001		<0.0001	< 0.00002
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		5.82	3.69	3.23		0.60	1.68
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.246					
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01		<0.01	< 0.005
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	263	267	221		203	197
TKN				0.5	0.43	0.49		<0.10	1.37
N-NH3 - Ammonia				0.24	0.03	0.1		0.03	0.04
Organic Nitrogen			0.15	0.26	0.42	0.39		<0.10	1.33
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001		<0.001	< 0.001
BOD				1					
COD				21	20	15		23	176
DOC			5	5	4.8	7.7		3.8	4
TDS			500	416	422	358		366	321
Total Sus. Solids				8620					
pH			6.5-8.5	7.74	7.44	7.4		7.45	7.66
Ion Balance									0.889
Field Measured									
Water Temp. (°C)			15	12.2	13.5	12.6	14.1	14.1	12.3
Conductivity (microS/cm)				741	672	405	531	531	553
pH (pH units)			6.5 - 8.5	7.4	8.0	7.6	7.0	7.0	7.1

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

PWQO= Provincial Water Quality Objetives

Shaded values exceed ODWO Cirteria

Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-14					
Date>				Aug-15	Aug-16	Aug-17	Jul-18	Aug-19	Aug-20
Parameters	PWQO		ODWS						
Fluoride			1.5					No Sample	No Sample
Chloride			250	64.8	46.5	74.2	66.4	Collected	Collected
N-NO2 - Nitrite			1	< 0.1	< 0.1	< 0.05	< 0.05		
N-NO3 -Nitrate			10	< 0.1	0.1	< 0.05	< 0.05		
Bromide									
Phosphate									
Sulphate			500	21	25	20	23		
Calcium				54.2	64.8	51.2	57.9		
Magnesium				36.8	44.9	38.2	40.9		
Sodium			200	34.8	45.8	33.1	37.4		
Potassium				3.4	5.6	3.3	4.4		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	0.0003	0.0003	0.0004	0.0002		
Barium			1	0.035	0.048	0.032	0.037		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.045	0.08	0.053	0.055		
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.00002	< 0.00002	< 0.000014	0.000019		
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.002	< 0.002		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				650	741	688	747		
Copper	PWQO IPWQO	0.005 d	1	< 0.002	< 0.002	< 0.002	0.004		
Iron	PWQO	0.3	0.3	2.76	0.108	0.086	0.067		
Lead	PWQO IPWQO	e	0.01	0.00012	< 0.00002	< 0.00002	0.00007		
Manganese			0.05	0.173	0.105	0.032	0.057		
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002	<0.00002		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		24.7	1	0.53	0.93		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005		
Hardness (as CaCO3)			500			285	313		
Alkalinity as CaCO3	IPWQO	a	30 - 500	228	317	221	293		
TKN				5.3	3.6	0.8	1.4		
N-NH3 - Ammonia				3.46	0.69	0.15	0.47		
Organic Nitrogen			0.15						
Phenols	IPWQO	0.005		0.004	< 0.001	< 0.001	0.013		
BOD									
COD				3360	200	28	34		
DOC			5	2.1	2.7	3	2.8		
TDS			500	439	497	353	407		
Total Sus. Solids									
pH			6.5-8.5	7.5	7.93	7.67	7.65		
Ion Balance							1.02		
Field Measured									
Water Temp. (°C)			15	13.4	13.9	13.3	11.7		
Conductivity (microS/cm)				571	766	660	544		
pH (pH units)			6.5 - 8.5	7.1	7.2	7.3	7.0		

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ODWS = Ontario Drinking Water Standards
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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-14					
Date>				Aug-21	Aug-22	Aug-23	Aug-24		
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	92	111	92	124		
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10		
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10		
Bromide									
Phosphate									
Sulphate			500	23	35	20	20		
Calcium				63	74	56	66		
Magnesium				45	51	39	44		
Sodium			200	39	38	33	35		
Potassium				3	5	3	4		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	<0.001	<0.001		
Barium			1	0.03	0.04	0.04	0.03		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.03	0.05	0.05	0.05		
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	<0.0001	<0.0001		
Chromium	PWQO	0.009	0.05	<0.001	<0.001	<0.001	<0.001		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				727	880	756	796		
Copper	PWQO IPWQO	0.005 d	1	0.002	<0.001	0.002	0.001		
Iron	PWQO	0.3	0.3	0.52	0.15	0.43	0.2		
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	<0.001	<0.001		
Manganese			0.05	0.04	0.04	0.1	0.1		
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	<0.0001	<0.0001		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		0.492	2.14	1.76	1.97		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	<0.01	<0.01		
Hardness (as CaCO3)			500	343	395	300	346		
Alkalinity as CaCO3	IPWQO	a	30 - 500	211	286	254	258		
TKN				1.24	1.53	1.06	0.334		
N-NH3 - Ammonia				0.054	0.364	0.279	0.168		
Organic Nitrogen			0.15	1.186	1.166	0.781	0.166		
Phenols	IPWQO	0.005		<0.004	<0.001	<0.001	<0.001		
BOD									
COD				11	17	<5	18		
DOC			5	7.2	38	3.7	3		
TDS			500	473	572	491	517		
Total Sus. Solids									
pH			6.5-8.5	7.19	7.33	7.2	7.46		
Ion Balance									
Field Measured									
Water Temp. (°C)			15	14.2	14.3	14.4	14.5		
Conductivity (microS/cm)				724	880	870	840		
pH (pH units)			6.5 - 8.5	6.7	6.8	8.2	6.8		

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-15					
Date>				Nov-91	Nov-92	Nov-96	Sep-97	Nov-98	Sep-99
Parameters	PWQO		ODWS						
Fluoride			1.5	0.2					
Chloride			250	174	169	120	114	82	89
N-NO2 - Nitrite			1						<0.10
N-NO3 -Nitrate			10						0.47
Bromide				1					
Phosphate				0.3					
Sulphate			500	290	238	206	207	133	162
Calcium				142	108	113	102	89	90
Magnesium				94	94	87	79	68	67
Sodium			200	43	49	70	81	67	70
Potassium				4	4	5	5	4	5
Aluminum	IPWQO	0.075	0.1			0.13			
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1	0.12	0.09	0.1			
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.05	0.05	0.14	0.15	0.18	0.23
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)									
Copper	PWQO IPWQO	0.005 d	1			0.016			<0.005
Iron	PWQO	0.3	0.3			0.07	0.28	nd	0.11
Lead	PWQO IPWQO	e	0.01	0.006	0.007				
Manganese			0.05	0.4	0.04	0.18	0.12	0.07	0.04
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon				6.1	9.2	9.4			
Silver	PWQO	0.0001	0.05						
Strontium				0.63	0.54	0.631	0.521	0.426	0.419
Sulphur				82	90	59			
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	0.04		0.02			
Hardness (as CaCO3)			500	740	655	641	580		
Alkalinity as CaCO3	IPWQO	a	30 - 500	232	276	415	403	353	342
TKN				0.3		0.47	0.44	0.23	1.08
N-NH3 - Ammonia						0.11	0.07	0.06	0.02
Organic Nitrogen			0.15	0.3		0.36	0.37	0.17	1.06
Phenols	IPWQO	0.005						nd	<0.001
BOD									
COD				21		31	26	15	13
DOC			5						
TDS			500	800	880	812	820	684	688
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance						1	0.98	1.08	1.03
Field Measured									
Water Temp. (°C)			15	8	7	4.7	14.6	7.6	13.8
Conductivity (microS/cm)				1754	2150	2300	1100	1025	1000
pH (pH units)			6.5 - 8.5	6.4	6.4	8.8	7.5	7.2	8.6

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-15					
Date>				Aug-00	Aug-01	Dec-02	Nov-03	Aug-04	Dec-05
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	84	84	74	86	79	79
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	0.17	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	165	123	95	120	115	118
Calcium				85	83	72	76	70	82
Magnesium				63	59	55	60	55	60
Sodium			200	64	64	56	64	57	55
Potassium				5	5	4	5	5	4
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025						
Barium			1						
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.31	0.29	0.3	0.24	0.31	0.29
Cadmium	PWQO IPWQO	0.0002 c	0.005						
Chromium	PWQO	0.009	0.05						
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)							1010	1020	1030
Copper	PWQO IPWQO	0.005 d	1	<0.01	0.001	0.002	0.002	0.002	0.004
Iron	PWQO	0.3	0.3	0.05	<0.01	<0.01	<0.01	<0.01	<0.03
Lead	PWQO IPWQO	e	0.01						
Manganese			0.05	0.06	0.07	<0.005	0.01	0.02	0.02
Mercury	PWQO	0.0002	0.001						
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3							
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.398	0.41	0.362	0.403	0.387	0.399
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5						
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	341	383	351	312	315	330
TKN				0.32	0.43	0.35	0.39	0.21	0.33
N-NH3 - Ammonia				0.02	<0.02	<0.02	<0.02	0.11	<0.02
Organic Nitrogen			0.15	0.3	<0.43	<0.35	<0.39	0.1	<0.33
Phenols	IPWQO	0.005		0.005	<0.001	<0.001	<0.001	<0.001	<0.001
BOD									
COD				13	16	9	24	6	8
DOC			5						
TDS			500	604	700	657	657	663	670
Total Sus. Solids									
pH			6.5-8.5						
Ion Balance				0.98	0.95	0.96	1.04	0.97	1.02
Field Measured									
Water Temp. (°C)			15	14.3	14.5	2.9	7.2	13.2	7
Conductivity (microS/cm)				960	1103	892	790	829	957
pH (pH units)			6.5 - 8.5	6.5	6.7	8.5	6.9	6.6	6.1

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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-15					
Date>				Sep-06	Oct-07	Nov-08	Oct-09	Sep-10	Jul-11
Parameters	PWQO		ODWS						
Fluoride			1.5						
Chloride			250	80	94	96	79	98	92
N-NO2 - Nitrite			1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 -Nitrate			10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide									
Phosphate									
Sulphate			500	112	89	88	75	67	66
Calcium				81	85	76	76	68	76
Magnesium				58	58	57	53	45	54
Sodium			200	54	52	51	50	47	51
Potassium				4	4	3	4	4	4
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025				<0.001	<0.001	<0.001
Barium			1				0.08	0.06	0.07
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.4	0.55	0.59	0.67	0.52	0.62
Cadmium	PWQO IPWQO	0.0002 c	0.005			<0.0001	<0.0001	<0.0001	<0.0001
Chromium	PWQO	0.009	0.05				<0.005	0.004	0.003
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1080	1110	1040	1010	900	1110
Copper	PWQO IPWQO	0.005 d	1	0.003	0.005	0.002	0.003	0.004	0.002
Iron	PWQO	0.3	0.3	<0.03	<0.03	<0.03	0.23	<0.03	0.17
Lead	PWQO IPWQO	e	0.01				<0.001	<0.001	<0.001
Manganese			0.05	0.02	0.06	0.05	0.08	0.05	0.06
Mercury	PWQO	0.0002	0.001				<0.0001	<0.0001	<0.0001
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3				3.92	4.39	2.46	4.3
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium				0.428	0.453	0.396	0.455		
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5			<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	333	382	357	335	265	389
TKN				0.29	0.57	0.37	0.5	0.40	0.36
N-NH3 - Ammonia				0.04	0.05	0.03	0.14	<0.02	
Organic Nitrogen			0.15	0.25	0.52	0.32	0.36	≤ 0.40	
Phenols	IPWQO	0.005		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD							<1		
COD				9	15	20	18	25	42
DOC			5				8.7	8.7	6.9
TDS			500	702	722	676	657	585	722
Total Sus. Solids							3920		
pH			6.5-8.5				7.53	7.1	7.51
Ion Balance				1	0.94	0.92			
Field Measured									
Water Temp. (°C)			15	12.8	12.1	7.4	12	13.2	11.6
Conductivity (microS/cm)				889	1094	1069	886	862	794
pH (pH units)			6.5 - 8.5	7.0	6.6	7.0	7.1	8.2	7.0

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				BH-15					
Date>				Aug-12	Aug-13	Jul-14	Jul-14		
Parameters	PWQO		ODWS				DUP BH 18		
Fluoride			1.5						
Chloride			250	94	96	106	105		
N-NO2 - Nitrite			1	<0.10	<0.10	< 0.10	< 0.10		
N-NO3 -Nitrate			10	<0.10	<0.10	< 0.10	< 0.10		
Bromide									
Phosphate									
Sulphate			500	85	100	116	116		
Calcium				87	78	83.6	83.4		
Magnesium				59	56	58.7	58.6		
Sodium			200	57	54	56.3	56.2		
Potassium				5	4	4.3	4.3		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	<0.001	<0.001	0.0003	0.0003		
Barium			1	0.07	0.06	0.068	0.067		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	0.58	0.64	0.613	0.613		
Cadmium	PWQO IPWQO	0.0002 c	0.005	<0.0001	<0.0001	0.00006	0.00006		
Chromium	PWQO	0.009	0.05	0.004	0.004	< 0.002	< 0.002		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				1100	1030	1040	1060		
Copper	PWQO IPWQO	0.005 d	1	0.003	0.003	0.0022	0.0021		
Iron	PWQO	0.3	0.3	0.59	0.04	0.124	0.075		
Lead	PWQO IPWQO	e	0.01	<0.001	<0.001	0.00007	0.00003		
Manganese			0.05	0.12	0.02	0.037	0.03		
Mercury	PWQO	0.0002	0.001	<0.0001	<0.0001	0.00005	0.00004		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		1.47	0.98	1.39	1.22		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	<0.01	<0.01	< 0.005	< 0.005		
Hardness (as CaCO3)			500						
Alkalinity as CaCO3	IPWQO	a	30 - 500	388	314	288	290		
TKN				0.16	0.15	0.51	0.52		
N-NH3 - Ammonia				0.04	<0.02	< 0.01	< 0.01		
Organic Nitrogen			0.15	0.12	≤ 0.15	≤ 0.51	≤ 0.52		
Phenols	IPWQO	0.005		<0.001	<0.001	< 0.001	< 0.001		
BOD									
COD				10	16	6	6		
DOC			5	4.5	5.4	4.9	5		
TDS			500	715	670	598	598		
Total Sus. Solids									
pH			6.5-8.5	7.48	7.28	7.57	7.51		
Ion Balance						0.964	0.968		
Field Measured									
Water Temp. (°C)			15	13.4	13.4	12			
Conductivity (microS/cm)				825	963	928			
pH (pH units)			6.5 - 8.5	7.2	6.7	7.0			

All values reported in mg/L unless otherwise noted
ODWS = Ontario Drinking Water Standards
PWQO= Provincial Water Quality Objetives
Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number>				Field Blanks					
Date>				Jul-14	Aug-15	Aug-16	Aug-17		
Parameters	PWQO		ODWS	BH 17	BH 17	BH 17	BH 17		
Fluoride			1.5						
Chloride			250	< 0.5	< 0.5	< 0.5	< 0.5		
N-NO2 - Nitrite			1	< 0.10	< 0.1	< 0.1	< 0.05		
N-NO3 -Nitrate			10	0.1	< 0.1	< 0.1	< 0.05		
Bromide									
Phosphate									
Sulphate			500	< 1	< 1	< 1	< 1		
Calcium				0.04	< 0.02	< 0.02	< 0.02		
Magnesium				< 0.01	< 0.01	< 0.01	< 0.01		
Sodium			200	0.5	< 0.2	< 0.2	< 0.2		
Potassium				0.1	< 0.1	< 0.1	< 0.1		
Aluminum	IPWQO	0.075	0.1						
Arsenic	PWQO IPWQO	0.1 0.0005	0.025	< 0.0001	< 0.0001	< 0.0001	< 0.0001		
Barium			1	< 0.001	< 0.001	< 0.001	< 0.001		
Beryllium	PWQO	b							
Boron	IPWQO	0.2	5	< 0.005	< 0.005	< 0.005	< 0.005		
Cadmium	PWQO IPWQO	0.0002 c	0.005	< 0.00002	< 0.00002	< 0.00002	< 0.000014		
Chromium	PWQO	0.009	0.05	< 0.002	< 0.002	< 0.002	< 0.002		
Cobalt	PWQO	0.0009							
Conductivity (microS/cm)				2	1	1	1		
Copper	PWQO IPWQO	0.005 d	1	< 0.0001	< 0.002	< 0.002	< 0.002		
Iron	PWQO	0.3	0.3	< 0.005	< 0.005	< 0.005	< 0.005		
Lead	PWQO IPWQO	e	0.01	0.00004	< 0.00002	< 0.00002	< 0.00002		
Manganese			0.05	< 0.001	< 0.001	< 0.001	< 0.001		
Mercury	PWQO	0.0002	0.001	< 0.00002	< 0.00002	< 0.00002	< 0.00002		
Molybdenum	IPWQO	0.04							
Nickel	PWQO	0.025							
Total Phosphorus	IPWQO	0.3		< 0.001	< 0.01	< 0.01	0.02		
Silicon									
Silver	PWQO	0.0001	0.05						
Strontium									
Sulphur									
Thallium	IPWQO	0.0003							
Tin									
Titanium									
Vanadium	PWQO	0.006							
Zinc	PWQO IPWQO	0.03 0.02	5	< 0.005	< 0.005	< 0.005	< 0.005		
Hardness (as CaCO3)			500				< 1		
Alkalinity as CaCO3	IPWQO	a	30 - 500	< 5	< 5	< 5	< 5		
TKN				< 0.05	< 0.1	< 0.1	0.2		
N-NH3 - Ammonia				< 0.01	< 0.01	< 0.01	0.02		
Organic Nitrogen			0.15	< 0.05					
Phenols	IPWQO	0.005		< 0.001	< 0.001	< 0.001	< 0.001		
BOD									
COD				< 5	< 5	< 5	< 5		
DOC			5	< 0.2	0.3	< 0.2	< 0.2		
TDS			500	2	< 1	< 1	2		
Total Sus. Solids									
pH			6.5-8.5	6.35	5.39	6.2	6.55		
Ion Balance				1.72					
Field Measured									
Water Temp. (°C)			15						
Conductivity (microS/cm)									
pH (pH units)			6.5 - 8.5						

All values reported in mg/L unless otherwise noted
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Shaded values exceed ODWO Cirteria
Shaded values exceed PWQO Cirteria

Surface Water

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SEEP 1					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-04	Aug-04	May-05	Apr-06		
Fluoride	1.0 - 2.0									
Chloride				180	Not Active	Not Active	Not Active	Not Active		
N -NO2 (Nitrite)	10.0		0.06		Wet Black	Wet Black	Wet Black	Wet Black		
N-NO3 (Nitrate)			13		Peat Only	Peat Only	Peat Only	Peat Only		
Bromide										
Phosphate										
Sulphate	1000									
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55						
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021						
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069						
Iron		0.300	0.300							
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese										
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)								
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089						
Hardness (as CaCO3)										
Alkalinity as CaCO3		a								
TKN										
N-NH3 (Ammonia)		0.02	pH Temp							
Organic Nitrogen										
Phenols		0.001 (i)	0.004	0.961						
BOD										
COD										
TDS (Cond - Calc)	3000									
Total Sus. Solids										
Ion Balance										
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)										
Conductivity (microS/cm)										
pH (pH units)		6.5 - 8.5								
Dissolved Oxygen		f(Temp)								
Flow (L/Sec)										

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SEEP 2					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-02	Sep-02	Nov-02	Apr-03	Aug-03	Nov-03
Fluoride	1.0 - 2.0									
Chloride				180	50	Not Active	Not Active	45	Not Active	60
N -NO2 (Nitrite)	10.0		0.06		<0.10			<0.10		<0.10
N-NO3 (Nitrate)			13		<0.10			0.22		0.560
Bromide										
Phosphate										
Sulphate	1000				23			40		266
Calcium	1000				108			39		256
Magnesium					24			12		49
Sodium					16			16		33
Potassium					4			3		17
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.17			<0.05		0.90
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001			<0.0001		0.0002
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)								411		1450
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002			0.003		0.004
Iron		0.300	0.300		1.24			0.04		1.01
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.10			0.014		0.220
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.11			0.07		0.06
Silicon										
Silver		0.0001		0.00012						
Strontium					0.388			2.800		11.500
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01			<0.005		0.02
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			314			88		525
TKN					0.62			0.95		0.70
N-NH3 (Ammonia)		0.02	pH Temp		<0.02			<0.02		0.05
Organic Nitrogen					<0.62			0.94		0.65
Phenols		0.001 (i)	0.004	0.961	<0.001			<0.001		<0.001
BOD										
COD					16			32		36
TDS (Cond - Calc)	3000				497			267		943
Total Sus. Solids										
Ion Balance					1.00			0.96		1.05
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					19.2			12.4		7.2
Conductivity (microS/cm)					784			740		1157
pH (pH units)		6.5 - 8.5			7.49			8.83		6.66
Dissolved Oxygen		f(Temp)			4.92			8.39		3.44
Flow (L/Sec)					None			None		0.04

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SEEP 2					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-04	May-05	Apr-06	May-07		
Fluoride	1.0 - 2.0									
Chloride				180	Not Active	117	113	Not Active		
N -NO2 (Nitrite)	10.0		0.06		Wet Black	<0.10	<0.10	Wet Black		
N-NO3 (Nitrate)			13		Peat Only	<0.10	2.080	Peat Only		
Bromide										
Phosphate										
Sulphate	1000					209	248			
Calcium	1000					181	212			
Magnesium						40	41			
Sodium						41	50			
Potassium						25	18			
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		0.79	0.73			
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		<0.0001	0.0002			
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						1450	1510			
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.003	0.005			
Iron		0.300	0.300			2.14	0.54			
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.370	0.210			
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.09	0.19			
Silicon										
Silver		0.0001		0.00012						
Strontium						10.4	15.4			
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		0.01	0.03			
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				415	415			
TKN						0.41	1.03			
N-NH3 (Ammonia)		0.02	pH Temp			0.16	0.13			
Organic Nitrogen						0.25	0.90			
Phenols		0.001 (i)	0.004	0.961		<0.001	<0.001			
BOD										
COD						12	13			
TDS (Cond - Calc)	3000					943	982			
Total Sus. Solids										
Ion Balance						0.92	0.99			
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)						16.1	10.6			
Conductivity (microS/cm)						1367	1366			
pH (pH units)		6.5 - 8.5				7.19	7.46			
Dissolved Oxygen		f(Temp)				3.17	3.27			
Flow (L/Sec)							0.03			

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Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					Cattle Watering Hole 1					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Sep-02	May-07	Oct-07			
Fluoride	1.0 - 2.0									
Chloride				180	34	11	17			
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	0.26			
N-NO3 (Nitrate)			13		<0.10	<0.10	<0.10			
Bromide										
Phosphate										
Sulphate	1000				43	15	13			
Calcium	1000				18	8	7			
Magnesium					14	8	67			
Sodium					71					
Potassium										
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30		<0.01	<0.01			
Beryllium	0.1	0.011		0.0053	0.13	<0.0001	<0.0001			
Boron	5.0	0.2 (i)	1.15	3.55	<0.001					
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021						
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052		433	529			
Conductivity (microS/cm)					0.006	<0.001	0.002			
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	6.11	1.660	2.410			
Iron		0.300	0.300							
Lead	0.1	0.005 e	min 0.001	0.002	0.998	0.740	0.80			
Manganese										
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			8	55	38			
Silicon										
Silver		0.0001		0.00012	0.289	0.130	0.150			
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium						0.30	0.51			
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.012	<0.01	<0.01			
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			314	213	232			
TKN					40.50	6.610	8.800			
N-NH3 (Ammonia)		0.02	pH Temp		18.30	2.130	3.650			
Organic Nitrogen					22.20	4.480	5.150			
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	<0.001			
BOD										
COD					120	26	93			
TDS (Cond - Calc)	3000				465	281	344			
Total Sus. Solids										
Ion Balance					0.99	1.01	1.01			
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					22.4	15.9	11.7			
Conductivity (microS/cm)					564	432	541			
pH (pH units)		6.5 - 8.5			8.18	7.04	7.70			
Dissolved Oxygen		f(Temp)			16.49	1.69	6.11			
Flow (L/Sec)					No Flow					

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(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					Cattle Watering Hole 2					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Sep-02	May-07	Oct-07			
Fluoride	1.0 - 2.0									
Chloride				180	13	16	16			
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	<0.10			
N-NO3 (Nitrate)			13		0.230	<0.10	<0.10			
Bromide										
Phosphate										
Sulphate	1000				4	19	4			
Calcium	1000				76	66	66			
Magnesium					15	19	17			
Sodium					8	10	7			
Potassium					8	2	26			
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.05	0.010	<0.01			
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	<0.0001			
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						493	604			
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		<0.001	0.001			
Iron		0.300	0.300		0.45	0.11	5.76			
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.524	0.050	1.360			
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.05	1.77			
Silicon										
Silver		0.0001		0.00012						
Strontium					0.195	0.164	0.168			
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.005	<0.01	<0.01			
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			254	223	290			
TKN					5.12	0.410	12.500			
N-NH3 (Ammonia)		0.02	pH Temp		0.58	0.040	11.100			
Organic Nitrogen					4.54	0.390	1.400			
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	<0.001			
BOD										
COD					35	6	95			
TDS (Cond - Calc)	3000				319	320	393			
Total Sus. Solids										
Ion Balance					1.01	1.01	1.02			
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					16.0	12.8	12.2			
Conductivity (microS/cm)					431	486	619			
pH (pH units)		6.5 - 8.5			7.83	7.61	7.60			
Dissolved Oxygen		f(Temp)			7.23	4.81	5.76			
Flow (L/Sec)					No Flow	No Flow	No Flow			

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 1					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-91	Nov-96				
Fluoride	1.0 - 2.0				0.060	No Sample				
Chloride				180	13	Collected				
N -NO2 (Nitrite)	10.0		0.06							
N-NO3 (Nitrate)			13							
Bromide										
Phosphate					0.650					
Sulphate	1000				36					
Calcium	1000				73					
Magnesium					18					
Sodium					10					
Potassium					24					
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		0.090					
Barium				2.30	0.070					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.060					
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021						
Chromium	1.0	0.0099		0.064	0.020					
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.016					
Iron		0.300	0.300		1.140					
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					1.740					
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)								
Silicon					7.40					
Silver		0.0001		0.00012						
Strontium					0.110					
Sulphur					12					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089						
Hardness (as CaCO3)					256					
Alkalinity as CaCO3		a			236					
TKN					4.740					
N-NH3 (Ammonia)		0.02	pH Temp							
Organic Nitrogen					4.740					
Phenols		0.001 (i)	0.004	0.961						
BOD					17.0					
COD					95.0					
TDS (Cond - Calc)	3000				306					
Total Sus. Solids										
Ion Balance										
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					1.0					
Conductivity (microS/cm)					755					
pH (pH units)		6.5 - 8.5			7.6					
Dissolved Oxygen		f(Temp)			13.7					
Flow (L/Sec)										

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 2					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-91	Nov-96				
Fluoride	1.0 - 2.0				0.060	No Sample				
Chloride				180	8	Collected				
N -NO2 (Nitrite)	10.0		0.06							
N-NO3 (Nitrate)			13		0.150					
Bromide										
Phosphate					0.560					
Sulphate	1000				21					
Calcium	1000				55					
Magnesium					13					
Sodium					3					
Potassium					10					
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		0.140					
Barium				2.30	0.170					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.100					
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021						
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.038					
Iron		0.300	0.300		1.670					
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.600					
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)								
Silicon					5.50					
Silver		0.0001		0.00012						
Strontium					0.190					
Sulphur					8.00					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.140					
Hardness (as CaCO3)					191					
Alkalinity as CaCO3		a			176					
TKN					0.770					
N-NH3 (Ammonia)		0.02	pH Temp		0.450					
Organic Nitrogen					0.320					
Phenols		0.001 (i)	0.004	0.961						
BOD					5.0					
COD					49.0					
TDS (Cond - Calc)	3000				236					
Total Sus. Solids										
Ion Balance										
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					2.0					
Conductivity (microS/cm)					574					
pH (pH units)		6.5 - 8.5			7.3					
Dissolved Oxygen		f(Temp)			13.5					
Flow (L/Sec)										

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Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-91	Nov-96	Apr-97	Jun-05	Apr-99	Dec-99
Fluoride	1.0 - 2.0				0.060					
Chloride				180	5	13	2	No samples	16	16
N -NO2 (Nitrite)	10.0		0.06					collected	<0.10	<0.10
N-NO3 (Nitrate)			13		0.130	0.600		during 1998	<0.10	0.260
Bromide										
Phosphate					0.170					
Sulphate	1000				38	23	9	Frozen	17	16
Calcium	1000				34	23	7		20	29
Magnesium					10	7	2	Sept.28/98 -	6	8
Sodium					8	9	2	Dry	13	17
Potassium					2	1	1		1	1
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		0.150			Nov.25/98 -		
Barium				2.30	0.030	0.020		Dry		
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		0.040			<0.01	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021					<0.00015	<0.00015
Chromium	1.0	0.0099		0.064	0.020					
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.012			<0.005	<0.005
Iron		0.300	0.300		0.490	0.260	0.42		0.07	0.43
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.180	0.060	0.020		0.030	0.090
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039	0.010					
Total Phosphorus		0.03 (i)					0.05		0.02	0.06
Silicon					5.10	5.70				
Silver		0.0001		0.00012						
Strontium					0.120	0.067	0.038		0.066	0.083
Sulphur					12.00	7.00				
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020		0.010				
Zinc	50	0.03 0.02 (i)	0.03	0.089		0.010			<0.01	<0.01
Hardness (as CaCO3)					126	86				
Alkalinity as CaCO3		a			102	60	21		67	96
TKN					0.430	0.630			0.69	0.81
N-NH3 (Ammonia)		0.02	pH Temp		0.10	0.05			0.03	0.05
Organic Nitrogen					0.330				0.660	0.031
Phenols		0.001 (i)	0.004	0.961					<0.001	<0.001
BOD										
COD					27	25	57		21	15
TDS (Cond - Calc)	3000				156	132	48		144	156
Total Sus. Solids										
Ion Balance						1.03	0.95		0.97	1.06
Un-ionized Ammonia						<0.001				
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					2.0	1.3	11.1		7.2	2.9
Conductivity (microS/cm)					430	210			320	250
pH (pH units)		6.5 - 8.5			6.00	7.55	6.80		6.97	8.37
Dissolved Oxygen		f(Temp)			13.4	13.0	11.6		4.3	3.4
Flow (L/Sec)						0.1	0.8		3.0	0.1

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Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-00	Jun-05	Jul-08	Sep-08	Jun-09	Oct-09
Fluoride	1.0 - 2.0							No Sample		
Chloride				180	6	No	61	Collected	109	84
N -NO2 (Nitrite)	10.0		0.06		<0.10	samples	<0.10	No Water	<0.10	<0.10
N-NO3 (Nitrate)			13		0.190	collected	<0.10		0.39	0.27
Bromide						during				
Phosphate						Aug.				
Sulphate	1000				10	Nov	5		6	11
Calcium	1000				19	2000	0		43	43
Magnesium					6		10		9	10
Sodium					7		34		60	55
Potassium					1	Aug.16/00 -	1		2	1
Arsenic		0.1 0.005	0.005	0.15					<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5			Dry				
Barium				2.30					0.03	0.03
Beryllium	0.1	0.011		0.0053		Nov.7/00 -				
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	Dry	<0.01		0.02	0.02
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.00006		<0.0001		<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)							456		609	614
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.013		<0.001		<0.001	<0.001
Iron		0.300	0.300		0.20		3.01		0.54	0.35
Lead	0.1	0.005 e	min 0.001	0.002					<0.001	<0.001
Manganese					0.050		1.160		0.3	0.32
Mercury		0.0002		0.00077					<0.0001	<0.0002
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.02		0.12		0.03	0.02
Silicon										
Silver		0.0001		0.00012						
Strontium					0.070		0.130		0.154	0.138
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01		<0.01		<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			65		133		122	171
TKN					0.76		0.73		0.44	0.38
N-NH3 (Ammonia)		0.02	pH Temp		0.04		0.20		0.06	0.09
Organic Nitrogen					0.720		0.53			
Phenols		0.001 (i)	0.004	0.961	<0.001		<0.001		<0.001	<0.001
BOD									<1	<1
COD					36		18		15	<5
TDS (Cond - Calc)	3000				100		296		396	399
Total Sus. Solids									<2	<2
Ion Balance					1.05		0.99			
Un-ionized Ammonia									<0.02	<0.02
pH		6.5 - 8.5							7.85	8.09
DOC										
Field Measured										
Water Temp. (°C)					4.5		16.0		11.0	7.0
Conductivity (microS/cm)					140		455		657	607
pH (pH units)		6.5 - 8.5			7.95		Not Measured		7.80	8.88
Dissolved Oxygen		f(Temp)			6.5		Not Measured		4.6	8.4
Flow (L/Sec)					0.8		Not Measured			

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Surface Water Quality Data
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Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-10	Aug-10	Sep-10	May-11	Jul-11	Nov-11
Fluoride	1.0 - 2.0				No Sample	No Sample	No Sample			
Chloride				180	Collected	Collected	Collected	2	100	142
N -NO2 (Nitrite)	10.0		0.06		No Water	No Water	No Water	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13					<0.10	0.450	<0.10
Bromide										
Phosphate										
Sulphate	1000							<1	10	23
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15				<0.001	<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30				0.02	0.05	0.06
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55				0.01	0.02	0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064				0.001	0.004	0.003
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)								111	639	909
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				0.002	<0.001	<0.001
Iron		0.300	0.300					0.59	1.01	0.86
Lead	0.1	0.005 e	min 0.001	0.002				<0.001	<0.001	<0.001
Manganese										
Mercury		0.0002		0.00077				<0.0001	<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)						0.040	0.030	0.060
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a						51	161	226
TKN								0.96	0.48	0.30
N-NH3 (Ammonia)		0.02	pH Temp					0.02	0.12	0.06
Organic Nitrogen								<0.70	0.36	0.24
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	<0.001
BOD								<1	<1	<1
COD								63	18	18
TDS (Cond - Calc)	3000							72	415	591
Total Sus. Solids								7	22	8
Ion Balance										
Un-ionized Ammonia								<0.02	<0.02	<0.02
pH		6.5 - 8.5						7.6	7.13	7.01
DOC										
Field Measured										
Water Temp. (°C)								15.9	14.9	7.1
Conductivity (microS/cm)								114	495	892
pH (pH units)		6.5 - 8.5						7.8	7.6	6.8
Dissolved Oxygen		f(Temp)						8.3	2.57	8.8
Flow (L/Sec)								3.0	0.2	0.1

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Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-11 Field Blank	May-12	Aug-12	Oct-12	Apr-13	Aug-13
Fluoride	1.0 - 2.0				QA/QC		No Sample	No Sample		No Sample
Chloride				180	<1	2	Collected	Collected	5	Collected
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	No Water	<0.10	No Water
N-NO3 (Nitrate)			13		<0.10	<0.10			<0.10	
Bromide										
Phosphate										
Sulphate	1000				<1	8			8	
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001			<0.001	
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	<0.01	0.01			0.01	
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	<0.01			<0.01	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001			<0.0001	
Chromium	1.0	0.0099		0.064	<0.001	<0.001			<0.001	
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					<5	111			79	
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	<0.001	0.002			0.002	
Iron		0.300	0.300		<0.03	0.27			0.27	
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001			<0.001	
Manganese										
Mercury		0.0002		0.00077	<0.0001	<0.0001			<0.0001	
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			<0.01	0.010			<0.01	
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01			0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			<5	45			21	
TKN					<0.10	0.56			0.76	
N-NH3 (Ammonia)		0.02	pH Temp		<0.02	0.02			<0.02	
Organic Nitrogen					<0.10	0.54			≤ 0.76	
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001			<0.001	
BOD					<1	<1			4	
COD					<5	38			36	
TDS (Cond - Calc)	3000				<1	72			51	
Total Sus. Solids					<2	2			<2	
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02			<0.02	
pH		6.5 - 8.5			5.44	6.84			6.68	
DOC										
Field Measured										
Water Temp. (°C)					14.9	8.7			8.1	
Conductivity (microS/cm)					495	110			81	
pH (pH units)		6.5 - 8.5			7.6	7.0			6.1	
Dissolved Oxygen		f(Temp)			2.57	9.32			5.22	
Flow (L/Sec)					0.2	1.0			7.6	

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Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-13	Nov-13 DUP SW 2	Apr-14	Jul-14	Nov-14	Nov-15
Fluoride	1.0 - 2.0							No Sample		No Sample
Chloride				180	18	20	2.8	Collected	5.3	Collected
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	< 0.10	No Water	< 0.1	No Water
N-NO3 (Nitrate)			13		2.2	2.22	0.2		0.1	
Bromide										
Phosphate										
Sulphate	1000				33	32	5		12	
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001	0.0002		0.0002	
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.03	0.03	0.01		0.0019	
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	<0.01	0.008		< 0.005	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	0.00003		0.00002	
Chromium	1.0	0.0099		0.064	0.001	< 0.001	< 0.0002		< 0.002	
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					263	272	55		171	
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002	0.002	0.0011		0.0017	
Iron		0.300	0.300		0.29	0.25	0.362		0.139	
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001	0.00033		0.00022	
Manganese										
Mercury		0.0002		0.00077	<0.0001	<0.0001	< 0.00002		0.00003	
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.04	0.05	0.05		0.01	
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01	<0.005		0.007	
Hardness (as CaCO3)							22			
Alkalinity as CaCO3		a			61	63	12		64	
TKN					0.84	0.7	0.56		0.58	
N-NH3 (Ammonia)		0.02	pH Temp		0.03	0.03	0.02		< 0.01	
Organic Nitrogen					0.81	0.67	0.54		≤ 0.58	
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	< 0.001		< 0.001	
BOD					1	1	< 3		< 3	
COD					34	34	41		23	
TDS (Cond - Calc)	3000				171	177	27		90.2	
Total Sus. Solids					38	8	4		< 3	
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02				
pH		6.5 - 8.5			7.12	7.13	6.91		7.35	
DOC										
Field Measured										
Water Temp. (°C)					8.2		7.2		4.6	
Conductivity (microS/cm)					267		50		166	
pH (pH units)		6.5 - 8.5			7.1		7.5		7.6	
Dissolved Oxygen		f(Temp)			4.35		8.38		6.03	
Flow (L/Sec)					0.4		21.3		0.3	

All values reported in mg/L unless otherwise noted
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(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-16	Apr-17	Apr-18	Apr-18 DUP SW 4	Apr-19	Apr-19 DUP SW 4
Fluoride	1.0 - 2.0									
Chloride				180	10	12.8	5.5	5.3	1.6	1.4
N -NO2 (Nitrite)	10.0		0.06		< 0.1	< 0.1	< 0.1	< 0.1	<0.10	<0.10
N-NO3 (Nitrate)			13		0.1	< 0.1	< 0.1	< 0.1	0.1	<0.1
Bromide										
Phosphate										
Sulphate	1000				6	6	3	3	4	4
Calcium	1000				22.2	7.55	11.8	11.6	5.33	5.5
Magnesium					6.52	1.95	3.37	3.23	1.54	1.6
Sodium					10.9	7.6	3.2	3	1.8	1.9
Potassium					1	0.5	0.6	0.5	0.5	0.5
Arsenic		0.1 0.005	0.005	0.15	< 0.0012	0.0002	< 0.0001	0.0003	0.0002	0.0002
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.02	0.013	0.023	0.022	0.01	0.01
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.009	< 0.005	< 0.005	< 0.005	0.008	0.007
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	< 0.001	0.000029	0.000035	0.000035	0.000032	0.00003
Chromium	1.0	0.0099		0.064	0.0011	0.001	< 0.001	0.002	<0.001	<0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					200	94	58	57	44	44
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.003	0.001	0.0012	0.0013	0.0013	0.0013
Iron		0.300	0.300		0.091	0.426	0.575	0.572	0.3	0.316
Lead	0.1	0.005 e	min 0.001	0.002	< 0.0006	0.0002	0.00034	0.00032	0.00027	0.00026
Manganese					0.074	0.014	0.021	0.021	0.01	0.01
Mercury		0.0002		0.00077	< 0.00002	< 0.02	< 0.00002	< 0.00002	<0.00002	<0.00002
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.02	0.04	0.05	0.05	0.07	0.06
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	< 0.005	0.01	0.024	0.024	0.012	0.012
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			83	14	23	24	10	10
TKN					0.52	0.89	0.6	0.6	0.6	0.05
N-NH3 (Ammonia)		0.02	pH Temp		0.02	< 0.01	0.03	0.03	0.06	0.04
Organic Nitrogen							0.57	0.57	0.54	0.01
Phenols		0.001 (i)	0.004	0.961	< 0.001	< 0.001	< 0.001	< 0.001	<0.002	<0.002
BOD					< 3	< 3	< 3	< 3	< 3	< 3
COD					28	40	49	45	27	39
TDS (Cond - Calc)	3000				107	44.7	42	42	22	21
Total Sus. Solids					7	18	8	9	11	9
Ion Balance						0.834				
Un-ionized Ammonia										
pH		6.5 - 8.5			7.6	6.97	7.37	7.26	6.63	6.63
DOC					11.1	11	14.3	14.5	14.2	12.4
Field Measured										
Water Temp. (°C)					9.6	4.6	5.3		10	
Conductivity (microS/cm)					198	98	56		37	
pH (pH units)		6.5 - 8.5			7.6	6.9	7.4		7.5	
Dissolved Oxygen		f(Temp)			5.45	11.39	6.39		10.9	
Flow (L/Sec)					0.15	10.9	6.5		18.1	

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Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-20	Mar-21	Apr-22	May-23	May-24	
Fluoride	1.0 - 2.0									
Chloride				180	2.8	8	4	2	3	
N -NO2 (Nitrite)	10.0		0.06		< 0.10	<0.10	<0.10	<0.10	<0.10	
N-NO3 (Nitrate)			13		< 0.10	<0.10	<0.10	<0.10	<0.10	
Bromide										
Phosphate										
Sulphate	1000				6	5	4	2	3	
Calcium	1000				16.2	10	10	8	22	
Magnesium					4.96	3	3	2	7	
Sodium					3.1	5	4	3	5	
Potassium					0.6	<1	<1	<1	1	
Arsenic		0.1 0.005	0.005	0.15	0.0003	<0.001	<0.001	<0.001	<0.001	
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.016	0.01	0.01	0.01	0.02	
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	< 0.005	<0.01	<0.01	<0.01	<0.01	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.000039	<0.0001	<0.0001	<0.0001	<0.0001	
Chromium	1.0	0.0099		0.064	< 0.001	<0.001	<0.001	0.001	0.001	
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					132	95	84	59	149	
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.0016	0.001	0.002	0.001	0.002	
Iron		0.300	0.300		0.121	0.35	0.18	0.58	1.14	
Lead	0.1	0.005 e	min 0.001	0.002	0.00012	<0.001	<0.001	<0.001	<0.001	
Manganese					0.06	0.02	0.01	0.02	0.12	
Mercury		0.0002		0.00077	< 0.00002	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.02	0.044	0.026	0.034	0.068	
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	< 0.005	<0.01	<0.01	<0.01	<0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			54	27	34	25	80	
TKN					0.5	0.664	0.942	0.647	1.38	
N-NH3 (Ammonia)		0.02	pH Temp		0.04	<0.010	0.013	<0.020	<0.020	
Organic Nitrogen					0.46	≤0.664	≤0.929			
Phenols		0.001 (i)	0.004	0.961	< 0.002	0.004	<0.001	<0.001	<0.001	
BOD					< 3	<1	<1	<1	<1	
COD					34	40	47	58	47	
TDS (Cond - Calc)	3000				66	62	55	38	97	
Total Sus. Solids					< 3	9	57	13	26	
Ion Balance										
Un-ionized Ammonia						<0.02	<0.02	<0.02	<0.02	
pH		6.5 - 8.5			7.41	6.87	6.77	7.04	7.51	
DOC					12.2	12.6	14.5	19.1	20.2	
Field Measured										
Water Temp. (°C)					5.7	4.6	4.8	11.1	12.6	
Conductivity (microS/cm)					133	140	131	90	200	
pH (pH units)		6.5 - 8.5			8	6.4	6.4	7.6	7.5	
Dissolved Oxygen		f(Temp)			12.4	8.6	11.2	9.1	7.2	
Flow (L/Sec)					0.1	2.5	1	24.7	5.1	

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-01	Aug-01	Nov-01	Jun-02	Sep-02	Nov-02
Fluoride	1.0 - 2.0								No Sample	No Sample
Chloride				180	Not	No	34	64	Collected	Collected
N -NO2 (Nitrite)	10.0		0.06		sampled	samples	<0.10	<0.10	No Water	No Water
N-NO3 (Nitrate)			13		as	collected	0.17	0.26		
Bromide					this	during				
Phosphate					is a	Aug.				
Sulphate	1000				ground		27	80		
Calcium	1000				surface		27	45		
Magnesium					water		9	11		
Sodium					station		25	41		
Potassium					and		1	1		
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		there	Dry				
Barium				2.30	is					
Beryllium	0.1	0.011		0.0053	no					
Boron	5.0	0.2 (i)	1.15	3.55	water		<0.05	<0.05		
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	to		<0.0001	<0.0001		
Chromium	1.0	0.0099		0.064	sample					
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	down		0.001	0.001		
Iron		0.300	0.300		stream		0.14	0.26		
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese							0.060	0.250		
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)					0.04	0.07		
Silicon										
Silver		0.0001		0.00012						
Strontium							0.064	0.142		
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089			<0.01	0.020		
Hardness (as CaCO3)										
Alkalinity as CaCO3		a					78	139		
TKN							0.76	0.66		
N-NH3 (Ammonia)		0.02	pH Temp				0.06	<0.02		
Organic Nitrogen							0.700			
Phenols		0.001 (i)	0.004	0.961			<0.001	<0.001		
BOD										
COD							28	27		
TDS (Cond - Calc)	3000						171	323		
Total Sus. Solids										
Ion Balance							1.04	1.04		
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)							2.2	10.7		
Conductivity (microS/cm)							336	427		
pH (pH units)		6.5 - 8.5					8.43	8.23		
Dissolved Oxygen		f(Temp)					13.9	9.7		
Flow (L/Sec)							0.13			

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-03	Aug-03	Nov-03	Jun-04	Aug-04	Dec-04
Fluoride	1.0 - 2.0					No Sample		No Sample	No Sample	
Chloride				180	87	Collected	12	Collected	Collected	6
N -NO2 (Nitrite)	10.0		0.06		0.14	No Water	<0.10	No Water	No Water	<0.10
N-NO3 (Nitrate)			13		0.31		0.11			0.45
Bromide										
Phosphate										
Sulphate	1000				25		9			13
Calcium	1000				39		13			12
Magnesium					9		4			4
Sodium					41		11			5
Potassium					2		1			1
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.05		<0.01			0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001		<0.0001			<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					501		158			109
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002		0.001			0.001
Iron		0.300	0.300		0.15		0.29			0.23
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.061		0.040			0.020
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.15		0.03			0.11
Silicon										
Silver		0.0001		0.00012						
Strontium					0.119		0.056			0.043
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.005		<0.01			<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			83		48			26
TKN					0.91		0.62			0.61
N-NH3 (Ammonia)		0.02	pH Temp		0.09		0.04			<0.02
Organic Nitrogen					0.82		0.58			<0.61
Phenols		0.001 (i)	0.004	0.961	<0.001		<0.001			<0.001
BOD										
COD					31		46			29
TDS (Cond - Calc)	3000				326		103			71
Total Sus. Solids										
Ion Balance					0.97		0.99			N/A
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					3.9		2.4			0.8
Conductivity (microS/cm)					511		162			240
pH (pH units)		6.5 - 8.5			8.09		6.90			9.10
Dissolved Oxygen		f(Temp)			8.6		11.7			Not Measured
Flow (L/Sec)					0.25		1.30			1.3

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-05	Sep-05	Dec-05	Apr-06	Sep-06	Nov-06
Fluoride	1.0 - 2.0					No Sample				
Chloride				180	39	Collected	62	28	23	5
N -NO2 (Nitrite)	10.0		0.06		<0.10	No Water	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		0.23		0.56	0.20	0.11	<0.10
Bromide										
Phosphate										
Sulphate	1000				9		16	9	6	6
Calcium	1000				25		31	18	22	12
Magnesium					6		7	5	5	4
Sodium					22		43	16	19	3
Potassium					2		1	1	1	1
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.03		0.01	0.03	0.02	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					284		421	209	239	106
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002		0.001	0.002	0.001	0.001
Iron		0.300	0.300		0.32		0.21	0.23	0.85	0.86
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.090		0.040	0.030	0.190	0.070
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			<0.01		0.04	0.02	0.03	0.06
Silicon										
Silver		0.0001		0.00012						
Strontium					0.089		0.085	0.064	0.175	0.042
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01		<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			73		87	53	78	45
TKN					0.50		0.30	0.59	1.68	0.86
N-NH3 (Ammonia)		0.02	pH Temp		0.05		0.03	0.03	0.05	<0.02
Organic Nitrogen					0.45		0.27	0.56	1.63	
Phenols		0.001 (i)	0.004	0.961	<0.001		<0.001	<0.001	<0.001	<0.001
BOD										
COD					33		28	36	55	36
TDS (Cond - Calc)	3000				185		274	136	155	69
Total Sus. Solids										
Ion Balance					1.00		1.04	0.99	1.01	N/A LC
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					10.4		0.3	10.3	14.5	7.5
Conductivity (microS/cm)					273		55	230	204	102
pH (pH units)		6.5 - 8.5			8.14		8.26	8.30	6.93	7.28
Dissolved Oxygen		f(Temp)			5.5		10.9	9.1	6.4	9.5
Flow (L/Sec)					1.2		0.4	1.0	2.0	6.0

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PWQO = Provincial Water Quality Objectives
(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-07	Jul-08	Sep-08	Jun-09	Oct-09	Jun-10
Fluoride	1.0 - 2.0						No Sample		No Sample	No Sample
Chloride				180	64	150	Collected	112	Collected	Collected
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	<0.10	No Water	No Water
N-NO3 (Nitrate)			13		0.26	0.62		0.25		
Bromide										
Phosphate										
Sulphate	1000				4	7		7		
Calcium	1000				44	66		43		
Magnesium					10	12		9		
Sodium					38	84		58		
Potassium					2	2		1		
Arsenic		0.1 0.005	0.005	0.15				<0.001		
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30				0.04		
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	0.02		0.02		
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001		<0.0001		
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					491	834		614		
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	<0.001	0.005		0.001		
Iron		0.300	0.300		1.32	4.49		1.67		
Lead	0.1	0.005 e	min 0.001	0.002				0.001		
Manganese					0.610	0.400		0.51		
Mercury		0.0002		0.00077				<0.0001		
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.11	0.12		0.08		
Silicon										
Silver		0.0001		0.00012						
Strontium					0.133	0.174		0.142		
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	0.030		<0.01		
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			140	170		118		
TKN					0.46	0.87		0.58		
N-NH3 (Ammonia)		0.02	pH Temp		0.14	0.08		0.1		
Organic Nitrogen					0.32	0.79				
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001		<0.001		
BOD								<1		
COD					19	19		25		
TDS (Cond - Calc)	3000				319	542		399		
Total Sus. Solids								21		
Ion Balance					1.01	1.02				
Un-ionized Ammonia								<0.02		
pH		6.5 - 8.5						7.54		
DOC										
Field Measured										
Water Temp. (°C)					11.2	18.0		13		
Conductivity (microS/cm)					478	824		644		
pH (pH units)		6.5 - 8.5			7.27	--		7.8		
Dissolved Oxygen		f(Temp)			6.4	--		4.71		
Flow (L/Sec)					--	--				

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Aug-10	Sep-10	May-11	Jul-11	Nov-11	Nov-11 DUP
Fluoride	1.0 - 2.0				No Sample	No Sample				
Chloride				180	Collected	Collected	11	238	313	307
N -NO2 (Nitrite)	10.0		0.06		No Water	No Water	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13				<0.10	0.45	0.37	0.37
Bromide										
Phosphate										
Sulphate	1000						2	12	20	20
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15			<0.001	<0.001	<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30			0.02	0.06	0.07	0.07
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55			0.01	0.02	0.01	0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021			<0.0001	<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064			0.002	0.003	0.005	0.007
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)							153	1180	1560	1560
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			0.002	0.002	0.001	0.001
Iron		0.300	0.300				0.54	0.12	0.15	0.12
Lead	0.1	0.005 e	min 0.001	0.002			<0.001	<0.001	<0.001	<0.001
Manganese										
Mercury		0.0002		0.00077			<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)					0.050	0.030	0.020	0.030
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089			<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a					57	215	292	295
TKN							1.27	0.41	0.21	0.24
N-NH3 (Ammonia)		0.02	pH Temp				0.02	0.04	<0.02	<0.02
Organic Nitrogen							≤0.70	0.36	≤0.21	≤0.24
Phenols		0.001 (i)	0.004	0.961			<0.001	<0.001	<0.001	<0.001
BOD							<1	<1	1	<1
COD							58	15	18	18
TDS (Cond - Calc)	3000						99	767	1010	1010
Total Sus. Solids							7	22	14	13
Ion Balance										
Un-ionized Ammonia							<0.02	<0.02	<0.02	<0.02
pH		6.5 - 8.5					7.75	7.98	8.0	8.0
DOC										
Field Measured										
Water Temp. (°C)							15.9	17	6.2	17
Conductivity (microS/cm)							114	824	1566	824
pH (pH units)		6.5 - 8.5					7.8	8.0	8.2	8.0
Dissolved Oxygen		f(Temp)					8.3	6.04	8.77	6.04
Flow (L/Sec)							3.0	0.2	0.1	0.2

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-12	May-12 DUP SW 3B	Aug-12	Oct-12	Apr-13	Apr-13 DUP SW 2
Fluoride	1.0 - 2.0						No Sample	No Sample		
Chloride				180	25	26	Collected	Collected	15	15
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Flow	No Flow	<0.10	<0.10
N-NO3 (Nitrate)			13		0.14	0.12			<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				9	9			8	9
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001			<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.02	0.02			0.01	0.01
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.01	0.01			<0.01	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001			<0.0001	<0.0001
Chromium	1.0	0.0099		0.064	0.001	0.001			<0.001	<0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					213	213			122	122
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002	0.002			0.002	0.002
Iron		0.300	0.300		0.24	0.25			0.34	0.32
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001			<0.001	<0.001
Manganese										
Mercury		0.0002		0.00077	<0.0001	<0.0001			<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.05	0.05			<0.01	0.030
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01			<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			61	61			25	26
TKN					0.64	0.62			0.70	0.42
N-NH3 (Ammonia)		0.02	pH Temp		<0.02	0.02			<0.02	<0.02
Organic Nitrogen					≤0.64	0.60			≤ 0.70	≤ 0.42
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001			<0.001	<0.001
BOD					<1	<1			1	<1
COD					40	39			52	42
TDS (Cond - Calc)	3000				138	138			79	79
Total Sus. Solids					6	4			15	15
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02			<0.02	<0.02
pH		6.5 - 8.5			7.17	7.12			6.8	6.8
DOC										
Field Measured										
Water Temp. (°C)					6.0				5.8	
Conductivity (microS/cm)					219				126	
pH (pH units)		6.5 - 8.5			7.6				7.1	
Dissolved Oxygen		f(Temp)			11.05				6.03	
Flow (L/Sec)					1.0				8.6	

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Aug-13	Nov-13	Apr-14	Apr-14 DUP SW 4	Jul-14	Nov-14
Fluoride	1.0 - 2.0								No Sample	
Chloride				180	536	73	11.8	11.2	Collected	92.8
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	< 0.10	< 0.10		< 0.10
N-NO3 (Nitrate)			13		0.23	2.05	0.2	0.2		0.2
Bromide										
Phosphate										
Sulphate	1000				14	30	5	5		13
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001	0.0002	0.0003		0.0003
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.13	0.03	0.015	0.022		0.036
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	0.01	0.008	0.008		< 0.005
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	0.00005	0.00004		0.00004
Chromium	1.0	0.0099		0.064	0.006	0.002	0.0004	0.0011		< 0.002
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					2320	555	97	95		501
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001	0.002	0.0014	0.0021		0.0018
Iron		0.300	0.300		0.11	0.16	0.527	0.847		0.121
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001	0.00041	0.0005		0.00036
Manganese										
Mercury		0.0002		0.00077	<0.0001	<0.0001	< 0.00002	< 0.00002		< 0.00002
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.04	0.03	0.11	0.19		0.02
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01	0.006	0.007		0.013
Hardness (as CaCO3)							27	29		
Alkalinity as CaCO3		a			323	113	16	16		108
TKN					0.41	0.7	0.48	0.59		0.61
N-NH3 (Ammonia)		0.02	pH Temp		0.03	<0.02	0.02	0.02		< 0.01
Organic Nitrogen					0.038	≤ 0.70	0.46	0.57		≤ 0.61
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	< 0.001	< 0.001		< 0.001
BOD					<1	<1	< 3	< 3		< 3
COD					25	37	42	39		24
TDS (Cond - Calc)	3000				1510	361	46	47		287
Total Sus. Solids					34	<2	74	88		< 3
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02				
pH		6.5 - 8.5			8.14	7.9	7.08	7.05		7.83
DOC										
Field Measured										
Water Temp. (°C)					17.5	10.3	5.5			4.4
Conductivity (microS/cm)					2080	573	90			505
pH (pH units)		6.5 - 8.5			7.7	8	7.9			7.9
Dissolved Oxygen		f(Temp)			6.14	8.63	8.94			8.61
Flow (L/Sec)					0.1	0.35	16.44			0.35

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-14 DUP SW 4	Nov-15	May-16	May-16 DUP SW 4	Apr-17	Apr-17 DUP SW 22
Fluoride	1.0 - 2.0					No Sample				
Chloride				180	92.3	Collected	130	130	3.7	3.1
N -NO2 (Nitrite)	10.0		0.06		< 0.10	No Water	< 0.1	< 0.1	< 0.1	< 0.1
N-NO3 (Nitrate)			13		0.2		0.3	0.3	< 0.1	< 0.1
Bromide										
Phosphate										
Sulphate	1000				13		9	9	6	5
Calcium	1000						46.4	46	5.61	5.55
Magnesium							9.83	9.78	1.61	1.61
Sodium							72.1	72.5	2.8	2.8
Potassium							1.2	1.2	0.4	0.4
Arsenic		0.1 0.005	0.005	0.15	0.0003		< 0.0012	< 0.0012	0.0002	0.0002
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.034		0.044	0.04	0.01	0.01
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.005		0.009	0.009	0.005	< 0.005
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	< 0.00002		< 0.001	< 0.001	0.000026	0.000029
Chromium	1.0	0.0099		0.064	< 0.002		0.0012	0.0008	< 0.001	< 0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					496		653	659	56	54
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002		0.003	0.002	0.0008	0.0008
Iron		0.300	0.300		0.118		0.344	0.142	0.244	0.271
Lead	0.1	0.005 e	min 0.001	0.002	0.00008		0.003	< 0.0006	0.00016	0.00017
Manganese							0.109	0.028	0.012	0.013
Mercury		0.0002		0.00077	< 0.00002		< 0.00002	< 0.00002	< 0.02	< 0.02
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.03		0.03	0.02	0.03	0.03
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.014		0.018	0.012	0.005	0.005
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			108		134	149	11	10
TKN					0.067		0.41	0.46	0.69	0.74
N-NH3 (Ammonia)		0.02	pH Temp		< 0.01		< 0.01	< 0.01	< 0.01	< 0.01
Organic Nitrogen					≤ 0.67					
Phenols		0.001 (i)	0.004	0.961	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001
BOD					3		< 3	< 3	< 3	< 3
COD					22		25	25	42	38
TDS (Cond - Calc)	3000				278		350	359	26.5	25.2
Total Sus. Solids					< 3		10	15	20	3
Ion Balance									0.782	0.723
Un-ionized Ammonia										
pH		6.5 - 8.5			7.79		7.98	7.99	6.86	6.81
DOC							7.4	7.6	11.8	12
Field Measured										
Water Temp. (°C)							8.5		5.9	
Conductivity (microS/cm)							642		55	
pH (pH units)		6.5 - 8.5					8		6.4	
Dissolved Oxygen		f(Temp)					6.63		9.98	
Flow (L/Sec)							0.2		7.97	

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A				
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-18	Apr-19	May-20	May-20 Dup 1	Mar-21
Fluoride	1.0 - 2.0								
Chloride				180	9.2	10.4	136	135	24
N -NO2 (Nitrite)	10.0		0.06		< 0.1	<0.10	< 0.1	< 0.1	<0.10
N-NO3 (Nitrate)			13		< 0.1	<0.10	0.3	0.3	<0.10
Bromide									
Phosphate									
Sulphate	1000				3	4	8	8	6
Calcium	1000				12.6	7.33	39.3	40.3	13
Magnesium					3.42	1.8	7.86	8.08	4
Sodium					6.3	6.8	65.8	67.4	15
Potassium					0.6	0.5	0.9	0.9	1
Arsenic		0.1 0.005	0.005	0.15	0.00002	0.0002	0.002	0.002	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5						
Barium				2.30	0.022	0.011	0.034	0.035	0.02
Beryllium	0.1	0.011		0.0053					
Boron	5.0	0.2 (i)	1.15	3.55	0.005	0.008	<0.005	<0.005	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.000039	0.000027	0.000029	< 0.000025	<0.0001
Chromium	1.0	0.0099		0.064	0.001	<0.001	<0.001	<0.001	0.002
Cobalt	1.0	0.0009 (i)		0.0052					
Conductivity (microS/cm)					81	88	640	641	166
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.0013	0.0013	0.0017	0.0014	0.002
Iron		0.300	0.300		0.676	0.306	0.077	0.075	0.71
Lead	0.1	0.005 e	min 0.001	0.002	0.00046	0.00022	0.00007	0.00007	<0.001
Manganese					0.028	0.009	0.022	0.022	0.02
Mercury		0.0002		0.00077	< 0.00002	<0.00002	<0.00002	<0.00002	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730					
Nickel	1.0	0.025	min 0.025	0.039					
Total Phosphorus		0.03 (i)			0.05	0.05	0.02	0.02	0.073
Silicon									
Silver		0.0001		0.00012					
Strontium									
Sulphur									
Thallium		0.0003 (i)	0.001	0.040					
Tin									
Titanium									
Vanadium		0.006 (i)		0.020					
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.025	0.011	0.025	0.006	<0.01
Hardness (as CaCO3)									
Alkalinity as CaCO3		a			43	14	99	100	34
TKN					0.7	0.6	0.5	0.5	0.719
N-NH3 (Ammonia)		0.02	pH Temp		0.03	0.03	0.02	0.07	<0.010
Organic Nitrogen							0.48	0.43	<0.719
Phenols		0.001 (i)	0.004	0.961	< 0.001	<0.002	<0.002	<0.002	0.003
BOD					< 3	< 3	< 3	< 3	<1
COD					49	35	29	29	30
TDS (Cond - Calc)	3000				62	40	318	321	108
Total Sus. Solids					9	9	< 3	< 3	55
Ion Balance									
Un-ionized Ammonia									<0.02
pH		6.5 - 8.5			7.34	6.94	7.64	7.86	7.15
DOC					14.4	12.9	6.1	6.1	12.6
Field Measured									
Water Temp. (°C)					4.7	8	4		4.5
Conductivity (microS/cm)					84	73	665		178
pH (pH units)		6.5 - 8.5			7.7	7.1	7.9		6.6
Dissolved Oxygen		f(Temp)			6.75	13.3	12.1		8.7
Flow (L/Sec)					5.9	17.5	0.5		2.5

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 3A					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-22	Apr-22 DUP 1	May-23	May-23 DUP 1	May-24	May-24 DUP 1
Fluoride	1.0 - 2.0									
Chloride				180	19	20	18	18	36	32
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				4	4	3	3	3	3
Calcium	1000				13	13	11	11	28	27
Magnesium					4	4	3	3	8	8
Sodium					12	12	13	13	23	21
Potassium					<1	<1	<1	<1	1	1
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.01	0.01	0.01	0.01	0.03	0.02
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064	<0.001	<0.001	0.001	0.001	0.003	0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					135	137	121	120	243	234
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.003	0.001	0.001	0.001	0.002	0.002
Iron		0.300	0.300		0.15	0.17	0.57	0.56	1.04	0.99
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese					0.01	0.01	0.02	0.02	0.1	0.09
Mercury		0.0002		0.00077	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.023	0.028	0.038	0.036	0.067	0.063
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			40	42	32	31	90	90
TKN					1.03	1.03	0.841	0.693	0.986	1.15
N-NH3 (Ammonia)		0.02	pH Temp		0.017	0.013	<0.020	<0.020	<0.020	<0.020
Organic Nitrogen					≤1.013	≤1.017				
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BOD					<1	<1	<1	<1	<1	<1
COD					47	41	60	54	46	57
TDS (Cond - Calc)	3000				88	89	79	78	158	152
Total Sus. Solids					51	50	11	10	20	14
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
pH		6.5 - 8.5			7.04	6.61	7.27	7.22	7.66	7.74
DOC					14	14.1	19	18.8	19.6	20.1
Field Measured										
Water Temp. (°C)					4.4		10.7		11.4	
Conductivity (microS/cm)					188		160		390	
pH (pH units)		6.5 - 8.5			5.8		7.6		7.8	
Dissolved Oxygen		f(Temp)			11.3		9.7		6.8	
Flow (L/Sec)					3.2		43.2		3.6	

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 4					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-91	Nov-96	May-07			
Fluoride	1.0 - 2.0				0.100	No Sample				
Chloride				180	216	Collected	194			
N -NO2 (Nitrite)	10.0		0.06				<0.10			
N-NO3 (Nitrate)			13				<0.10			
Bromide										
Phosphate					1.530					
Sulphate	1000				240		32			
Calcium	1000				156		123			
Magnesium					98		109			
Sodium					88		153			
Potassium					12		10			
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.090					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.120		6.00			
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.0021		<0.0001			
Chromium	1.0	0.0099		0.064	0.020					
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)							1930			
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			0.002			
Iron		0.300	0.300		0.490		0.580			
Lead	0.1	0.005 e	min 0.001	0.002	0.007					
Manganese					0.360		0.190			
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)					0.220			
Silicon					8.50					
Silver		0.0001		0.00012						
Strontium					0.670		3.880			
Sulphur					80					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089			<0.01			
Hardness (as CaCO3)					792					
Alkalinity as CaCO3		a			450		807			
TKN					1.860		1.960			
N-NH3 (Ammonia)		0.02	pH Temp				0.660			
Organic Nitrogen					1.860		1.300			
Phenols		0.001 (i)	0.004	0.961			<0.001			
BOD					8.0					
COD					124.0		90			
TDS (Cond - Calc)	3000				1,096		1250			
Total Sus. Solids										
Ion Balance							0.99			
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					1.0		15.00			
Conductivity (microS/cm)					2396		1936			
pH (pH units)		6.5 - 8.5			6.5		7.82			
Dissolved Oxygen		f(Temp)			13.4		3.2			
Flow (L/Sec)										

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-91	Nov-96	Apr-97	Jun-05	Apr-99	Dec-99
Fluoride	1.0 - 2.0				0.110			No samples		
Chloride				180	167	55	9	collected	63	64
N -NO2 (Nitrite)	10.0		0.06					during 1998	<0.10	<0.10
N-NO3 (Nitrate)			13			0.190			<0.10	0.230
Bromide										
Phosphate					0.430			Feb.10/98 -		
Sulphate	1000				250	62	10		63	17
Calcium	1000				113	58	9	Sept.28/98 -	61	39
Magnesium					77	38	3	Dry	32	13
Sodium					74	35	6		41	29
Potassium					7.00	3.00	1.00	Nov.25/98 -	4	1
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5					Dry		
Barium				2.30	0.080	0.040				
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.18	0.21			0.17	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.0022				<0.00015	<0.00015
Chromium	1.0	0.0099		0.064		0.020				
Cobalt	1.0	0.0009 (i)		0.0052		0.010				
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069					<0.005	<0.005
Iron		0.300	0.300		0.51	0.35	0.88		0.12	0.04
Lead	0.1	0.005 e	min 0.001	0.002	0.006	nd				
Manganese					0.19	0.18	0.02		<0.01	0.02
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)					0.06		0.04	0.15
Silicon					6.20	6.30				
Silver		0.0001		0.00012						
Strontium					0.62	0.27	0.04		1.07	0.25
Sulphur					86.00	24.00				
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089					<0.01	<0.01
Hardness (as CaCO3)					598	301				
Alkalinity as CaCO3		a			304	205	27		221	95
TKN					0.84	0.71			0.96	0.64
N-NH3 (Ammonia)		0.02	pH Temp			0.02			0.03	0.04
Organic Nitrogen					0.84				0.96	0.60
Phenols		0.001 (i)	0.004	0.961					<0.001	<0.001
BOD					2.0					
COD					65	34			28	<3
TDS (Cond - Calc)	3000				794	404	52		448	264
Total Sus. Solids										
Ion Balance						1.090	72.00		1.01	1.06
Un-ionized Ammonia						0.001	0.980			
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					1.0	3.1	9.3		13.7	0.1
Conductivity (microS/cm)					2178	620	100		680	400
pH (pH units)		6.5 - 8.5			6.80	8.35	7.26		6.98	8.14
Dissolved Oxygen		f(Temp)			13.40	8.00	10.60		9.80	0.00
Flow (L/Sec)						0.1	0.5		3.9	0.3

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-00	Jun-05	Jun-01	Aug-01	Nov-01	Jun-02
Fluoride	1.0 - 2.0									
Chloride				180	53	No	No	No	66	66
N -NO2 (Nitrite)	10.0		0.06		<0.10	samples	samples	samples	<0.10	<0.10
N-NO3 (Nitrate)			13		0.100	collected	collected	collected	<0.10	<0.10
Bromide						during	during	during		
Phosphate						Aug.	June	August		
Sulphate	1000				34	Nov			112	95
Calcium	1000				51	2000			66	90
Magnesium					25				40	70
Sodium					35				40	77
Potassium					3	Aug.16/00 -	No	No	2	4
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5			Dry	Water	Water		
Barium				2.30						
Beryllium	0.1	0.011		0.0053		Nov.7/00 -				
Boron	5.0	0.2 (i)	1.15	3.55	0.12	Ponded			0.24	1.13
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.00006	water -			<0.0001	<0.0001
Chromium	1.0	0.0099		0.064		no				
Cobalt	1.0	0.0009 (i)		0.0052		flow				
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.013				<0.001	0.001
Iron		0.300	0.300		0.13				0.12	0.57
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.02				0.02	0.13
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.03	and			0.01	0.07
Silicon										
Silver		0.0001		0.00012						
Strontium					1.05				1.06	3.17
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01				<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			196				200	468
TKN					0.85				0.56	1.72
N-NH3 (Ammonia)		0.02	pH Temp		0.06				0.05	<0.02
Organic Nitrogen					0.79					≤01.72
Phenols		0.001 (i)	0.004	0.961	<0.001				<0.001	<0.001
BOD										
COD					36				41	73
TDS (Cond - Calc)	3000				348				446	761
Total Sus. Solids										
Ion Balance					1.01				1.02	1.04
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					7.5				0.5	20.2
Conductivity (microS/cm)					520				1273	1230
pH (pH units)		6.5 - 8.5			7.69				7.90	7.91
Dissolved Oxygen		f(Temp)			13.80				8.62	5.79
Flow (L/Sec)					1.2				0.2	0.3

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Sep-02	Nov-02	Apr-03	Aug-03	Nov-03	Jun-04
Fluoride	1.0 - 2.0				No Sample	No Sample		No Sample		No Sample
Chloride				180	Collected	Collected	55	Collected	41	Collected
N -NO2 (Nitrite)	10.0		0.06		No Water	No Water	<0.10	No Water	<0.10	No Water
N-NO3 (Nitrate)			13				<0.10		0.120	
Bromide										
Phosphate										
Sulphate	1000						83		36	
Calcium	1000						49		49	
Magnesium							28		21	
Sodium							36		30	
Potassium							3		3	
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55			0.26		0.19	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021			<0.0001		<0.0001	
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)							633		533	
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			0.002		<0.001	
Iron		0.300	0.300				0.18		0.15	
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese							0.02		0.03	
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)					0.07		0.05	
Silicon										
Silver		0.0001		0.00012						
Strontium							2.24		1.14	
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089			<0.005		<0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a					164		182	
TKN							1.03		0.62	
N-NH3 (Ammonia)		0.02	pH Temp				0.04		0.05	
Organic Nitrogen							0.99			
Phenols		0.001 (i)	0.004	0.961			<0.001		<0.001	
BOD										
COD							54		41	
TDS (Cond - Calc)	3000						411		346	
Total Sus. Solids										
Ion Balance							0.98		1.00	
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)							12.2		2.6	
Conductivity (microS/cm)							620		403	
pH (pH units)		6.5 - 8.5					7.27		6.88	
Dissolved Oxygen		f(Temp)					6.63		9.49	
Flow (L/Sec)							0.5		2.0	

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Surface Water Quality Data
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Aug-04	Dec-04	May-05	Sep-05	Dec-05	Apr-06
Fluoride	1.0 - 2.0				No Sample			No Sample		
Chloride				180	Collected	34	66	Collected	92	58
N -NO2 (Nitrite)	10.0		0.06		No Water	<0.10	<0.10	No Water	<0.10	<0.10
N-NO3 (Nitrate)			13			0.28	<0.10		<0.10	0.16
Bromide										
Phosphate										
Sulphate	1000					21	32		67	31
Calcium	1000					21	67		70	58
Magnesium						16	29		38	24
Sodium						2	40		49	33
Potassium							5		4	4
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		0.04	0.54		0.42	0.46
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		<0.0001	<0.0001		<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						249	752		865	624
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.001	0.001		0.001	0.001
Iron		0.300	0.300			0.13	0.22		0.51	0.20
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.01	0.08		0.30	0.06
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.13	0.05		0.11	0.03
Silicon										
Silver		0.0001		0.00012						
Strontium						0.24	1.39		1.62	1.50
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		<0.01	<0.01		<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				51	257		252	219
TKN						0.56	0.70		1.04	0.60
N-NH3 (Ammonia)		0.02	pH Temp			<0.02	0.07		0.06	0.05
Organic Nitrogen						<0.56			0.98	0.55
Phenols		0.001 (i)	0.004	0.961		<0.001	<0.001		<0.001	<0.001
BOD										
COD						44	32		57	31
TDS (Cond - Calc)	3000					162	489		562	406
Total Sus. Solids										
Ion Balance						1.01	0.99		0.98	0.96
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)						0.2	14.1		0.5	11.9
Conductivity (microS/cm)						247	687		822	590
pH (pH units)		6.5 - 8.5				8.88	7.03		7.95	7.77
Dissolved Oxygen		f(Temp)				Not Measured	6.82		3.40	10.10
Flow (L/Sec)						4.0	1.5		1.5	2.8

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Sep-06	Nov-06	May-07	Jul-08	Sep-08	Nov-08
Fluoride	1.0 - 2.0								No Sample	
Chloride				180	53	20	77	122	Collected	164
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	0.450	<0.10	No Water	<0.10
N-NO3 (Nitrate)			13		<0.10	0.18	<0.10	<0.10		<0.10
Bromide										
Phosphate										
Sulphate	1000				11	7	5	375		103
Calcium	1000				48	20	81	108		172
Magnesium					22	7	44	70		99
Sodium					34	13	48	80		104
Potassium					5	1	5	5		10
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.29	0.02	0.66	1.20		1.30
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					562	218	908	1380		1820
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	<0.001	0.001	0.001	0.001		0.005
Iron		0.300	0.300		0.75	0.59	8.68	0.26		5.32
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.09	0.04	4.14	0.08		0.35
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.21	0.05	0.66	0.17		0.81
Silicon										
Silver		0.0001		0.00012						
Strontium					0.85	0.22	1.15	2.15		2.88
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01	<0.01	<0.01		0.020
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			194	68	370	140		689
TKN					0.94	0.80	3.63	1.85		1.25
N-NH3 (Ammonia)		0.02	pH Temp		0.02	0.03	0.48	0.22		0.03
Organic Nitrogen					0.92	0.77	3.15	1.63		1.63
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	<0.001	<0.001		<0.001
BOD										
COD					68	38	57	54		90
TDS (Cond - Calc)	3000				365	142	590	966		1180
Total Sus. Solids										
Ion Balance					1.04	1.04	1.02	1.05		1.05
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					14.5	7.5	12.3	21.5		0.4
Conductivity (microS/cm)					456	208	921	1368		1837
pH (pH units)		6.5 - 8.5			7.11	7.00	7.09	Not measured		7.4
Dissolved Oxygen		f(Temp)			1.91	9.00	1.54	Not measured		7.1
Flow (L/Sec)					4.0	5.5	Not measured	Not measured		Not measured

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Surface Water Quality Data
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-09	Oct-09	Jun-10	Aug-10	Sep-10	May-11
Fluoride	1.0 - 2.0						No Sample	No Sample		
Chloride				180	89	93	Collected	Collected	32	58
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	No Water	<0.10	<0.10
N-NO3 (Nitrate)			13		<0.10	<0.10			<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				35	100			119	14
Calcium	1000				97	82				
Magnesium					61	45				
Sodium					66	50				
Potassium					6	8				
Arsenic		0.1 0.005	0.005	0.15	0.001	<0.001			<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.07	0.07			0.05	0.04
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.87	0.98			1.4	0.29
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001			<0.0001	<0.0001
Chromium	1.0	0.0099		0.064					0.008	0.002
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					1160	1090			602	599
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.006	0.002			0.004	0.001
Iron		0.300	0.300		0.67	1.5			0.37	0.58
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001			<0.001	<0.001
Manganese					0.68	0.49				
Mercury		0.0002		0.00077	<0.0001	<0.0002			<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.12	0.15			0.20	0.040
Silicon										
Silver		0.0001		0.00012						
Strontium					2.39	2.05				
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01			0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			467	330			117	215
TKN					1.02	1.52			1.91	0.70
N-NH3 (Ammonia)		0.02	pH Temp		0.05	0.22			<0.02	<0.02
Organic Nitrogen									≤ 1.91	≤0.70
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001			<0.001	<0.001
BOD					3	3			12	2
COD					48	37			100	50
TDS (Cond - Calc)	3000				754	708			391	389
Total Sus. Solids					93	23			154	6
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02			<0.02	<0.02
pH		6.5 - 8.5			7.98	7.85			7.5	8.2
DOC										
Field Measured										
Water Temp. (°C)					14.6	6.2			16.3	17.9
Conductivity (microS/cm)					1189	1081			612	400
pH (pH units)		6.5 - 8.5			8.1	8.49			8.43	7.6
Dissolved Oxygen		f(Temp)			3.82	5.2			5.15	7.42
Flow (L/Sec)										2.7

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jul-11	May-12	Aug-12	Oct-12	Apr-13	Aug-13
Fluoride	1.0 - 2.0						No Sample	No Sample		No Sample
Chloride				180	52	91	Collected	Collected	54	Collected
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	No Water	<0.10	No Water
N-NO3 (Nitrate)			13		<0.10	<0.10			<0.10	
Bromide										
Phosphate										
Sulphate	1000				20	25			37	
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001			<0.001	
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.04	0.05			0.04	
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.09	0.34			0.26	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001			<0.0001	
Chromium	1.0	0.0099		0.064	0.002	0.003			<0.001	
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					575	759			564	
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001	0.001			0.001	
Iron		0.300	0.300		0.41	0.34			0.12	
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001			<0.001	
Manganese										
Mercury		0.0002		0.00077	<0.0001	<0.0001			<0.0001	
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.090	0.04			<0.02	
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01			<0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			208	257			180	
TKN					1.27	0.69			0.76	
N-NH3 (Ammonia)		0.02	pH Temp		0.04	<0.02			<0.02	
Organic Nitrogen					1.23				≤ 0.76	
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001			<0.001	
BOD					2	<1			<1	
COD					55	32			41	
TDS (Cond - Calc)	3000				374	493			367	
Total Sus. Solids					5	3			<2	
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02			<0.02	
pH		6.5 - 8.5			7.7	7.92			7.64	
DOC										
Field Measured										
Water Temp. (°C)					20.4	7.6			5.0	
Conductivity (microS/cm)					435	781			554	
pH (pH units)		6.5 - 8.5			7.5	7.5			7.4	
Dissolved Oxygen		f(Temp)			2.83	7.28			5.48	
Flow (L/Sec)					0.3	1.1			7.4	

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Surface Water Quality Data
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-13	Apr-14	Jul-14	Nov-14	Nov-15	May-16
Fluoride	1.0 - 2.0						No Sample		No Sample	
Chloride				180	47	45.7	Collected	109	Collected	132
N -NO2 (Nitrite)	10.0		0.06		<0.10	0.2	No Water	< 0.10	No Water	< 0.1
N-NO3 (Nitrate)			13		<0.10	0.9		< 0.10		0.2
Bromide										
Phosphate										
Sulphate	1000				68	23		32		73
Calcium	1000									106
Magnesium										46.2
Sodium										64
Potassium										9.9
Arsenic		0.1 0.005	0.005	0.15	<0.001	0.0003		0.0007		< 0.0012
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.05	0.038		0.07		0.096
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.57	0.265		0.37		0.514
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	0.00002		0.00005		< 0.001
Chromium	1.0	0.0099		0.064	0.002	< 0.0002		< 0.002		0.0005
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					546	583		894		1120
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.003	0.0003		0.0011		0.001
Iron		0.300	0.300		0.40	0.11		0.844		0.223
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	0.0001		0.00118		< 0.0006
Manganese										0.035
Mercury		0.0002		0.00077	<0.0001	< 0.00002		< 0.00002		< 0.00002
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.100	0.06		0.14		0.04
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	< 0.005		< 0.005		< 0.005
Hardness (as CaCO3)						236				
Alkalinity as CaCO3		a			126	204		296		368
TKN					1.27	0.74		0.99		0.92
N-NH3 (Ammonia)		0.02	pH Temp		0.15	0.09		< 0.01		< 0.01
Organic Nitrogen					1.12	0.65		≤ 0.99		
Phenols		0.001 (i)	0.004	0.961	<0.001	< 0.001		< 0.001		< 0.001
BOD					4	< 3		< 3		6
COD					92	35		72		59
TDS (Cond - Calc)	3000				355	307		514		652
Total Sus. Solids					4	< 3		4		17
Ion Balance										
Un-ionized Ammonia					<0.02					
pH		6.5 - 8.5			7.69	7.75		8		8.17
DOC										12.1
Field Measured										
Water Temp. (°C)					11.0	3.1		4.4		17
Conductivity (microS/cm)					559	428		910		1042
pH (pH units)		6.5 - 8.5			7.5	7.6		7.5		7.6
Dissolved Oxygen		f(Temp)			3.48	7.81		4.25		9.35
Flow (L/Sec)					0.6	9.9		0.5		0.55

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-17	Apr-18	Apr-19	May-20	Mar-21	Apr-22
Fluoride	1.0 - 2.0									
Chloride				180	45.8	40.5	17.2	137	60	77
N -NO2 (Nitrite)	10.0		0.06		< 0.1	< 0.1	<0.01	<0.1	<0.10	<0.10
N-NO3 (Nitrate)			13		1.1	< 0.1	0.2	0.1	<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				34	17	9	80	21	19
Calcium	1000				60.1	51	17.5	118	47	52
Magnesium					23.7	21.2	4.98	46.5	21	19
Sodium					29	26.9	11.6	71.9	34	39
Potassium					7.2	6.1	1.4	12.6	5	3
Arsenic		0.1 0.005	0.005	0.15	0.0003	0.0003	0.0002	0.0004	<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.055	0.041	0.021	0.111	0.05	0.04
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.363	0.315	0.033	0.484	0.29	0.16
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	< 0.000020	< 0.000014	0.000015	0.000025	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064	< 0.001	< 0.001	<0.001	< 0.001	<0.001	<0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					609	548	185	1260	565	576
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.0011	0.001	0.0014	0.0012	<0.001	0.002
Iron		0.300	0.300		0.083	0.171	0.306	0.347	0.18	0.08
Lead	0.1	0.005 e	min 0.001	0.002	0.00004	0.00008	0.00022	0.00011	<0.001	<0.001
Manganese					0.016	0.022	0.009	0.082	0.09	0.02
Mercury		0.0002		0.00077	< 0.02	< 0.00002	<0.00002	<0.00002	<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.02	0.04	0.05	0.06	0.048	0.033
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	< 0.005	< 0.005	0.014	0.086	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			212	199	45	388	180	164
TKN					0.89	0.7	0.6	0.9	0.878	0.574
N-NH3 (Ammonia)		0.02	pH Temp		0.12	0.14	0.05	0.04	<0.010	0.011
Organic Nitrogen						0.56		0.86	≤0.878	<0.563
Phenols		0.001 (i)	0.004	0.961	< 0.001	< 0.001	<0.002	<0.002	0.003	<0.001
BOD					< 3	< 3	<3	< 3	<1	<1
COD					28	35	32	53	20	25
TDS (Cond - Calc)	3000				332	282	90	699	367	374
Total Sus. Solids					3	< 3	3	< 3	7	<2
Ion Balance					0.986	0.971				
Un-ionized Ammonia									<0.02	<0.02
pH		6.5 - 8.5			7.99	8.12	7.28	8.11	7.61	7.4
DOC					9.4	11.4	12.2	11.3	9.8	10.1
Field Measured										
Water Temp. (°C)					5	3.7	8.6	6.9	3.2	4.0
Conductivity (microS/cm)					591	465	134	1221	468	605
pH (pH units)		6.5 - 8.5			7	7.5	7	7.3	6.3	6.6
Dissolved Oxygen		f(Temp)			7.8	5.86	13.9	12.4	9.6	7.3
Flow (L/Sec)					5.21	3.8	9.3	0.9	3.07	0.15

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 5					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-23	May-24				
Fluoride	1.0 - 2.0									
Chloride				180	38	97				
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10				
N-NO3 (Nitrate)			13		<0.10	<0.10				
Bromide										
Phosphate										
Sulphate	1000				8	17				
Calcium	1000				26	83				
Magnesium					7	41				
Sodium					23	63				
Potassium					2	9				
Arsenic		0.1 0.005	0.005	0.15	<0.001	<0.001				
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.03	0.07				
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.04	0.63				
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001				
Chromium	1.0	0.0099		0.064	0.001	0.002				
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					250	952				
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001	0.001				
Iron		0.300	0.300		0.48	0.51				
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001				
Manganese					0.02	0.12				
Mercury		0.0002		0.00077	<0.0001	<0.0001				
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.038	0.171				
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01				
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			84	347				
TKN					0.925	1.29				
N-NH3 (Ammonia)		0.02	pH Temp		0.09	<0.020				
Organic Nitrogen										
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001				
BOD					<1	1				
COD					42	36				
TDS (Cond - Calc)	3000				162	619				
Total Sus. Solids					12	4				
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02				
pH		6.5 - 8.5			7.67	7.98				
DOC					16.1	19.2				
Field Measured										
Water Temp. (°C)					9.8	13.6				
Conductivity (microS/cm)					360	1000				
pH (pH units)		6.5 - 8.5			7.6	7.4				
Dissolved Oxygen		f(Temp)			10.2	5.2				
Flow (L/Sec)					22.44	20.89				

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 6					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-91	Nov-96				
Fluoride	1.0 - 2.0				0.06	No Sample				
Chloride				180	77	Collected				
N -NO2 (Nitrite)	10.0		0.06							
N-NO3 (Nitrate)			13		0.35					
Bromide										
Phosphate					0.15					
Sulphate	1000				140					
Calcium	1000				57					
Magnesium					31					
Sodium					31					
Potassium					4					
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		0.29					
Barium				2.30	0.06					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.05					
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021						
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069						
Iron		0.300	0.300		0.28					
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.09					
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)								
Silicon					6					
Silver		0.0001		0.00012						
Strontium					0.25					
Sulphur					45					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium					0.01					
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089						
Hardness (as CaCO3)					270					
Alkalinity as CaCO3		a			100					
TKN					1					
N-NH3 (Ammonia)		0.02	pH Temp		0.10					
Organic Nitrogen					1					
Phenols		0.001 (i)	0.004	0.961						
BOD										
COD					53					
TDS (Cond - Calc)	3000				382					
Total Sus. Solids										
Ion Balance										
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					--					
Conductivity (microS/cm)					1073					
pH (pH units)		6.5 - 8.5			7					
Dissolved Oxygen		f(Temp)			14					
Flow (L/Sec)										

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Surface Water Quality Data
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Surface Water Station>					SW 15					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-96	Apr-97	1998	Apr-99	Dec-99	Apr-00
Fluoride	1.0 - 2.0						No samples			
Chloride				180	35	9	collected	60	80	47
N -NO2 (Nitrite)	10.0		0.06				during 1998	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		0.35			<0.10	0.16	0.16
Bromide										
Phosphate							Feb.10/98 -			
Sulphate	1000				24	10		26	61	12
Calcium	1000				26	9	Sept.28/98 -	34	73	30
Magnesium					10	3	Stagnant	11	39	9
Sodium					16	6		26	49	24
Potassium					2	1	Nov.25/98 -	2	3	2
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5				Dry			
Barium				2.30	0.020					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.02			0.02	0.16	<0.01
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.00015	<0.00015	<0.00006
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				<0.005	<0.005	0.009
Iron		0.300	0.300		0.08	0.90		0.02	0.17	0.06
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.02		<0.01	0.08	<0.01
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.06		0.02	0.12	0.02
Silicon					6.20					
Silver		0.0001		0.00012						
Strontium					0.092	0.040		0.265	2.000	0.187
Sulphur					8.00					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	<0.01	<0.01
Hardness (as CaCO3)					106					
Alkalinity as CaCO3		a			62	28		86	273	80
TKN					0.50			0.69	0.84	0.73
N-NH3 (Ammonia)		0.02	pH Temp		0.04			0.03	0.03	0.33
Organic Nitrogen								0.66	0.81	0.40
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	<0.001
BOD										
COD					23			26	34	31
TDS (Cond - Calc)	3000				180	53		248	484	204
Total Sus. Solids										
Ion Balance					1.04	68.00		0.96	1.01	1.05
Un-ionized Ammonia					0.001	0.960				
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					1.9	9.9		12.8	0.4	6.9
Conductivity (microS/cm)					280	100		360	720	320
pH (pH units)		6.5 - 8.5			8.22	7.23		7.33	7.29	8.30
Dissolved Oxygen		f(Temp)			11.0	12.4		6.5	0.0	9.7
Flow (L/Sec)					0.07	0.83		3.85	0.59	1.55

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Surface Water Quality Data
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Surface Water Station>					SW 15					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-05	Jun-01	Aug-01	Nov-01	Jun-02	Sep-02
Fluoride	1.0 - 2.0									No Sample
Chloride				180	No	No	No	70	49	Collected
N -NO2 (Nitrite)	10.0		0.06		samples	samples	samples	<0.10	<0.10	No Water
N-NO3 (Nitrate)			13		collected	collected	collected	<0.10	<0.10	
Bromide					during	during	during			
Phosphate					Aug.	June	August			
Sulphate	1000				Nov			35	7	
Calcium	1000				2000			24	40	
Magnesium								11	16	
Sodium								32	21	
Potassium					Aug.16/00 -	No	No	1	<1	
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		Dry	Water	Water			
Barium				2.30						
Beryllium	0.1	0.011		0.0053	Nov.7/00 -					
Boron	5.0	0.2 (i)	1.15	3.55	Ponded			<0.05	<0.05	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	water -			<0.0001	<0.0001	
Chromium	1.0	0.0099		0.064	no					
Cobalt	1.0	0.0009 (i)		0.0052	flow					
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				0.001	0.002	
Iron		0.300	0.300					0.11	1.22	
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese								<0.01	0.73	
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			and			<0.01	0.11	
Silicon										
Silver		0.0001		0.00012						
Strontium								0.142	0.283	
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	<0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a						45	132	
TKN								1.09	1.12	
N-NH3 (Ammonia)		0.02	pH Temp					0.05	<0.02	
Organic Nitrogen								1.04	≤1.12	
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	
BOD										
COD								18	42	
TDS (Cond - Calc)	3000							200	268	
Total Sus. Solids										
Ion Balance								0.98	1.01	
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)								0.5	17.3	
Conductivity (microS/cm)								666	413	
pH (pH units)		6.5 - 8.5						8.86	7.62	
Dissolved Oxygen		f(Temp)						13.2	5.4	
Flow (L/Sec)								0.14	0.20	

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Surface Water Station>					SW 15					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-02	Apr-03	Aug-03	Nov-03	Jun-04	Aug-04
Fluoride	1.0 - 2.0				No Sample		No Sample		No Sample	No Sample
Chloride				180	Collected	51	Collected	40	Collected	Collected
N -NO2 (Nitrite)	10.0		0.06		No Water	<0.10	No Water	<0.10	No Water	No Water
N-NO3 (Nitrate)			13			<0.10		0.23		
Bromide										
Phosphate										
Sulphate	1000					35		24		
Calcium	1000					25		36		
Magnesium						10		11		
Sodium						25		21		
Potassium						2		2		
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		<0.05		0.03		
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		<0.0001		<0.0001		
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						358		375		
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.003		0.001		
Iron		0.300	0.300			0.34		0.13		
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.04		0.02		
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.22		0.05		
Silicon										
Silver		0.0001		0.00012						
Strontium						0.280		0.472		
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		<0.005		<0.01		
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				54		102		
TKN						2.22		0.58		
N-NH3 (Ammonia)		0.02	pH Temp			0.04		0.05		
Organic Nitrogen						2.18		0.53		
Phenols		0.001 (i)	0.004	0.961		<0.001		<0.001		
BOD										
COD						34		36		
TDS (Cond - Calc)	3000					233		244		
Total Sus. Solids										
Ion Balance						0.99		1.00		
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)						15.0		2.5		
Conductivity (microS/cm)						357		294		
pH (pH units)		6.5 - 8.5				7.40		7.03		
Dissolved Oxygen		f(Temp)				4.69		10.38		
Flow (L/Sec)						0.20		1.5		

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Surface Water Quality Data
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Surface Water Station>					SW 15					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Dec-04	May-05	Sep-05	Dec-05	Apr-06	Sep-06
Fluoride	1.0 - 2.0						No Sample			
Chloride				180	34	63	Collected	62	58	50
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		0.22	0.11		0.29	0.29	<0.10
Bromide										
Phosphate										
Sulphate	1000				19	25		30	30	8
Calcium	1000				20	45		34	46	34
Magnesium					7	13		14	14	10
Sodium					16	29		28	28	31
Potassium					1	4		2	3	2
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.02	0.12		0.03	0.13	0.02
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					231	487		433	484	396
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002	0.001		0.001	0.002	0.002
Iron		0.300	0.300		0.15	0.20		0.04	0.14	0.54
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					<0.01	0.11		0.01	0.05	0.14
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.09	0.03		0.03	0.03	0.07
Silicon										
Silver		0.0001		0.00012						
Strontium					0.154	0.728		0.437	1.470	0.303
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01		<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			44	119		80	128	107
TKN					0.48	0.39		0.40	0.75	0.96
N-NH3 (Ammonia)		0.02	pH Temp		<0.02	0.02		0.05	0.08	0.05
Organic Nitrogen					<0.48	0.37		0.35	0.67	
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001		<0.001	<0.001	0.001
BOD										
COD					23	20		31	27	45
TDS (Cond - Calc)	3000				150	317		281	315	257
Total Sus. Solids										
Ion Balance					1.02	1.00		1.03	0.98	1.06
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					0.2	14.4		0.3	14.7	16.0
Conductivity (microS/cm)					294	473		135	485	326
pH (pH units)		6.5 - 8.5			8.67	7.67		8.20	7.85	Not Measured
Dissolved Oxygen		f(Temp)			Not Measured	8.52		8.70	10.10	3.88
Flow (L/Sec)					3.0	1.2		1.0	2.4	2.0

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 15					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-06	May-07	Oct-07			
Fluoride	1.0 - 2.0					No Sample				
Chloride				180	20	Collected	80			
N -NO2 (Nitrite)	10.0		0.06		<0.10	No Water	<0.10			
N-NO3 (Nitrate)			13		0.21		<0.10			
Bromide										
Phosphate										
Sulphate	1000				7		173			
Calcium	1000				21		98			
Magnesium					7		46			
Sodium					13		46			
Potassium					1		7			
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.02		1.40			
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001		<0.0001			
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					211		1020			
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001		0.001			
Iron		0.300	0.300		0.65		2.60			
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.07		1.55			
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.07		0.20			
Silicon										
Silver		0.0001		0.00012						
Strontium					0.207		2.610			
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01		<0.01			
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			65		244			
TKN					0.69		1.67			
N-NH3 (Ammonia)		0.02	pH Temp		0.02		0.15			
Organic Nitrogen										
Phenols		0.001 (i)	0.004	0.961	<0.001		<0.001			
BOD										
COD					35		83			
TDS (Cond - Calc)	3000				137		663			
Total Sus. Solids										
Ion Balance					1.09		1.01			
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					7.6		No			
Conductivity (microS/cm)					209		Field			
pH (pH units)		6.5 - 8.5			7.08		Readings			
Dissolved Oxygen		f(Temp)			9.71		Taken			
Flow (L/Sec)					4.5					

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(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 16					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-96	Apr-97	1998	Apr-99	Dec-99	Apr-00
Fluoride	1.0 - 2.0						No samples			
Chloride				180	92	9	collected	74	96	64
N -NO2 (Nitrite)	10.0		0.06				during 1998	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13					<0.10	0.210	<0.10
Bromide										
Phosphate							Feb.10/98 -			
Sulphate	1000				159	10		141	147	104
Calcium	1000				106	9	Sept.28/98 -	118	155	112
Magnesium					76	3	Stagnant	74	97	71
Sodium					67	6		72	98	68
Potassium					6	1	Nov.25/98 -	8	8	7
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		0.350		Stagnant			
Barium				2.30	0.060					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.51			0.48	0.47	0.46
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.0015	<0.0015	<0.00006
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052	0.010					
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				<0.005	<0.005	0.010
Iron		0.300	0.300		0.84	0.83		0.17	0.34	0.16
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.43	0.02		<0.01	0.11	0.04
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039	0.010					
Total Phosphorus		0.03 (i)				0.06		0.06	0.15	0.08
Silicon					6.30					
Silver		0.0001		0.00012						
Strontium					0.59	0.04		2.64	5.54	3.51
Sulphur					49.00					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.01			<0.01	<0.01	
Hardness (as CaCO3)					578					<0.01
Alkalinity as CaCO3		a			415	28		501	659	522
TKN					1.08			1.54	1.83	1.42
N-NH3 (Ammonia)		0.02	pH Temp		0.08			0.03	<0.02	0.04
Organic Nitrogen								1.51	1.83	1.38
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	<0.001
BOD										
COD					56			51	78	67
TDS (Cond - Calc)	3000				732	50		852	1060	756
Total Sus. Solids										
Ion Balance					1.03	72.00		1.02	1.06	1.01
Un-ionized Ammonia					<0.001	0.960				
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					4.2	9.1		13.3	0.6	8.7
Conductivity (microS/cm)					1100	100		1100	1400	1200
pH (pH units)		6.5 - 8.5			7.66	7.16		7.20	7.20	7.71
Dissolved Oxygen		f(Temp)			3.00	11.00		9.20	0.80	12.40
Flow (L/Sec)					0.1	0.7		0.8	0.3	0.2

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 16					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-05	Jun-01	Aug-01	Nov-01	Jun-02	Sep-02
Fluoride	1.0 - 2.0									No Sample
Chloride				180	No	No	No	75	72	Collected
N -NO2 (Nitrite)	10.0		0.06		samples	samples	samples	<0.10	<0.10	No Water
N-NO3 (Nitrate)			13		collected	collected	collected	<0.10	<0.10	
Bromide					during	during	during			
Phosphate					Aug.	June	August			
Sulphate	1000				Nov			250	113	
Calcium	1000				2000			144	103	
Magnesium								78	84	
Sodium								97	85	
Potassium					Aug.16/00 -			6	5	
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		Ponded	Ponded	No			
Barium				2.30	water -	water -	water			
Beryllium	0.1	0.011		0.0053	no	no				
Boron	5.0	0.2 (i)	1.15	3.55	flow	flow		0.82	1.36	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.0001	0.0002	
Chromium	1.0	0.0099		0.064	Nov.7/00 -					
Cobalt	1.0	0.0009 (i)		0.0052	Ponded					
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	water -			0.001	0.005	
Iron		0.300	0.300		no			0.14	2.87	
Lead	0.1	0.005 e	min 0.001	0.002	flow					
Manganese								0.08	0.37	
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)						0.07	0.06	
Silicon										
Silver		0.0001		0.00012						
Strontium								4.53	3.92	
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	0.03	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a						534	535	
TKN								0.73	1.87	
N-NH3 (Ammonia)		0.02	pH Temp					0.03	0.03	
Organic Nitrogen								0.70	1.84	
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	
BOD										
COD								56	83	
TDS (Cond - Calc)	3000							970	839	
Total Sus. Solids										
Ion Balance								1.00	1.05	
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)								0.5	20.1	
Conductivity (microS/cm)								1711	1318	
pH (pH units)		6.5 - 8.5						7.88	8.03	
Dissolved Oxygen		f(Temp)						6.38	6.15	
Flow (L/Sec)								Not Taken	0.1	

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 16					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-02	Apr-03	Aug-03	Nov-03	Jun-04	Jun-04
Fluoride	1.0 - 2.0				No Sample		No Sample		No Sample	No Sample
Chloride				180	Collected	60	Collected	51	Collected	Collected
N -NO2 (Nitrite)	10.0		0.06		No Water	<0.10	No Water	<0.10	No Water	No Water
N-NO3 (Nitrate)			13			<0.10		<0.10		
Bromide										
Phosphate										
Sulphate	1000					153		79		
Calcium	1000					84		89		
Magnesium						54		47		
Sodium						54		55		
Potassium						6		6		
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		0.62		0.63		
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		<0.0001		<0.0001		
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						1010		937		
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.006		<0.001		
Iron		0.300	0.300			0.50		0.13		
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.207		0.060		
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.16		0.04		
Silicon										
Silver		0.0001		0.00012						
Strontium						4.64		3.15		
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		<0.005		<0.01		
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				332		369		
TKN						2.14		0.93		
N-NH3 (Ammonia)		0.02	pH Temp			0.04		0.05		
Organic Nitrogen						2.10		0.88		
Phenols		0.001 (i)	0.004	0.961		<0.001		<0.001		
BOD										
COD						81		64		
TDS (Cond - Calc)	3000					657		609		
Total Sus. Solids										
Ion Balance						0.97		1.04		
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)						14.3		2.7		
Conductivity (microS/cm)						985		686		
pH (pH units)		6.5 - 8.5				7.50		6.89		
Dissolved Oxygen		f(Temp)				3.35		6.03		
Flow (L/Sec)						Not Measured		0.5		

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 16					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Dec-04	May-05	Sep-05	Dec-05	Apr-06	Sep-06
Fluoride	1.0 - 2.0						No Sample			
Chloride				180	39	74	Collected	90	68	61
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		0.120	<0.10		<0.10	<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				41	51		81	42	16
Calcium	1000				35	112		85	94	64
Magnesium					18	58		48	45	34
Sodium					25	60		57	46	39
Potassium					3	7		5	5	8
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.20	1.13		0.55	0.99	0.46
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					410	1190		1010	951	745
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002	0.001		0.001	0.001	<0.001
Iron		0.300	0.300		0.21	0.35		0.67	0.23	1.28
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.070	0.070		0.400	0.030	0.120
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.14	0.09		0.10	0.04	0.17
Silicon										
Silver		0.0001		0.00012						
Strontium					0.79	2.69		2.10	2.24	1.42
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01		<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			109	510		310	414	283
TKN					0.68	1.10		1.17	1.54	1.38
N-NH3 (Ammonia)		0.02	pH Temp		0.08	0.07		0.04	0.50	0.05
Organic Nitrogen					0.60	1.03		1.13	1.04	1.33
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001		<0.001	<0.001	0.001
BOD										
COD					27	55		69	37	84
TDS (Cond - Calc)	3000				267	774		657	618	484
Total Sus. Solids										
Ion Balance					1.06	0.99		1.04	0.94	1.02
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					0.2	14.3		0.3	12.1	15.1
Conductivity (microS/cm)					506	1112		362	905	610
pH (pH units)		6.5 - 8.5			8.60	7.19		7.90	7.60	Not Measured
Dissolved Oxygen		f(Temp)				0.00		2.46	6.08	0.35
Flow (L/Sec)						0.7		0.5	0.4	2.0

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 16					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-06	May-07	Oct-07			
Fluoride	1.0 - 2.0									
Chloride				180	22	80	81			
N -NO2 (Nitrite)	10.0		0.06		<0.10	0.560	<0.10			
N-NO3 (Nitrate)			13		0.430	<0.10	<0.10			
Bromide										
Phosphate										
Sulphate	1000				7	2	125			
Calcium	1000				23	81	73			
Magnesium					7	47	35			
Sodium					14	46	38			
Potassium					2	5	7			
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.02	0.75	0.80			
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	<0.0001			
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					226	910	825			
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001	0.006	0.003			
Iron		0.300	0.300		0.64	4.99	4.39			
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.060	1.530	1.26			
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.05	0.88	0.92			
Silicon										
Silver		0.0001		0.00012						
Strontium					0.22	1.49	1.46			
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01	0.01			
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			69	375	174			
TKN					0.75	4.57	1.62			
N-NH3 (Ammonia)		0.02	pH Temp		<0.02	0.76	0.08			
Organic Nitrogen					≤ 0.75	3.81	1.54			
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	<0.001			
BOD										
COD					35	76	<5			
TDS (Cond - Calc)	3000				147	592	536			
Total Sus. Solids										
Ion Balance					1.09	1.03	1.00			
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					7.6	14.4	No			
Conductivity (microS/cm)					222	906	Field			
pH (pH units)		6.5 - 8.5			7.02	7.38	Readings			
Dissolved Oxygen		f(Temp)			9.09	1.29	Taken			
Flow (L/Sec)					1.0	Not Measured				

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-96	Apr-97	1998	Apr-99	Dec-99	Apr-00
Fluoride	1.0 - 2.0						No samples			
Chloride				180	39	11	collected	94	76	45
N -NO2 (Nitrite)	10.0		0.06				during 1998	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		0.360			<0.10	<0.10	<0.10
Bromide										
Phosphate							Feb.10/98 -			
Sulphate	1000				52	12		64	62	28
Calcium	1000				43	12	Sept.28/98 -	60	69	46
Magnesium					25	5	Dry		37	23
Sodium					23	7		36	46	29
Potassium					2	1	Nov.25/98 -	4	3	3
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5				Dry			
Barium				2.30	0.030					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.10			0.14	0.14	0.10
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.0015	<0.0015	<0.00006
Chromium	1.0	0.0099		0.064	0.020					
Cobalt	1.0	0.0009 (i)		0.0052	0.010					
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.005			<0.005	<0.005	0.015
Iron		0.300	0.300		0.23	0.73		0.09	0.22	0.21
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.12	0.02		<0.01	0.12	0.04
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.05		0.02	0.02	0.06
Silicon					6.50					
Silver		0.0001		0.00012						
Strontium					0.19	0.06		0.88	1.73	0.84
Sulphur					17.00					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	<0.01	<0.01
Hardness (as CaCO3)					210					
Alkalinity as CaCO3		a			138	40		193	264	177
TKN					0.74			0.73	0.91	0.96
N-NH3 (Ammonia)		0.02	pH Temp		0.03			0.04	<0.02	0.03
Organic Nitrogen								0.69	0.91	0.93
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	<0.001
BOD										
COD					37	50		41	42	39
TDS (Cond - Calc)	3000				296	84		396	460	308
Total Sus. Solids										
Ion Balance					1.06	0.99		0.90	0.98	1.03
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					0.5	9.2		10.4	1.4	6.3
Conductivity (microS/cm)					445	150		600	680	450
pH (pH units)		6.5 - 8.5			7.69	7.29		7.24	6.82	7.19
Dissolved Oxygen		f(Temp)			3.00	12.00		6.80	0.00	11.10
Flow (L/Sec)					0.2	0.3		4.7	0.6	0.7

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-05	Jun-01	Aug-01	Nov-01	Jun-02	Sep-02
Fluoride	1.0 - 2.0									No Sample
Chloride				180	No	No	No	51	61	Collected
N -NO2 (Nitrite)	10.0		0.06		samples	samples	samples	<0.10	<0.10	No Water
N-NO3 (Nitrate)			13		collected	collected	collected	<0.10	<0.10	
Bromide					during	during	during			
Phosphate					Aug.	June	August			
Sulphate	1000				Nov			108	80	
Calcium	1000				2000			52	87	
Magnesium								32	58	
Sodium								33	70	
Potassium					Aug.16/00 -			2	4	
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		Dry	No	No			
Barium				2.30		Water	Water			
Beryllium	0.1	0.011		0.0053	Nov.7/00 -					
Boron	5.0	0.2 (i)	1.15	3.55	Dry			0.26	0.83	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.0001	<0.0001	
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				0.001	0.001	
Iron		0.300	0.300					0.12	0.76	
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese								0.02	0.16	
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)						0.03	0.07	
Silicon										
Silver		0.0001		0.00012						
Strontium								0.96	2.42	
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	<0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a						165	409	
TKN								1.09	1.41	
N-NH3 (Ammonia)		0.02	pH Temp					0.02	0.03	
Organic Nitrogen								1.07	1.38	
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	
BOD										
COD								40	65	
TDS (Cond - Calc)	3000							377	657	
Total Sus. Solids										
Ion Balance								0.96	1.06	
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)								0.8	17.0	
Conductivity (microS/cm)								713	1143	
pH (pH units)		6.5 - 8.5						8.08	7.80	
Dissolved Oxygen		f(Temp)						11.81	5.93	
Flow (L/Sec)								0.5	0.3	

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Surface Water Quality Data
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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-02	Apr-03	Aug-03	Nov-03	Jun-04	Aug-04
Fluoride	1.0 - 2.0				No Sample		No Sample		No Sample	No Sample
Chloride				180	Collected	45	Collected	38	Collected	Collected
N -NO2 (Nitrite)	10.0		0.06		No Water	<0.10	No Water	<0.10	No Water	No Water
N-NO3 (Nitrate)			13			<0.10		0.160		
Bromide										
Phosphate										
Sulphate	1000					69		51		
Calcium	1000					39		43		
Magnesium						22		20		
Sodium						29		27		
Potassium						2		3		
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		0.19		0.16		
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		<0.0001		<0.0001		
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						518		478		
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.002		0.001		
Iron		0.300	0.300			0.14		0.21		
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.020		0.03		
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.07		0.08		
Silicon										
Silver		0.0001		0.00012						
Strontium						0.947		0.980		
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		0.005		<0.01		
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				122		163		
TKN						1.07		0.68		
N-NH3 (Ammonia)		0.02	pH Temp			0.03		0.08		
Organic Nitrogen						1.04		0.60		
Phenols		0.001 (i)	0.004	0.961		<0.001		<0.001		
BOD										
COD						53		41		
TDS (Cond - Calc)	3000					337		311		
Total Sus. Solids										
Ion Balance						0.99		0.93		
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)						10.6		2.5		
Conductivity (microS/cm)						503		370		
pH (pH units)		6.5 - 8.5				7.07		6.76		
Dissolved Oxygen		f(Temp)				5.71		10.29		
Flow (L/Sec)						0.5		3.0		

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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Dec-04	May-05	Sep-05	Dec-05	Apr-06	Sep-06
Fluoride	1.0 - 2.0						No Sample			
Chloride				180	34	61	Collected	65	50	41
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		<0.10	<0.10		<0.10	<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				31	27		54	24	10
Calcium	1000				25	59		52	52	45
Magnesium					13	26		28	22	20
Sodium					19	34		38	30	31
Potassium					2	4		3	3	2
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.10	0.39		0.03	0.36	0.21
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001		0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					295	657		657	558	512
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001	0.001		0.004	0.001	<0.001
Iron		0.300	0.300		0.15	0.44		0.26	0.24	0.57
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.02	0.08		0.27	0.05	0.06
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.10	0.06		0.04	0.03	0.08
Silicon										
Silver		0.0001		0.00012						
Strontium					0.420	1.120		0.096	1.170	0.733
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01		0.010	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			70	224		175	196	177
TKN					0.64	0.67		0.58	0.68	1.10
N-NH3 (Ammonia)		0.02	pH Temp		0.03	0.12		0.02	0.02	0.03
Organic Nitrogen					0.61	0.55		0.57	0.66	1.07
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001		<0.001	<0.001	<0.001
BOD										
COD					70	40		48	33	71
TDS (Cond - Calc)	3000				192	427		427	363	333
Total Sus. Solids										
Ion Balance					1.06	0.99		1.03	0.99	1.05
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					0.5	12.1		1.0	9.8	14.1
Conductivity (microS/cm)					380	605		607	525	422
pH (pH units)		6.5 - 8.5			8.92	6.77		8.27	7.72	7.02
Dissolved Oxygen		f(Temp)			Not Measured	4.85		7.09	10.04	3.81
Flow (L/Sec)					5.0	1.7		2.0	3.0	4.0

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Surface Water Quality Data
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Township of Whitewater Region

Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-06	May-07	Jul-08	Sep-08	Nov-08	Jun-09
Fluoride	1.0 - 2.0					No Sample	No Sample	No Sample		
Chloride				180	24	Collected	Collected	Collected	88	78
N -NO2 (Nitrite)	10.0		0.06		<0.10	No Water	No Water	No Water	<0.10	<0.10
N-NO3 (Nitrate)			13		<0.10				<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				6				43	28
Calcium	1000				24				79	84
Magnesium					10				45	48
Sodium					14				46	53
Potassium					2				5	5
Arsenic		0.1 0.005	0.005	0.15						<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						0.05
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.03				0.50	0.64
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001				0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					252				944	934
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001				0.005	<0.001
Iron		0.300	0.300		0.71				8.93	1.4
Lead	0.1	0.005 e	min 0.001	0.002						<0.001
Manganese					0.07				1.44	0.26
Mercury		0.0002		0.00077						<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.05				0.34	0.15
Silicon										
Silver		0.0001		0.00012						
Strontium					0.204				0.995	1.81
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01				0.020	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			82				342	359
TKN					0.83				0.88	1.1
N-NH3 (Ammonia)		0.02	pH Temp		<0.02				0.04	0.04
Organic Nitrogen					≤ 0.83				0.84	
Phenols		0.001 (i)	0.004	0.961	<0.001				<0.001	<0.001
BOD										1
COD					35				60	45
TDS (Cond - Calc)	3000				164				614	607
Total Sus. Solids										13
Ion Balance					1.10				0.96	
Un-ionized Ammonia										<0.02
pH		6.5 - 8.5								7.97
DOC										
Field Measured										
Water Temp. (°C)					7.4				0.1	14.2
Conductivity (microS/cm)					242				660	924
pH (pH units)		6.5 - 8.5			6.94				7.10	8
Dissolved Oxygen		f(Temp)			7.81				4.58	4.75
Flow (L/Sec)					6.0				Not Measured	

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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Oct-09	Jun-10	Aug-10	Sep-10	May-11	Jul-11
Fluoride	1.0 - 2.0					No Sample	No Sample	No Sample		
Chloride				180	86	Collected	Collected	Collected	48	47
N -NO2 (Nitrite)	10.0		0.06		<0.10	No Water	No Water	No Water	<0.10	<0.10
N-NO3 (Nitrate)			13		<0.10				<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				91				6	43
Calcium	1000				77					
Magnesium					42					
Sodium					49					
Potassium					8					
Arsenic		0.1 0.005	0.005	0.15	<0.001				<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.06				0.03	0.04
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.97				0.11	0.73
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001				<0.0001	<0.0001
Chromium	1.0	0.0099		0.064					0.002	0.002
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					975				425	495
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.002				<0.001	0.001
Iron		0.300	0.300		1.1				0.64	0.24
Lead	0.1	0.005 e	min 0.001	0.002	<0.001				<0.001	<0.001
Manganese					0.43					
Mercury		0.0002		0.00077	<0.0002				<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.06				0.040	0.040
Silicon										
Silver		0.0001		0.00012						
Strontium					1.68					
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01				<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			281				138	148
TKN					0.66				0.80	0.78
N-NH3 (Ammonia)		0.02	pH Temp		0.02				<0.02	<0.02
Organic Nitrogen									≤0.80	≤0.78
Phenols		0.001 (i)	0.004	0.961	<0.001				<0.001	<0.001
BOD					4				1	1
COD					38				50	68
TDS (Cond - Calc)	3000				634				276	322
Total Sus. Solids					38				5	<2
Ion Balance										
Un-ionized Ammonia					<0.02				<0.02	<0.02
pH		6.5 - 8.5			7.94				8.14	7.5
DOC										
Field Measured										
Water Temp. (°C)									15.9	19.4
Conductivity (microS/cm)					946				303	373
pH (pH units)		6.5 - 8.5			8.7				7.7	7.8
Dissolved Oxygen		f(Temp)			11				6.95	5.97
Flow (L/Sec)									4.4	0.8

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-11	May-12	Aug-12	Apr-13	Aug-13	Nov-13
Fluoride	1.0 - 2.0				No Sample		No Sample		No Sample	
Chloride				180	Collected	63	Collected	30	Collected	53
N -NO2 (Nitrite)	10.0		0.06		No Water	<0.10	No Water	<0.10	No Water	<0.10
N-NO3 (Nitrate)			13			<0.10		0.15		<0.10
Bromide										
Phosphate										
Sulphate	1000					12		15		83
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15		<0.001		<0.001		<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30		0.03		0.02		0.04
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		0.16		0.05		0.42
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		<0.0001		<0.0001		<0.0001
Chromium	1.0	0.0099		0.064		0.002		<0.001		0.002
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						486		252		550
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.001		0.001		0.002
Iron		0.300	0.300			0.46		0.26		0.40
Lead	0.1	0.005 e	min 0.001	0.002		<0.001		<0.001		<0.001
Manganese										
Mercury		0.0002		0.00077		<0.0001		<0.0001		<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.030		<0.01		0.07
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		<0.01		<0.01		<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				150		63		111
TKN						0.56		0.57		1.08
N-NH3 (Ammonia)		0.02	pH Temp			<0.02		<0.02		<0.02
Organic Nitrogen						≤0.56		≤ 0.57		≤ 1.08
Phenols		0.001 (i)	0.004	0.961		<0.001		<0.001		<0.001
BOD						<1		<1		3
COD						32		40		78
TDS (Cond - Calc)	3000					316		164		358
Total Sus. Solids						4		2		<2
Ion Balance										
Un-ionized Ammonia						<0.02		<0.02		<0.02
pH		6.5 - 8.5				7.76		7.08		7.65
DOC										
Field Measured										
Water Temp. (°C)						7.1		3.7		10.6
Conductivity (microS/cm)						490		265		563
pH (pH units)		6.5 - 8.5				6.7		7.3		7.6
Dissolved Oxygen		f(Temp)				8.43		9.61		5.4
Flow (L/Sec)						1.7		14.7		1.2

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-14	Jul-14	Nov-14	Nov-15	May-16	Apr-17
Fluoride	1.0 - 2.0					No Sample		No Sample		
Chloride				180	23.2	Collected	82	Collected	100	26.4
N -NO2 (Nitrite)	10.0		0.06		< 0.10	No Water	< 0.10	No Water	< 0.1	< 0.1
N-NO3 (Nitrate)			13		0.5		< 0.10		< 0.1	0.4
Bromide										
Phosphate										
Sulphate	1000				9		17		42	14
Calcium	1000								77	24.2
Magnesium									34	9.06
Sodium									48.7	15.5
Potassium									6.2	2.4
Arsenic		0.1 0.005	0.005	0.15	0.0003		0.0004		< 0.0012	0.0002
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.02		0.039		0.067	0.025
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.069		0.104		0.309	0.103
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.00003		< 0.00002		< 0.001	< 0.000020
Chromium	1.0	0.0099		0.064	0.0002		< 0.002		0.0012	< 0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					231		530		839	277
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001		0.0013		0.004	0.0009
Iron		0.300	0.300		0.382		0.348		0.376	0.202
Lead	0.1	0.005 e	min 0.001	0.002	0.00023		0.00017		< 0.0006	0.0001
Manganese									0.106	0.009
Mercury		0.0002		0.00077	< 0.00002		< 0.00002		< 0.00002	< 0.02
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.06		0.04		0.04	0.03
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.008		0.005		< 0.005	< 0.005
Hardness (as CaCO3)					85					
Alkalinity as CaCO3		a			63		137		269	81
TKN					0.54		0.92		0.96	0.72
N-NH3 (Ammonia)		0.02	pH Temp		0.03		< 0.01		0.02	0.02
Organic Nitrogen					0.51		≤ 0.92			
Phenols		0.001 (i)	0.004	0.961	<0.001		< 0.001		< 0.001	< 0.001
BOD					< 3		< 3		< 3	< 3
COD					35		42		53	35
TDS (Cond - Calc)	3000				118		294		471	142
Total Sus. Solids					3		< 3		9	< 3
Ion Balance										0.996
Un-ionized Ammonia										
pH		6.5 - 8.5			7.5		7.86		8.13	7.75
DOC									14.2	10.3
Field Measured										
Water Temp. (°C)					2		3.8		15.2	3.9
Conductivity (microS/cm)					219		532		780	288
pH (pH units)		6.5 - 8.5			7.9		7.5		7.4	7.2
Dissolved Oxygen		f(Temp)			8.59		8.32		8.96	10.4
Flow (L/Sec)					38.9		0.75		0.7	20.6

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Apr-18	Apr-19	May-20	Mar-21	Apr-22	May-23
Fluoride	1.0 - 2.0									
Chloride				180	26.3	20.2	101	45	62	38
N -NO2 (Nitrite)	10.0		0.06		< 0.1	<0.1	< 0.1	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		0.1	0.3	< 0.1	0.14	<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				7	11	42	10	10	5
Calcium	1000				23.5	21.3	72.3	26	35	21
Magnesium					9.34	7.4	30.1	12	14	7
Sodium					15.7	13.7	49.4	24	32	23
Potassium					2.1	1.9	6.7	3	2	1
Arsenic		0.1 0.005	0.005	0.15	0.0003	0.0002	0.0004	<0.001	<0.001	<0.001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.02	0.023	0.064	0.03	0.03	0.02
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.091	0.069	0.241	0.1	0.08	0.04
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.000036	<0.000015	0.000029	<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064	0.002	<0.001	< 0.001	<0.001	<0.001	<0.001
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					273	232	851	367	436	228
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.0041	0.0013	0.0014	<0.001	0.002	0.001
Iron		0.300	0.300		0.35	0.227	0.329	0.24	0.16	0.47
Lead	0.1	0.005 e	min 0.001	0.002	0.00017	0.00016	0.00013	<0.001	<0.001	<0.001
Manganese					0.15	0.012	0.07	0.1	0.03	0.01
Mercury		0.0002		0.00077	< 0.00002	<0.00002	< 0.00002	<0.0001	<0.0001	<0.0001
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.04	0.05	0.04	0.04	0.027	0.041
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	< 0.005	0.057	< 0.005	<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			86	62	243	92	113	72
TKN					0.5	0.6	0.8	0.775	0.73	0.765
N-NH3 (Ammonia)		0.02	pH Temp		0.08	0.08	0.03	<0.010	0.014	0.028
Organic Nitrogen							0.77	≤0.775	<0.716	
Phenols		0.001 (i)	0.004	0.961	< 0.001	<0.002	< 0.002	0.005	<0.001	<0.001
BOD					< 3	<3	< 3	<1	4	<1
COD					41	34	50	25	35	46
TDS (Cond - Calc)	3000				137	114	448	239	283	148
Total Sus. Solids					< 3	4	3	2	4	4
Ion Balance					0.968					
Un-ionized Ammonia								<0.02	<0.02	<0.02
pH		6.5 - 8.5			7.4	7.34	7.88	7.47	7.33	7.6
DOC					12.2	11	12.2	9.9	12.2	16.1
Field Measured										
Water Temp. (°C)					3.0	7.2	5.0	1.8	4.2	9.4
Conductivity (microS/cm)					242	178	837	373	444	310
pH (pH units)		6.5 - 8.5			8.0	7.0	7.0	6	7	7.5
Dissolved Oxygen		f(Temp)			6.19	11.1	9.3	13.6	9.4	9.1
Flow (L/Sec)					14.2	24.7	0.9	6.6	3	35.2

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Surface Water Quality Data
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Surface Water Station>					SW 20					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-24					
Fluoride	1.0 - 2.0									
Chloride				180	84					
N -NO2 (Nitrite)	10.0		0.06		<0.10					
N-NO3 (Nitrate)			13		<0.10					
Bromide										
Phosphate										
Sulphate	1000				7					
Calcium	1000				54					
Magnesium					25					
Sodium					43					
Potassium					4					
Arsenic		0.1 0.005	0.005	0.15	<0.001					
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30	0.04					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.22					
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001					
Chromium	1.0	0.0099		0.064	0.001					
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					644					
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001					
Iron		0.300	0.300		0.59					
Lead	0.1	0.005 e	min 0.001	0.002	<0.001					
Manganese					0.07					
Mercury		0.0002		0.00077	<0.0001					
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.086					
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01					
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			200					
TKN					1.22					
N-NH3 (Ammonia)		0.02	pH Temp		<0.020					
Organic Nitrogen										
Phenols		0.001 (i)	0.004	0.961	<0.001					
BOD					<1					
COD					31					
TDS (Cond - Calc)	3000				419					
Total Sus. Solids					4					
Ion Balance										
Un-ionized Ammonia					<0.02					
pH		6.5 - 8.5			7.82					
DOC					17.7					
Field Measured										
Water Temp. (°C)					11.9					
Conductivity (microS/cm)					710					
pH (pH units)		6.5 - 8.5			7.5					
Dissolved Oxygen		f(Temp)			5.2					
Flow (L/Sec)					9.1					

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Surface Water Quality Data
Westmeath Landfill Monitoring
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Surface Water Station>					SW 23					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-96	Apr-97	Jun-05	Apr-99	Dec-99	Apr-00
Fluoride	1.0 - 2.0						No samples			
Chloride				180	8	11	collected	10	Not	38
N -NO2 (Nitrite)	10.0		0.06				during 1998	<0.10	Sampled	<0.10
N-NO3 (Nitrate)			13					<0.10		0.100
Bromide									Area	
Phosphate							Feb.10/98 -		is	
Sulphate	1000				101	13		7	and	25
Calcium	1000				29	13	Sept.28/98 -	20	Frozen	40
Magnesium					13	6	Dry	8		19
Sodium					8	9		7		25
Potassium						2	Nov.25/98 -	2		3
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		0.270		Dry			
Barium				2.30	0.040					
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.04	0.02		<0.01		0.06
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				0.00018		<0.00006
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052	0.010					
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				<0.005		0.013
Iron		0.300	0.300		0.58	0.35		3.52		0.13
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.11	0.01		0.29		0.04
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.05		1.18		0.03
Silicon					13.60					
Silver		0.0001		0.00012						
Strontium					0.151	0.064		0.107		0.532
Sulphur					35.00					
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	0.010			<0.01		<0.01
Hardness (as CaCO3)					126					
Alkalinity as CaCO3		a			15	49		84		150
TKN					1.03			0.58		0.90
N-NH3 (Ammonia)		0.02	pH Temp					0.42		0.51
Organic Nitrogen								0.16		0.39
Phenols		0.001 (i)	0.004	0.961				0.001		<0.001
BOD										
COD					48	49		164		39
TDS (Cond - Calc)	3000				188	96		264		264
Total Sus. Solids										
Ion Balance					1.09	1.02		0.96		1.03
Un-ionized Ammonia					<0.001					
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					5.4	10.1		11.5		7.1
Conductivity (microS/cm)					290	150		205		390
pH (pH units)		6.5 - 8.5			7.86	7.25		6.30		6.88
Dissolved Oxygen		f(Temp)				9.00		1.10		8.90
Flow (L/Sec)					--	--		0.0		0.4

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Surface Water Quality Data
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Surface Water Station>					SW 23					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-05	Jun-01	Aug-01	Nov-01	Apr-00	Jun-05
Fluoride	1.0 - 2.0									No Sample
Chloride				180	No	No	No	7	13	Collected
N -NO2 (Nitrite)	10.0		0.06		samples	samples	samples	<0.10	<0.10	No Water
N-NO3 (Nitrate)			13		collected	collected	collected	<0.10	<0.10	
Bromide					during	during	during			
Phosphate					Aug.	June	August			
Sulphate	1000				Nov			11	4	
Calcium	1000				2000			14	20	
Magnesium								7	8	
Sodium								6	6	
Potassium					Aug.16/00 -	No	No	2	2	
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		Dry	Water	Water			
Barium				2.30						
Beryllium	0.1	0.011		0.0053	Nov.7/00 -					
Boron	5.0	0.2 (i)	1.15	3.55	Dry			<0.05	<0.05	
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				<0.0001	<0.0001	
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)										
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069				0.002	0.001	
Iron		0.300	0.300					0.19	0.50	
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese								0.01	0.03	
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)						0.05	0.05	
Silicon										
Silver		0.0001		0.00012						
Strontium								0.074	0.121	
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089				<0.01	<0.01	
Hardness (as CaCO3)										
Alkalinity as CaCO3		a						54	70	
TKN								1.23	1.35	
N-NH3 (Ammonia)		0.02	pH Temp					0.03	<0.02	
Organic Nitrogen								1.20	>1.34	
Phenols		0.001 (i)	0.004	0.961				<0.001	<0.001	
BOD										
COD								70	53	
TDS (Cond - Calc)	3000							79	118	
Total Sus. Solids										
Ion Balance								1.05	1.06	
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)								1.0	16.7	
Conductivity (microS/cm)								200	149.7	
pH (pH units)		6.5 - 8.5						7.24	7.28	
Dissolved Oxygen		f(Temp)						2.96	1.80	
Flow (L/Sec)								NO FLOW	NO FLOW	

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Surface Water Quality Data
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Surface Water Station>					SW 23					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Jun-01	Aug-01	Nov-01	Nov-03	Jun-04	Aug-04
Fluoride	1.0 - 2.0				No Sample		No Sample		No Sample	No Sample
Chloride				180	Collected	9	Collected	34	Collected	Collected
N -NO2 (Nitrite)	10.0		0.06		No Water	<0.10	No Water	<0.10	No Water	No Water
N-NO3 (Nitrate)			13			<0.10		<0.10		
Bromide										
Phosphate										
Sulphate	1000					18		48		
Calcium	1000					13		40		
Magnesium						7		18		
Sodium						7		25		
Potassium						2		2		
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55		<0.05		0.13		
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021		0.0003		<0.0001		
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)						142		444		
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069		0.007		0.001		
Iron		0.300	0.300			0.42		0.14		
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese						0.18		0.02		
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)				0.12		0.06		
Silicon										
Silver		0.0001		0.00012						
Strontium						0.075		0.838		
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089		0.006		<0.01		
Hardness (as CaCO3)										
Alkalinity as CaCO3		a				31		150		
TKN						2.61		0.64		
N-NH3 (Ammonia)		0.02	pH Temp			0.04		0.03		
Organic Nitrogen						2.57		0.61		
Phenols		0.001 (i)	0.004	0.961		<0.001		<0.001		
BOD										
COD						123		40		
TDS (Cond - Calc)	3000					92		289		
Total Sus. Solids										
Ion Balance						N/A		0.93		
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)						10.7		2.1		
Conductivity (microS/cm)						150		346		
pH (pH units)		6.5 - 8.5				6.54		6.63		
Dissolved Oxygen		f(Temp)				2.94		10.20		
Flow (L/Sec)						Not Observed		0.8		

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(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 23					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Dec-04	May-05	Sep-05	Dec-05	Apr-06	Sep-06
Fluoride	1.0 - 2.0						No Sample			
Chloride				180	10	19	Collected	60	52	13
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	No Water	<0.10	<0.10	<0.10
N-NO3 (Nitrate)			13		<0.10	<0.10		<0.10	<0.10	<0.10
Bromide										
Phosphate										
Sulphate	1000				57	5		46	23	18
Calcium	1000				19	20		18	49	16
Magnesium					7	8		10	21	6
Sodium					8	12		10	28	11
Potassium					<1	2		2	3	<1
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	0.04		0.27	0.34	0.02
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					188	216		225	537	170
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.005	0.001		0.001	0.001	0.002
Iron		0.300	0.300		0.41	0.42		0.12	0.15	0.41
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.04	0.12		0.03	0.01	0.03
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.11	0.06		0.11	0.02	0.17
Silicon										
Silver		0.0001		0.00012						
Strontium					0.083	0.139		1.080	0.995	0.092
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01		<0.01	<0.01	<0.01
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			8	74		27	187	41
TKN					1.14	1.11		1.27	0.83	2.34
N-NH3 (Ammonia)		0.02	pH Temp		0.03			0.18	0.03	0.03
Organic Nitrogen					1.11			1.09	0.83	2.31
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001		<0.001	<0.001	<0.001
BOD										
COD					60	57		105	34	77
TDS (Cond - Calc)	3000				122	140		146	349	111
Total Sus. Solids										
Ion Balance					N/A	1.05		N/A -LC	0.96	NA-LC
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					1.7	11.8		1.3	12.8	15.1
Conductivity (microS/cm)					240	200		200	510	173
pH (pH units)		6.5 - 8.5			8.97	7.15		8.60	7.68	7.20
Dissolved Oxygen		f(Temp)			6.17	0.60		4.91	9.76	3.77
Flow (L/Sec)					No Flow	No Flow		No Flow	1.0	0.0

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Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					SW 23					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	Nov-06	May-07				
Fluoride	1.0 - 2.0									
Chloride				180	17	15				
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10				
N-NO3 (Nitrate)			13		<0.10	<0.10				
Bromide										
Phosphate										
Sulphate	1000				4	3				
Calcium	1000				25	18				
Magnesium					10	5				
Sodium					12	10				
Potassium					3	1				
Arsenic		0.1 0.005	0.005	0.15						
Aluminum	5.0	0.075 (i)	0.1 pH >6.5							
Barium				2.30						
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	0.03	0.01				
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	0.0004				
Chromium	1.0	0.0099		0.064						
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					234	232				
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	0.001	0.010				
Iron		0.300	0.300		0.27	7.69				
Lead	0.1	0.005 e	min 0.001	0.002						
Manganese					0.06	0.10				
Mercury		0.0002		0.00077						
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			0.17	0.65				
Silicon										
Silver		0.0001		0.00012						
Strontium					0.119	0.093				
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	0.020				
Hardness (as CaCO3)										
Alkalinity as CaCO3		a			90	84				
TKN					2.42	15.10				
N-NH3 (Ammonia)		0.02	pH Temp		<0.02	8.25				
Organic Nitrogen					≤ 2.42	6.85				
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001				
BOD										
COD					63	120				
TDS (Cond - Calc)	3000				152	151				
Total Sus. Solids										
Ion Balance					NA-LC	1.09				
Un-ionized Ammonia										
pH		6.5 - 8.5								
DOC										
Field Measured										
Water Temp. (°C)					7.4	15.3				
Conductivity (microS/cm)					230	159.7				
pH (pH units)		6.5 - 8.5			6.94	6.53				
Dissolved Oxygen		f(Temp)			1.40	3.34				
Flow (L/Sec)					0.0	No Flow				

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					Field Blanks					
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-12 SW 3C	Apr-13 SW 1	Aug-13 SW 6	Nov-13 SW 4	Apr-14 SW 2	Nov-14 SW 2
Fluoride	1.0 - 2.0									
Chloride				180	<1	<1	<1	<1	< 0.5	< 0.5
N -NO2 (Nitrite)	10.0		0.06		<0.10	<0.10	<0.10	<0.10	< 0.10	< 0.10
N-NO3 (Nitrate)			13		<0.10	<0.10	<0.10	<0.10	< 0.10	< 0.10
Bromide										
Phosphate										
Sulphate	1000				<1	<3	<3	<3	< 1	< 1
Calcium	1000									
Magnesium										
Sodium										
Potassium										
Arsenic		0.1 0.005	0.005	0.15		<0.001	<0.001	<0.001	< 0.0001	< 0.0001
Aluminum	5.0	0.075 (i)	0.1 pH >6.5		<0.001					
Barium				2.30	<0.01	<0.01	<0.01	<0.01	< 0.001	< 0.001
Beryllium	0.1	0.011		0.0053						
Boron	5.0	0.2 (i)	1.15	3.55	<0.01	<0.01	<0.01	<0.01	< 0.005	< 0.005
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002
Chromium	1.0	0.0099		0.064	<0.001	<0.001	<0.001	<0.001	< 0.0002	< 0.002
Cobalt	1.0	0.0009 (i)		0.0052						
Conductivity (microS/cm)					<5	<5	<5	<5	2	2
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	<0.001	<0.001	<0.001	<0.001	< 0.0001	< 0.0001
Iron		0.300	0.300		<0.03	<0.03	<0.03	<0.03	< 0.005	< 0.005
Lead	0.1	0.005 e	min 0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.00008	< 0.00002
Manganese										
Mercury		0.0002		0.00077	<0.0001	<0.0001	<0.0001	<0.0001	< 0.00002	< 0.00002
Molybdenum	0.5	0.04 (i)	0.073	0.730						
Nickel	1.0	0.025	min 0.025	0.039						
Total Phosphorus		0.03 (i)			<0.01	<0.01	<0.01	<0.01	< 0.01	< 0.01
Silicon										
Silver		0.0001		0.00012						
Strontium										
Sulphur										
Thallium		0.0003 (i)	0.001	0.040						
Tin										
Titanium										
Vanadium		0.006 (i)		0.020						
Zinc	50	0.03 0.02 (i)	0.03	0.089	<0.01	<0.01	<0.01	<0.01	< 0.005	< 0.005
Hardness (as CaCO3)									< 1	
Alkalinity as CaCO3		a			<5	<5	<5	<5	< 5	< 5
TKN					<0.10	<0.10	<0.10	<0.10	< 0.05	< 0.05
N-NH3 (Ammonia)		0.02	pH Temp		<0.02	<0.02	<0.02	<0.02	< 0.01	< 0.01
Organic Nitrogen					<0.10	<0.10	<0.10	<0.10	< 0.05	< 0.05
Phenols		0.001 (i)	0.004	0.961	<0.001	<0.001	<0.001	<0.001	< 0.001	< 0.001
BOD					<1	<1	<1	<1	< 3	< 3
COD					<5	<5	<5	<5	<5	< 5
TDS (Cond - Calc)	3000				<1	<1	<1	<1	1	< 1
Total Sus. Solids					<2	<2	<2	<2	< 3	< 3
Ion Balance										
Un-ionized Ammonia					<0.02	<0.02	<0.02	<0.02		
pH		6.5 - 8.5			5.55	5.5	5.92	6.18	6.65	5.93
DOC										
Field Measured										
Water Temp. (°C)										
Conductivity (microS/cm)										
pH (pH units)		6.5 - 8.5								
Dissolved Oxygen		f(Temp)								
Flow (L/Sec)										

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Shaded values exceed Provincial Criteria

Surface Water Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Surface Water Station>					Field Blanks						
Date Sampled> Parameters	Livestock Watering	PWQO	CWQG	APV	May-16 SW 22	Apr-17 SW 21					
Fluoride	1.0 - 2.0										
Chloride				180	< 0.5	< 0.5					
N -NO2 (Nitrite)	10.0		0.06		< 0.1	< 0.1					
N-NO3 (Nitrate)			13		< 0.1	< 0.1					
Bromide											
Phosphate											
Sulphate	1000				< 1	< 1					
Calcium	1000				< 0.02	0.02					
Magnesium					< 0.01	< 0.01					
Sodium					< 0.2	< 0.2					
Potassium					< 0.1	< 0.1					
Arsenic		0.1 0.005	0.005	0.15	< 0.0012	< 0.0001					
Aluminum	5.0	0.075 (i)	0.1 pH >6.5								
Barium				2.30	< 0.001	< 0.001					
Beryllium	0.1	0.011		0.0053							
Boron	5.0	0.2 (i)	1.15	3.55	< 0.005	< 0.005					
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021	< 0.001	< 0.000020					
Chromium	1.0	0.0099		0.064	< 0.0005	< 0.001					
Cobalt	1.0	0.0009 (i)		0.0052							
Conductivity (microS/cm)					2	2					
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069	< 0.001	< 0.0001					
Iron		0.300	0.300		< 0.005	< 0.005					
Lead	0.1	0.005 e	min 0.001	0.002	< 0.0006	< 0.00002					
Manganese					< 0.001	< 0.001					
Mercury		0.0002		0.00077	< 0.00002	< 0.02					
Molybdenum	0.5	0.04 (i)	0.073	0.730							
Nickel	1.0	0.025	min 0.025	0.039							
Total Phosphorus		0.03 (i)			< 0.01	< 0.01					
Silicon											
Silver		0.0001		0.00012							
Strontium											
Sulphur											
Thallium		0.0003 (i)	0.001	0.040							
Tin											
Titanium											
Vanadium		0.006 (i)		0.020							
Zinc	50	0.03 0.02 (i)	0.03	0.089	< 0.005	< 0.005					
Hardness (as CaCO3)											
Alkalinity as CaCO3		a			< 5	< 5					
TKN					< 0.05	< 0.05					
N-NH3 (Ammonia)		0.02	pH Temp		< 0.01	< 0.01					
Organic Nitrogen											
Phenols		0.001 (i)	0.004	0.961	< 0.001	< 0.001					
BOD					< 3	< 3					
COD					< 5	< 5					
TDS (Cond - Calc)	3000				< 1	0.672					
Total Sus. Solids					< 3	< 3					
Ion Balance						18					
Un-ionized Ammonia											
pH		6.5 - 8.5			6	5.83					
DOC					< 0.2	0.3					
Field Measured											
Water Temp. (°C)											
Conductivity (microS/cm)											
pH (pH units)		6.5 - 8.5									
Dissolved Oxygen		f(Temp)									
Flow (L/Sec)											

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Shaded values exceed Provincial Criteria

Surface Water Quality Data

Westmeath Landfill Monitoring

Township of Whitewater Region

					Surface Water Statistics Summary			
Surface Water Station>					**SW3**	**SW3**	**SW3**	**SW3**
Date Sampled> **Parameters**	**Livestock Watering**	**PWQO**	**CWQG**	**APV**	**Median (Last 10 Events)**	**75th Percentile**	**Min**	**Max**
Fluoride	1.0 - 2.0				Not			
Chloride				180	Required	16	<1	142
N -NO2 (Nitrite)	10.0		0.06					
N-NO3 (Nitrate)			13					
Bromide								
Phosphate								
Sulphate	1000					12	1	38
Calcium	1000							
Magnesium								
Sodium								
Potassium								
Arsenic		0.1 0.005	0.005	0.15				
Aluminum	5.0	0.075 (i)	0.1 pH >6.5					
Barium				2.30				
Beryllium	0.1	0.011		0.0053				
Boron	5.0	0.2 (i)	1.15	3.55		<0.01	<0.005	0.04
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				
Chromium	1.0	0.0099		0.064				
Cobalt	1.0	0.0009 (i)		0.0052				
Conductivity (microS/cm)							44	909
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			<0.001	0.013
Iron		0.300	0.300				<0.03	3.01
Lead	0.1	0.005 e	min 0.001	0.002				
Manganese								
Mercury		0.0002		0.00077				
Molybdenum	0.5	0.04 (i)	0.073	0.730				
Nickel	1.0	0.025	min 0.025	0.039				
Total Phosphorus		0.03 (i)					<0.01	0.12
Silicon								
Silver		0.0001		0.00012				
Strontium								
Sulphur								
Thallium		0.0003 (i)	0.001	0.040				
Tin								
Titanium								
Vanadium		0.006 (i)		0.020				
Zinc	50	0.03 0.02 (i)	0.03	0.089				
Hardness (as CaCO3)								
Alkalinity as CaCO3		a					5	226
TKN								
N-NH3 (Ammonia)		0.02	pH Temp			<0.06		
Organic Nitrogen								
Phenols		0.001 (i)	0.004	0.961				
BOD								
COD							5	63
TDS (Cond - Calc)	3000						<1	591
Total Sus. Solids								
Ion Balance								
Un-ionized Ammonia						<0.02		
pH		6.5 - 8.5						
DOC								
Field Measured								
Water Temp. (°C)								
Conductivity (microS/cm)								
pH (pH units)		6.5 - 8.5						
Dissolved Oxygen		f(Temp)						
Flow (L/Sec)								

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Shaded values exceed Provincial Criteria

Surface Water Quality Data

Westmeath Landfill Monitoring

Township of Whitewater Region

					Surface Water Statistics Summary			
Surface Water Station>					**SW3A**	**SW3A**	**SW3A**	**SW3A**
Date Sampled>					**Median**			
Parameters	**Livestock Watering**	**PWQO**	**CWQG**	**APV**	**(Last 10 Events)**	**75th Percentile**	**Min**	**Max**
Fluoride	1.0 - 2.0				Not			
Chloride				180	Required	90	3.7	536
N -NO2 (Nitrite)	10.0		0.06					
N-NO3 (Nitrate)			13					
Bromide								
Phosphate								
Sulphate	1000					13	2.0	80
Calcium	1000							
Magnesium								
Sodium								
Potassium								
Arsenic		0.1 0.005	0.005	0.15				
Aluminum	5.0	0.075 (i)	0.1 pH >6.5					
Barium				2.30				
Beryllium	0.1	0.011		0.0053				
Boron	5.0	0.2 (i)	1.15	3.55		<0.015	<0.005	0.050
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				
Chromium	1.0	0.0099		0.064				
Cobalt	1.0	0.0009 (i)		0.0052				
Conductivity (microS/cm)							56.0	2320
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			<0.001	0.005
Iron		0.300	0.300				0.077	4
Lead	0.1	0.005 e	min 0.001	0.002				
Manganese								
Mercury		0.0002		0.00077				
Molybdenum	0.5	0.04 (i)	0.073	0.730				
Nickel	1.0	0.025	min 0.025	0.039				
Total Phosphorus		0.03 (i)					0.01	0.19
Silicon								
Silver		0.0001		0.00012				
Strontium								
Sulphur								
Thallium		0.0003 (i)	0.001	0.040				
Tin								
Titanium								
Vanadium		0.006 (i)		0.020				
Zinc	50	0.03 0.02 (i)	0.03	0.089				
Hardness (as CaCO3)								
Alkalinity as CaCO3		a					11	323
TKN								
N-NH3 (Ammonia)		0.02	pH Temp			<0.04		
Organic Nitrogen								
Phenols		0.001 (i)	0.004	0.961				
BOD								
COD							15	60
TDS (Cond - Calc)	3000						27	1510
Total Sus. Solids								
Ion Balance								
Un-ionized Ammonia						<0.02		
pH		6.5 - 8.5						
DOC								
Field Measured								
Water Temp. (°C)								
Conductivity (microS/cm)								
pH (pH units)		6.5 - 8.5						
Dissolved Oxygen		f(Temp)						
Flow (L/Sec)								

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data

Westmeath Landfill Monitoring

Township of Whitewater Region

					Surface Water Statistics Summary			
Surface Water Station>					**SW5**	**SW5**	**SW5**	**SW5**
Date Sampled>					**Median**			
Parameters	**Livestock Watering**	**PWQO**	**CWQG**	**APV**	**(Last 10 Events)**	**75th Percentile**	**Min**	**Max**
Fluoride	1.0 - 2.0				Not			
Chloride				180	Required	90.5	9	167
N -NO2 (Nitrite)	10.0		0.06					
N-NO3 (Nitrate)			13					
Bromide								
Phosphate								
Sulphate	1000					73	5	375
Calcium	1000							
Magnesium								
Sodium								
Potassium								
Arsenic		0.1 0.005	0.005	0.15				
Aluminum	5.0	0.075 (i)	0.1 pH >6.5					
Barium				2.30				
Beryllium	0.1	0.011		0.0053				
Boron	5.0	0.2 (i)	1.15	3.55		0.54	<0.01	1.4
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				
Chromium	1.0	0.0099		0.064				
Cobalt	1.0	0.0009 (i)		0.0052				
Conductivity (microS/cm)							185	1820
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			<0.001	0.013
Iron		0.300	0.300				0.04	8.68
Lead	0.1	0.005 e	min 0.001	0.002				
Manganese								
Mercury		0.0002		0.00077				
Molybdenum	0.5	0.04 (i)	0.073	0.730				
Nickel	1.0	0.025	min 0.025	0.039				
Total Phosphorus		0.03 (i)					0.01	0.8
Silicon								
Silver		0.0001		0.00012				
Strontium								
Sulphur								
Thallium		0.0003 (i)	0.001	0.040				
Tin								
Titanium								
Vanadium		0.006 (i)		0.020				
Zinc	50	0.03 0.02 (i)	0.03	0.089				
Hardness (as CaCO3)								
Alkalinity as CaCO3		a					27	689
TKN								
N-NH3 (Ammonia)		0.02	pH Temp			<0.06		
Organic Nitrogen								
Phenols		0.001 (i)	0.004	0.961				
BOD								
COD							20	100
TDS (Cond - Calc)	3000						52	1180
Total Sus. Solids								
Ion Balance								
Un-ionized Ammonia						<0.02		
pH		6.5 - 8.5						
DOC								
Field Measured								
Water Temp. (°C)								
Conductivity (microS/cm)								
pH (pH units)		6.5 - 8.5						
Dissolved Oxygen		f(Temp)						
Flow (L/Sec)								

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

Surface Water Quality Data

Westmeath Landfill Monitoring

Township of Whitewater Region

					Surface Water Statistics Summary			
Surface Water Station>					**SW20**	**SW20**	**SW20**	**SW20**
Date Sampled>					**Median**			
Parameters	**Livestock Watering**	**PWQO**	**CWQG**	**APV**	**(Last 10 Events)**	**75th Percentile**	**Min**	**Max**
Fluoride	1.0 - 2.0				Not			
Chloride				180	Required	73.25	11	101
N -NO2 (Nitrite)	10.0		0.06					
N-NO3 (Nitrate)			13					
Bromide								
Phosphate								
Sulphate	1000					51.75	5	108
Calcium	1000							
Magnesium								
Sodium								
Potassium								
Arsenic		0.1 0.005	0.005	0.15				
Aluminum	5.0	0.075 (i)	0.1 pH >6.5					
Barium				2.30				
Beryllium	0.1	0.011		0.0053				
Boron	5.0	0.2 (i)	1.15	3.55		0.309	0.03	0.97
Cadmium	0.02	0.0002 c (i)	Based on Hardness	0.00021				
Chromium	1.0	0.0099		0.064				
Cobalt	1.0	0.0009 (i)		0.0052				
Conductivity (microS/cm)							228	975
Copper	0.5 - 5.0	0.005 d(i)	Min 0.002	0.069			0.0009	0.015
Iron		0.300	0.300				0.09	8.93
Lead	0.1	0.005 e	min 0.001	0.002				
Manganese								
Mercury		0.0002		0.00077				
Molybdenum	0.5	0.04 (i)	0.073	0.730				
Nickel	1.0	0.025	min 0.025	0.039				
Total Phosphorus		0.03 (i)					<0.01	0.34
Silicon								
Silver		0.0001		0.00012				
Strontium								
Sulphur								
Thallium		0.0003 (i)	0.001	0.040				
Tin								
Titanium								
Vanadium		0.006 (i)		0.020				
Zinc	50	0.03 0.02 (i)	0.03	0.089				
Hardness (as CaCO3)								
Alkalinity as CaCO3		a					40	409
TKN								
N-NH3 (Ammonia)		0.02	pH Temp			<0.03		
Organic Nitrogen								
Phenols		0.001 (i)	0.004	0.961				
BOD								
COD							25	78
TDS (Cond - Calc)	3000						84	657
Total Sus. Solids								
Ion Balance								
Un-ionized Ammonia						<0.02		
pH		6.5 - 8.5						
DOC								
Field Measured								
Water Temp. (°C)								
Conductivity (microS/cm)								
pH (pH units)		6.5 - 8.5						
Dissolved Oxygen		f(Temp)						
Flow (L/Sec)								

All values reported in mg/L unless otherwise noted
PWQO = Provincial Water Quality Objectives
(i) Refers to Interim PWQO
Livestock Watering = Provincial Livestock Watering Criteria
Shaded values exceed Provincial Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 1A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14	Aug-15	Aug-17
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			113	108	99.6	95	105
4-Bromofluorobenzene	%			114	100		116	96.9
Toluene-d8	%			98	101	90.7	97	89.8

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 1A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-17				
PARAMETERS				Dup				
VOLATILE ORGANIC COUMPOUNDS				BH 16				
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2				
Benzene	ug/l	MAC	5	< 0.5				
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3				
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5				
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2				
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			109				
4-Bromofluorobenzene	%			92.9				
Toluene-d8	%			88.9				

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 1B				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-18	Jul-18	Aug-19	Aug-20	Aug-21
PARAMETERS					Dup			
VOLATILE ORGANIC COUMPOUNDS					BH 16			
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.2	<0.2	< 0.5	< 0.5	<0.4
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<0.3	<0.3	< 5	< 5	<4
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			98	104			117
4-Bromofluorobenzene	%			96	96			93
Toluene-d8	%			99	99			122

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 1B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-22	Aug-23	Aug-23	Aug-24	
PARAMETERS						Dup 1		
VOLATILE ORGANIC COUMPOUNDS						QA/QC		
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	<0.4	<0.4	
Benzene	ug/l	MAC	5	<0.5	<0.5	<0.5	<0.5	
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0	<4.0	
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.4	<0.4	<0.4	<0.4	
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2	<0.2	
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			99	100	103	120	
4-Bromofluorobenzene	%			95	89	89	77	
Toluene-d8	%			95	95	96	91	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 1C				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-14				
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2				
Benzene	ug/l	MAC	5	< 0.5				
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3				
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5				
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2				
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			99.7				
4-Bromofluorobenzene	%			92.3				
Toluene-d8	%			96.1				

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 2A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			116	107	98.4		
4-Bromofluorobenzene	%			116	99	89.4		
Toluene-d8	%			99	100	94.4		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 2B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			113	111	99.1		
4-Bromofluorobenzene	%			115	100	91.2		
Toluene-d8	%			99	102	95.4		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 4A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-13	Jul-14	Aug-15	Aug-16	Aug-17
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	< 0.3	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	101	102	93	107
4-Bromofluorobenzene	%			97	91.1	113	98	93.1
Toluene-d8	%			99	97.5	105	102	96.6

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 4A				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-18	Aug-19	Aug-20	Aug-21	Aug-22
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.5	< 0.5	<0.4	<0.4
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	<0.5	<0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 5	< 5	<4.0	<4.0
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	<0.5	<0.4
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	<0.2	<0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			112			121	94
4-Bromofluorobenzene	%			97			84	92
Toluene-d8	%			100			120	93

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 4A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-23	Aug-24	Aug-24		
PARAMETERS						Dup 1		
VOLATILE ORGANIC COUMPOUNDS						QA/QC		
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	<0.4		
Benzene	ug/l	MAC	5	<0.5	<0.5	<0.5		
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0		
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.4	<0.4	<0.4		
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2		
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			110	120	91		
4-Bromofluorobenzene	%			71	78	77		
Toluene-d8	%			101	92	93		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 4B				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-14	Aug-15	Aug-17	Jul-18	Aug-19
PARAMETERS					Dry		Dry	Dry
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2		< 0.2		
Benzene	ug/l	MAC	5	< 0.5		< 0.5		
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3		< 0.3		
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5		< 0.5		
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2		< 0.2		
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			97.5		107		
4-Bromofluorobenzene	%			90.3		96.9		
Toluene-d8	%			96.6		91.8		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 4B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-20	Aug-21	Aug-22	Aug-23	Aug-24
PARAMETERS				Insufficient		Insufficient		Insufficient
VOLATILE ORGANIC COUMPOUNDS				Water		Water		Water
1, 1, 1, 2-tetrachloroethane	ug/l			to		to		to
1,1,1-trichloroethane	ug/l			Sample		Sample		Sample
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5		<0.4		<0.4	
Benzene	ug/l	MAC	5		<0.5		<0.5	
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50		<4.0		<4.0	
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24		<0.5		<0.5	
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2		<0.2		<0.2	
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%				113		112	
4-Bromofluorobenzene	%				85		87	
Toluene-d8	%				123		93	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 5A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.58		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.02	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			109	114	99.4		
4-Bromofluorobenzene	%			115	104	89.7		
Toluene-d8	%			97	101	95.7		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 5B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-13	Jul-14			
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	< 0.2			
Benzene	ug/l	MAC	5	<0.5	< 0.5			
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	< 0.3			
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.2	< 0.5			
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2		< 0.2			
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			113	99.2			
4-Bromofluorobenzene	%			102	90.9			
Toluene-d8	%			101	96.3			

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 6A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS						No		
VOLATILE ORGANIC COUMPOUNDS						Sample		
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4			
Benzene	ug/l	MAC	5	<0.5	<0.5			
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0			
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5			
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.02			
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			112	112			
4-Bromofluorobenzene	%			115	98			
Toluene-d8	%			97	101			

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 6B				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-14				
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2				
Benzene	ug/l	MAC	5	< 0.5				
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3				
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5				
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2				
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			100				
4-Bromofluorobenzene	%			92.6				
Toluene-d8	%			97.1				

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 7A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14	Jul-14	Aug-15
PARAMETERS							BH 16	
VOLATILE ORGANIC COUMPOUNDS							QA/QC	
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	110	97.5	101	98
4-Bromofluorobenzene	%			114	101	90.4	89.9	113
Toluene-d8	%			96	101	96.3	9.3	103

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 7A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-16	Aug-17	Jul-18	Aug-19	Aug-20
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 0.3	< 0.3	< 5	< 5
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			95	107	103		
4-Bromofluorobenzene	%			100	97	96		
Toluene-d8	%			102	90	98		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 7A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-21	Aug-22	Aug-23	Aug-24	
PARAMETERS						No		
VOLATILE ORGANIC COUMPOUNDS						Sample		
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.40	<0.4		<0.4	
Benzene	ug/l	MAC	5	<0.5	<0.5		<0.5	
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0		<4.0	
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	<0.4		<0.4	
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2		<0.2	
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			112	108		121	
4-Bromofluorobenzene	%			82	94		78	
Toluene-d8	%			119	97		90	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 7B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14	Aug-15	Aug-16
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	111	98.8	99	98
4-Bromofluorobenzene	%			114	102	89.2	114	97
Toluene-d8	%			98	100	98	104	102

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 7B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-17	Jul-18	Aug-19	Aug-20	Aug-21
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.2	< 0.5	< 0.5	<0.40
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	< 0.5	<0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 0.3	< 5	< 5	<4.0
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	< 0.5	<0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	< 0.2	<0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			102	103			123
4-Bromofluorobenzene	%			97.7	96			85
Toluene-d8	%			89.9	99			117

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 7B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-22	Aug-23	Aug-24		
PARAMETERS					No			
VOLATILE ORGANIC COUMPOUNDS					Sample			
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4		<0.4		
Benzene	ug/l	MAC	5	< 0.5		< 0.5		
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0		<4.0		
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.4		<0.4		
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2		<0.2		
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			112		119		
4-Bromofluorobenzene	%			97.7		75		
Toluene-d8	%			97		90		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-12	Aug-13	Jul-14	Aug-15
PARAMETERS					BH 18			
VOLATILE ORGANIC COUMPOUNDS					QA/QC			
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5	<0.5			
1,1,1-trichloroethane	ug/l			<0.4	<0.4			
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5	<0.5			
1,1,2-trichloroethane	ug/l			<0.4	<0.4			
1, 1-dichloroethane	ug/l			<0.4	<0.4			
1, 1-dichloroethylene	ug/l	MAC	14	<0.5	<0.5			
1, 2-dibromoethane	ug/l			<0.2	<0.2			
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4	<0.4			
1, 2-dichloroethane	ug/l	IMAC	5	<0.2	<0.2			
1, 2-dichloroepropane	ug/l			<0.5	<0.5			
1, 3, 5-trimethylbenzene	ug/l			<0.3	<0.3			
1,3-dichlorobenzene	ug/l			<0.4	<0.4			
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	<0.4	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	<0.5	<0.5	< 05	< 0.5
Bromodichloromethane	ug/l			<0.3	<0.3			
Bromoform	ug/l			<0.4	<0.4			
Bromomethane	ug/l			<0.5	<0.5			
c-1, 2-Dichloroethylene	ug/l			<0.4	<0.4			
c-1,3-Dichloropropylene	ug/l			<0.2	<0.2			
Carbon Tetrachloride	ug/l	MAC	5	<0.2	<0.2			
Chloroethane	ug/l			<0.2	<0.2			
Chloroform	ug/l			<0.5	<0.5			
Chloromethane	ug/l			<0.2	<0.2			
Dibromochloromethane	ug/l			<0.3	<0.3			
Dichlorodifluromethane	ug/l			<0.5	<0.5			
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40	<0.5	<0.5			
m/p-xylene	ug/l			<0.5	<0.5			
Monochlorobenzene	ug/l	MAC	80	<0.2	<0.2			
o-xylene	ug/l			<0.5	<0.5			
Styrene	ug/l			<0.5	<0.5			
T-1, 2-Dichloroethylene	ug/l			<0.4	<0.4			
t-1,3-Dichloropropylene	ug/l			<0.2	<0.2			
Tetrachloroethylene	ug/l	MAC	30	<0.3	<0.3			
Toluene	ug/l	MAC	24	<0.5	<0.5	<0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5	<0.3	<0.3			
Trichlorofluoromethane	ug/l			<0.5	<0.5			
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2	< 0.2	< 0.2
Xylene; total	ug/l			<1.0	<1.0			
VOC SURROGATES								
1, 2-dichloroethane-d4	%			112	113	107	102	99
4-Bromofluorobenzene	%			117	113	100	87.6	112
Toluene-d8	%			98	96	100	95.9	103

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-15	Aug-16	Aug-16	Aug-17	Jul-18
PARAMETERS				BH 16		BH 16		
VOLATILE ORGANIC COUMPOUNDS				QA/QC		QA/QC		
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			94	91	98	105	96
4-Bromofluorobenzene	%			114	99	96	96.1	102
Toluene-d8	%			95	101	103	90.2	96

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-19	Aug-19	Aug-20	Aug-21	Aug-21
PARAMETERS					BH 16			Dup 1
VOLATILE ORGANIC COUMPOUNDS					QA/QC			QA/QC
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	<0.40	<0.40
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	<0.5	<0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 5	< 5	< 5	<4.0	<4.0
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	<0.5	<0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	<0.2	<0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%						116	112
4-Bromofluorobenzene	%						83	83
Toluene-d8	%						117	109

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-22	Aug-22	Aug-23	Aug-24	
PARAMETERS					Dup 1			
VOLATILE ORGANIC COUMPOUNDS					QA/QC			
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	<0.4	<0.4	
Benzene	ug/l	MAC	5	< 0.5	<0.5	<0.5	<0.5	
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0	<4.0	
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.4	<0.4	<0.4	<0.4	
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2	<0.2	
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			99	94	118	112	
4-Bromofluorobenzene	%			98	94	74	71	
Toluene-d8	%			93	104	102	89	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14	Aug-15	Aug-16
PARAMETERS								No Sample
VOLATILE ORGANIC COUMPOUNDS								Collected
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2	< 0.2	
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5	< 0.5	
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3	< 0.3	
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			113	113	98.3	96	
4-Bromofluorobenzene	%			115	102	90	116	
Toluene-d8	%			96	103	97.6	99	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-17	Jul-18	Aug-19	Aug-20	Aug-20
PARAMETERS								Dup 1
VOLATILE ORGANIC COUMPOUNDS								QA/QC
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 0.3	< 5	< 5	< 5
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			112	97			
4-Bromofluorobenzene	%			94.7	101			
Toluene-d8	%			93.7	97			

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 8B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-21	Aug-22	Aug-23	Aug-24	
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.40	<0.4	<0.4	<0.4	
Benzene	ug/l	MAC	5	<0.5	<0.5	<0.5	<0.5	
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0	<4.0	
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	<0.4	<0.4	<0.4	
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2	<0.2	
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			118	96	120	123	
4-Bromofluorobenzene	%			86	95	70	76	
Toluene-d8	%			121	97	101	90	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 9A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-12	Aug-13	Jul-14	
PARAMETERS					BH 16			
VOLATILE ORGANIC COUMPOUNDS					QA/QC			
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5	<0.5			
1,1,1-trichloroethane	ug/l			<0.4	<0.4			
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5	<0.5			
1,1,2-trichloroethane	ug/l			<0.4	<0.4			
1, 1-dichloroethane	ug/l			<0.4	<0.4			
1, 1-dichloroethylene	ug/l	MAC	14	<0.5	<0.5			
1, 2-dibromoethane	ug/l			<0.2	<0.2			
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4	<0.4			
1, 2-dichloroethane	ug/l	IMAC	5	<0.2	<0.2			
1, 2-dichloroepropane	ug/l			<0.5	<0.5			
1, 3, 5-trimethylbenzene	ug/l			<0.3	<0.3			
1,3-dichlorobenzene	ug/l			<0.4	<0.4			
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	<0.4	< 0.2	
Benzene	ug/l	MAC	5	<0.5	<0.5	<0.5	< 0.5	
Bromodichloromethane	ug/l			<0.3	<0.3			
Bromoform	ug/l			<0.4	<0.4			
Bromomethane	ug/l			<0.5	<0.5			
c-1, 2-Dichloroethylene	ug/l			<0.4	<0.4			
c-1,3-Dichloropropylene	ug/l			<0.2	<0.2			
Carbon Tetrachloride	ug/l	MAC	5	<0.2	<0.2			
Chloroethane	ug/l			<0.2	<0.2			
Chloroform	ug/l			<0.5	<0.5			
Chloromethane	ug/l			<0.2	<0.2			
Dibromochloromethane	ug/l			<0.3	<0.3			
Dichlorodifluromethane	ug/l			<0.5	<0.5			
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0	< 0.3	
Ethylbenzene	ug/l	AO	2.40	<0.5	<0.5			
m/p-xylene	ug/l			<0.5	<0.5			
Monochlorobenzene	ug/l	MAC	80	<0.2	<0.2			
o-xylene	ug/l			<0.5	<0.5			
Styrene	ug/l			<0.5	<0.5			
T-1, 2-Dichloroethylene	ug/l			<0.4	<0.4			
t-1,3-Dichloropropylene	ug/l			<0.2	<0.2			
Tetrachloroethylene	ug/l	MAC	30	<0.3	<0.3			
Toluene	ug/l	MAC	24	<0.5	<0.5	<0.5	< 0.5	
Trichloroethylene	ug/l	MAC	5	<0.3	<0.3			
Trichlorofluoromethane	ug/l			<0.5	<0.5			
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2	< 0.2	
Xylene; total	ug/l			<1.0	<1.0			
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	109	108	96.3	
4-Bromofluorobenzene	%			116	114	97	88.4	
Toluene-d8	%			97	98	97	95.5	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 9B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			114	109	98.3		
4-Bromofluorobenzene	%			113	100	89.7		
Toluene-d8	%			97	101	95.5		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 10A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			109	108	101		
4-Bromofluorobenzene	%			118	100	89.3		
Toluene-d8	%			103	100	97.2		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 10B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			115	107	101		
4-Bromofluorobenzene	%			116	98	90.6		
Toluene-d8	%			99	99	97.3		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 11A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13			
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4			
Benzene	ug/l	MAC	5	<0.5	<0.5			
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0			
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5			
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2			
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	112			
4-Bromofluorobenzene	%			115	102			
Toluene-d8	%			98	101			

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 11B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14	Aug-15	Aug-16
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			1.1				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	1.6	1.9	1.8	1.4	1.6
Benzene	ug/l	MAC	5	<0.5	2	1.5	< 0.5	1.2
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	1.8				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			109	111	99.6	101	103
4-Bromofluorobenzene	%			110	102	89.1	113	96
Toluene-d8	%			98	102	97.2	104	103

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 11B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-17	Jul-18	Aug-19	Aug-20	Aug-21
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	1.5	1.4	1.7	1.3	1.6
Benzene	ug/l	MAC	5	0.8	1.8	2.1	0.8	1.8
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	<0.3	< 5	< 5	
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	<0.5	< 0.5	< 0.5	<0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	<0.2	< 0.2	< 0.2	<0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			105	105			94
4-Bromofluorobenzene	%			95.9	97			87
Toluene-d8	%			94.7	99			108

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 11B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-22	Aug-23	Aug-24		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	1.5	1.8	2.0		
Benzene	ug/l	MAC	5	1.7	<0.5	1.6		
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0		
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.4	<4.0	<0.4		
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	<0.2		
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			98	110	112		
4-Bromofluorobenzene	%			101	95	78		
Toluene-d8	%			95	95	86		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 12A				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			113	110	98.1		
4-Bromofluorobenzene	%			115	101	90		
Toluene-d8	%			98	102	96.2		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 12B				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS					BH 16			
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			114	112	103		
4-Bromofluorobenzene	%			116	103	93.4		
Toluene-d8	%			98	101	97.6		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 13				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14		
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2		
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5		
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3		
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5		
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2		
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	109	98.4		
4-Bromofluorobenzene	%			116	100	89.4		
Toluene-d8	%			99	101	98.7		

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 14				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-13	Jul-14	Aug-15	Aug-16	Aug-17
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	< 0.3	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			114	99	100	90	105
4-Bromofluorobenzene	%			104	89.5	113	101	96.9
Toluene-d8	%			102	97.2	100	101	91

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 14				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-18	Aug-19	Aug-20	Aug-21	Aug-22
PARAMETERS					Dry	Dry		
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2			<0.4	<0.4
Benzene	ug/l	MAC	5	< 0.5			<0.5	<0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3			<4.0	<4.0
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5			<0.5	<0.4
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2			<0.2	<0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			107			113	117
4-Bromofluorobenzene	%			96			83	94
Toluene-d8	%			99			121	128

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 14				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-23	Aug-24			
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4			
Benzene	ug/l	MAC	5	<0.5	<0.5			
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	<4.0			
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	<0.5			
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2			
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			107	128			
4-Bromofluorobenzene	%			91	76			
Toluene-d8	%			93	89			

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				BH 15				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-13	Jul-14	Jul-14	
PARAMETERS							BH 18	
VOLATILE ORGANIC COUMPOUNDS							QA/QC	
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5				
1,1,1-trichloroethane	ug/l			<0.4				
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5				
1,1,2-trichloroethane	ug/l			<0.4				
1, 1-dichloroethane	ug/l			<0.4				
1, 1-dichloroethylene	ug/l	MAC	14	<0.5				
1, 2-dibromoethane	ug/l			<0.2				
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4				
1, 2-dichloroethane	ug/l	IMAC	5	<0.2				
1, 2-dichloroepropane	ug/l			<0.5				
1, 3, 5-trimethylbenzene	ug/l			<0.3				
1,3-dichlorobenzene	ug/l			<0.4				
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	< 0.2	< 0.2	
Benzene	ug/l	MAC	5	<0.5	<0.5	< 0.5	< 0.5	
Bromodichloromethane	ug/l			<0.3				
Bromoform	ug/l			<0.4				
Bromomethane	ug/l			<0.5				
c-1, 2-Dichloroethylene	ug/l			<0.4				
c-1,3-Dichloropropylene	ug/l			<0.2				
Carbon Tetrachloride	ug/l	MAC	5	<0.2				
Chloroethane	ug/l			<0.2				
Chloroform	ug/l			<0.5				
Chloromethane	ug/l			<0.2				
Dibromochloromethane	ug/l			<0.3				
Dichlorodifluromethane	ug/l			<0.5				
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	< 0.3	< 0.3	
Ethylbenzene	ug/l	AO	2.40	<0.5				
m/p-xylene	ug/l			<0.5				
Monochlorobenzene	ug/l	MAC	80	<0.2				
o-xylene	ug/l			<0.5				
Styrene	ug/l			<0.5				
T-1, 2-Dichloroethylene	ug/l			<0.4				
t-1,3-Dichloropropylene	ug/l			<0.2				
Tetrachloroethylene	ug/l	MAC	30	<0.3				
Toluene	ug/l	MAC	24	<0.5	<0.5	< 0.5	< 0.5	
Trichloroethylene	ug/l	MAC	5	<0.3				
Trichlorofluoromethane	ug/l			<0.5				
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	< 0.2	< 0.2	
Xylene; total	ug/l			<1.0				
VOC SURROGATES								
1, 2-dichloroethane-d4	%			114	113	97.3	98.3	
4-Bromofluorobenzene	%			117	102	89.9	88.2	
Toluene-d8	%			99	101	95	97.5	

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				Field Blanks				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-12	Aug-12	Aug-13	Jul-14	Aug-16
PARAMETERS				BH 17	BH 19	BH 16	BH 17	BH 17
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l			<0.5	<0.5			
1,1,1-trichloroethane	ug/l			<0.4	<0.4			
1, 1, 2, 2-tetrachloroethane	ug/l			<0.5	<0.5			
1,1,2-trichloroethane	ug/l			<0.4	<0.4			
1, 1-dichloroethane	ug/l			<0.4	<0.4			
1, 1-dichloroethylene	ug/l	MAC	14	<0.5	<0.5			
1, 2-dibromoethane	ug/l			<0.2	<0.2			
1, 2-dichlorobenzene	ug/l	MAC	200	<0.4	<0.4			
1, 2-dichloroethane	ug/l	IMAC	5	<0.2	<0.2			
1, 2-dichloroepropane	ug/l			<0.5	<0.5			
1, 3, 5-trimethylbenzene	ug/l			<0.3	<0.3			
1,3-dichlorobenzene	ug/l			<0.4	<0.4			
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	<0.4	<0.4	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	<0.5	<0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l			0.3	0.4			
Bromoform	ug/l			<0.4	<0.4			
Bromomethane	ug/l			<0.5	<0.5			
c-1, 2-Dichloroethylene	ug/l			<0.4	<0.4			
c-1,3-Dichloropropylene	ug/l			<0.2	<0.2			
Carbon Tetrachloride	ug/l	MAC	5	<0.2	<0.2			
Chloroethane	ug/l			<0.2	<0.2			
Chloroform	ug/l			<0.5	0.6			
Chloromethane	ug/l			<0.2	0.4			
Dibromochloromethane	ug/l			0.5	0.5			
Dichlorodifluromethane	ug/l			<0.5	<0.5			
Dichloromethane	ug/l	MAC	50	<4.0	<4.0	<4.0	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40	<0.5	<0.5			
m/p-xylene	ug/l			<0.5	<0.5			
Monochlorobenzene	ug/l	MAC	80	<0.2	<0.2			
o-xylene	ug/l			<0.5	<0.5			
Styrene	ug/l			<0.5	<0.5			
T-1, 2-Dichloroethylene	ug/l			<0.4	<0.4			
t-1,3-Dichloropropylene	ug/l			<0.2	<0.2			
Tetrachloroethylene	ug/l	MAC	30	<0.3	<0.3			
Toluene	ug/l	MAC	24	<0.5	<0.5	<0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5	<0.3	<0.3			
Trichlorofluoromethane	ug/l			<0.5	<0.5			
Vinyl Chloride	ug/l	MAC	2	<0.2	<0.2	<0.2	<0.2	< 0.2
Xylene; total	ug/l			<1.0	<1.0			
VOC SURROGATES								
1, 2-dichloroethane-d4	%			114	112	111	99.8	94
4-Bromofluorobenzene	%			115	116	100	86.1	114
Toluene-d8	%			100	101	103	98.1	97

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				Field Blanks				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-16	Aug-17			
PARAMETERS				BH 17				
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.2			
Benzene	ug/l	MAC	5	< 0.5	< 0.5			
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 0.3			
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5			
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2			
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			94	106			
4-Bromofluorobenzene	%			102	101			
Toluene-d8	%			101	93.1			

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				Trip Blanks				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-13	Jul-14	Aug-15	Aug-16	Aug-17
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4	< 0.2	< 0.2	< 0.2	< 0.2
Benzene	ug/l	MAC	5	<0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0	< 0.3	< 0.3	< 0.3	< 0.3
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5	> 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2	< 0.2	< 0.2	< 0.2	< 0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			111	97.8	98	103	100
4-Bromofluorobenzene	%			102	89.1	112	98	96.5
Toluene-d8	%			101	97.5	104	103	89.4

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				Trip Blanks				
Date Sampled >	UNITS	TYPE	LIMIT	Jul-18	Aug-19	Aug-20	Aug-21	Aug-22
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	< 0.2	< 0.5	< 0.5	<0.4	<0.4
Benzene	ug/l	MAC	5	< 0.5	< 0.5	< 0.5	<0.5	<0.5
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	< 0.3	< 5	< 5	<4.0	<4.0
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	< 0.5	< 0.5	< 0.5	<0.5	<0.4
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	< 0.2	< 0.2	< 0.2	<0.2	<0.2
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			98			116	107
4-Bromofluorobenzene	%			100			84	89
Toluene-d8	%			100			121	97

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

VOC Groundwater Quality Data
Westmeath Landfill Monitoring
Township of Whitewater Region

Monitor Number >				Trip Blanks				
Date Sampled >	UNITS	TYPE	LIMIT	Aug-24				
PARAMETERS								
VOLATILE ORGANIC COUMPOUNDS								
1, 1, 1, 2-tetrachloroethane	ug/l							
1,1,1-trichloroethane	ug/l							
1, 1, 2, 2-tetrachloroethane	ug/l							
1,1,2-trichloroethane	ug/l							
1, 1-dichloroethane	ug/l							
1, 1-dichloroethylene	ug/l	MAC	14					
1, 2-dibromoethane	ug/l							
1, 2-dichlorobenzene	ug/l	MAC	200					
1, 2-dichloroethane	ug/l	IMAC	5					
1, 2-dichloroepropane	ug/l							
1, 3, 5-trimethylbenzene	ug/l							
1,3-dichlorobenzene	ug/l							
1,4-dichlorobenzene	ug/l	MAC	5	<0.4				
Benzene	ug/l	MAC	5	<0.5				
Bromodichloromethane	ug/l							
Bromoform	ug/l							
Bromomethane	ug/l							
c-1, 2-Dichloroethylene	ug/l							
c-1,3-Dichloropropylene	ug/l							
Carbon Tetrachloride	ug/l	MAC	5					
Chloroethane	ug/l							
Chloroform	ug/l							
Chloromethane	ug/l							
Dibromochloromethane	ug/l							
Dichlorodifluromethane	ug/l							
Dichloromethane	ug/l	MAC	50	<4.0				
Ethylbenzene	ug/l	AO	2.40					
m/p-xylene	ug/l							
Monochlorobenzene	ug/l	MAC	80					
o-xylene	ug/l							
Styrene	ug/l							
T-1, 2-Dichloroethylene	ug/l							
t-1,3-Dichloropropylene	ug/l							
Tetrachloroethylene	ug/l	MAC	30					
Toluene	ug/l	MAC	24	<0.5				
Trichloroethylene	ug/l	MAC	5					
Trichlorofluoromethane	ug/l							
Vinyl Chloride	ug/l	MAC	2	<0.2				
Xylene; total	ug/l							
VOC SURROGATES								
1, 2-dichloroethane-d4	%			109				
4-Bromofluorobenzene	%			87				
Toluene-d8	%			94				

All values reported in µg/L unless otherwise noted

MAC = Maximum acceptable concentration

Shaded values exceed MAC Criteria

Appendix J

Standard Sampling Protocol

STANDARD SAMPLING PROTOCOL

The following is a description of the monitoring procedures and protocols used for groundwater and surface water monitoring for landfill sites.

Equipment Cleaning and Calibration

Regardless of matrix, prior to traveling to the site to be sampled, all equipment such as water level indicators and multi-parameter meters must be cleaned and calibrated as specified by the equipment manufacturer. Details of the cleaning and calibration should be recorded in the field notes.

GROUNDWATER
Monitoring Well Assessment

Provide an assessment of the status of all monitoring wells at the site.

Note any changes to the well and/or protective casing and record the physical condition of the well; and

Label all observation wells clearly and accurately on both the protective casing and well pipe.

Groundwater Monitoring

Maintain and use an accurate, up-to-date list of all observation wells to be monitored.

Check all field equipment for cleanliness; and

Wear personnel protective equipment as required (i.e., gloves, protective glasses, splash guards) during all phases of work, and follow any appropriate health and safety plan procedures.

Gas Detection in Wells (Prior to Measuring Water Levels)

Turn on gas meter and prepare for sampling atmospheric condition inside monitoring well.

Remove protective casing cover and well cap avoiding introduction of foreign materials into the well.

Immediately insert the probe attached to the gas meter into the well and wait for readings to stabilize.

Record the measurement in the appropriate column on the field data sheet or field book.

Water Level Measurements (Prior to Purging)

Record water level measurements prior to purging or sampling when required.

Do not move dedicated sampling devices such as the "Waterra" inertial pump prior to measuring the water level unless the well diameter dictates removal; reference the measurement from the same location each time (marked location or lowest point on pipe).

Lower the tape/probe into the wells - record the depth to water when the indicator (audible/visual) shows the water level has been reached.

Measure the water level twice by raising and lowering the tape/probe; and

Record the measurement to the nearest cm (0.5 cm) in the appropriate column on the field data sheet or field book.

Well Purging (Prior to Sampling)

The purpose of purging is to remove the stagnant water from within a monitor (removal of all stagnant water) so that a representative water sample may be collected. The procedures for purging are as follows.

Purge the well only after water levels have been confirmed.

Lift the tubing off the bottom of the well and "pump" at a minimum all stagnant water from the well into a graduated container such as a bucket, pail or cylinder so that the purged volume can be measured and recorded.

For low-yield wells, it is expected that either “no purge sampling techniques or low flow purging will be utilized (avoid purging well dry).

Under normal circumstances purged water may be discarded on the ground, away from the well to avoid the potential of water seeping back into the well; and

Allow a sufficient recovery period before sampling (not more than 48 hours).

Field Measurements

Field measurements are to be collected and recorded as outlined in the Environmental Compliance Approval or the approved monitoring program. Typically, these include at a minimum: temperature, pH and conductivity.

Well Sampling

Collect the water sample as soon as practical (not more than 48 hours) after purging starting at the least contaminated location and proceeding to the most contaminated.

Lift tubing and check valve off bottom of well to avoid introducing unnecessary sediment into the sample and transfer some representative sample water into a clean, well rinsed container to conduct measurements of field parameters.

Lift the tubing and gently transfer a sample into a clean container and thoroughly mix to form a single representative sample.

Transfer the sample into a pre-labelled sample bottle; labelling to consist of at a minimum, the project number, well ID and the date.

For samples that require filtering, attach the disposable filter onto the end of the tubing (typically a 0.45-micron membrane filter or as otherwise specified should be used).

Attempt to keep sample agitation to a minimum during sample transfer.

Store samples in a cooler, with ice packs to keep cool.

Transport samples to laboratory within the maximum hold time established by the laboratory (typically within a 48-hour period).

Volatile Organic Compound (VOC) Sampling

Volatile Organic Compounds (VOC) can be easily lost during sample collection, storage, and transportation. The following sampling and handling protocols are adhered to.

VOC samples are to be collected in special containers provided by the laboratory. These typically include glass vials, preferably amber, with a minimum capacity of 20 ml and sealed with Septum tops.

Vials must be filled just to overflowing in such a manner that no air bubbles pass through the vial as it is being filled (this is easier to accomplish by inserting a 4' length of ¼ " poly tubing into the existing Wattera tubing and filling the vial from the ¼" tubing).

Vials must then be sealed with the cap so that no air bubbles are entrapped within it; the septum is placed with the Teflon side face down toward the inside of the bottle.

Check for the presence of air bubbles by inverting the vial and tapping on hard surface; if air bubbles are present, discard the sample and re-sample.

All VOC samples must be preserved as specified by the laboratory (typically with 1 to 2 drops of Hydrochloric Acid (HCI)) and refrigerated or stored on ice until analysed; and

VOC samples should be submitted in duplicate at a ratio specified in the approved monitoring program (typically 1:10)

Surface Water Sampling (General)

Surface water samples should be collected at the same designated location during each sample event (do not collect samples from any station which is frozen, stagnant or otherwise not representative of normal conditions).

If you must stand in the stream, position yourself downstream of the sample location to avoid contaminating the sample with sediment, debris, and other floating materials.

All equipment must be thoroughly rinsed with distilled water at the beginning of each station to avoid cross-contamination.

Wear gloves as required to handle the sample bottles.

Fill all bottles using an unpreserved transfer bottle (to avoid overflowing pre-preserved bottles).

When sampling for dissolved metals, the sample must be filtered and placed in a separate metals bottle, while sampling for total metals, the sample is placed in a common bottle for metals that is provided by the laboratory.

Label and store all samples in the same manner as for groundwater samples; and

Conduct field measurements (these typically include temperature, pH, conductivity, Dissolved Oxygen and Flow).

Flow Measurements (General)

Discharge flow measurements must be taken at designated stations.

QA/QC Water Samples

A field quality assurance and quality control program for all monitoring events will be established as follows and or as dictated in the approved monitoring program.

Where groundwater or surface water samples are collected, and if stipulated in the approved monitoring program, a field blank in which a set of sample bottles is filled with distilled water at a known site or monitoring station is submitted to the laboratory for analysis along with the samples

Where VOC samples are taken, a trip blank, in which 1 set of VOC vials are filled with distilled water (at the laboratory or office) prior to going to the field and accompanies the sample bottles until they are returned to the lab; and

Duplicate of as outlined in the approved monitoring program or 1 duplicate for every 10 samples (do not identify the sample ID number to the laboratory, but have it recorded in the field notes) use the sampling technique as for observation wells.

SAMPLING

Station Sampling Order

The stations will be sampled beginning with those wells exhibiting the lowest chemical concentrations and then moving on to wells with greater chemical concentrations.

Monitoring Periods

The monitoring periods are as recommended in either the approved monitoring program or the Environmental Compliance Approval.

Analytical Parameters

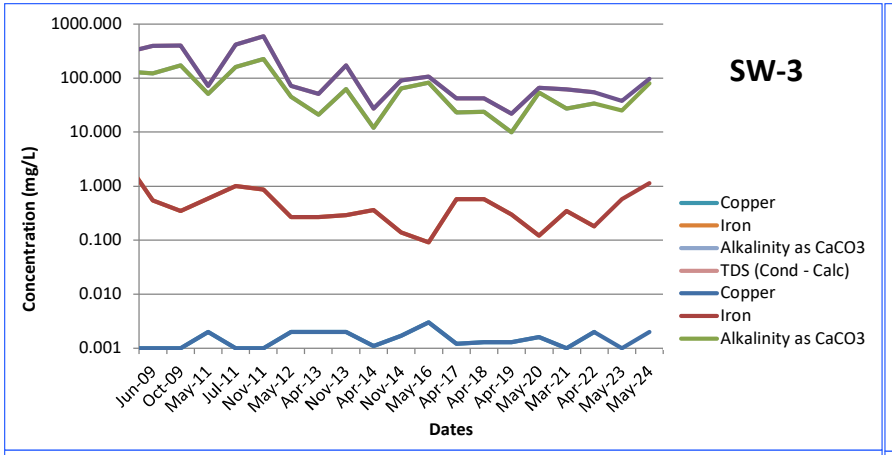
Analysis will be as recommended in either the approved monitoring program and or the Environmental Compliance Approval.

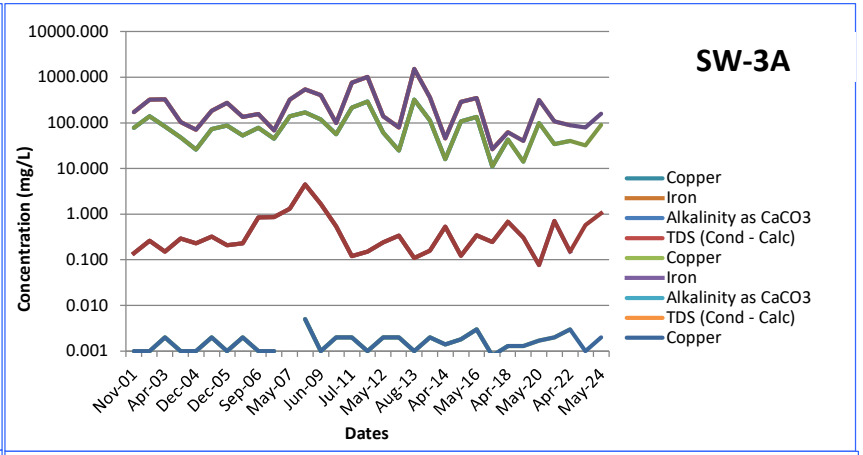
Gas Detection of On-site Buildings

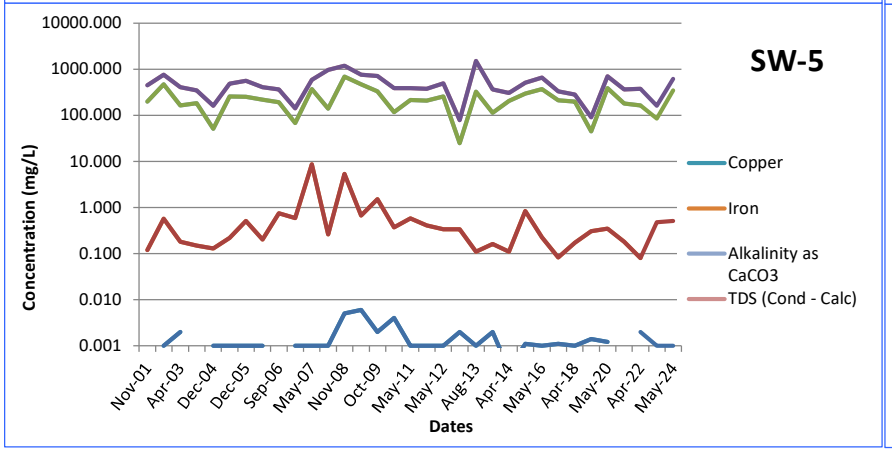
Gas detection in on-site buildings is to be included as part of regular monitoring.

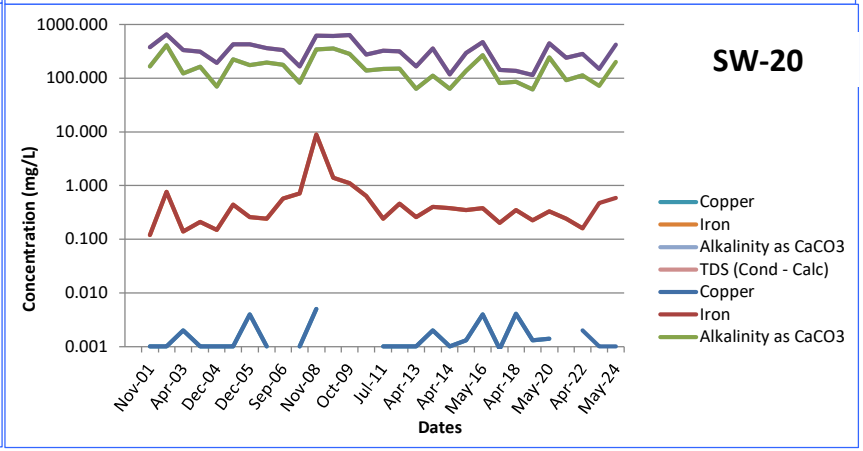
Appendix K

Surface Water Trends


SW-3
1000.000
100.000
10.000
1.000
0.100
0.010
0.001
Concentration (mg/L)
Jun-09
Oct-09
May-11
Jul-11
Nov-11
May-12
Apr-13
Nov-13
Apr-14
Nov-14
May-16
Apr-17
Apr-18
Apr-19
May-20
Mar-21
Apr-22
May-23
May-24
Dates
Copper
Iron
Alkalinity as CaCO3
TDS (Cond - Calc)
Copper
Iron
Alkalinity as CaCO3


SW-3A
10000.000
1000.000
100.000
10.000
1.000
0.100
0.010
0.001
Concentration (mg/L)
Nov-01
Apr-03
Dec-04
Dec-05
Sep-06
May-07
Jun-09
Jul-11
May-12
Aug-13
Apr-14
May-16
Apr-18
May-20
Apr-22
May-24
Dates
Copper
Iron
Alkalinity as CaCO3
TDS (Cond - Calc)
Copper
Iron
Alkalinity as CaCO3
TDS (Cond - Calc)
Copper


SW-5
10000.000
1000.000
100.000
10.000
1.000
0.100
0.010
0.001
Concentration (mg/L)
Nov-01
Apr-03
Dec-04
Dec-05
Sep-06
May-07
Nov-08
Oct-09
May-11
May-12
Aug-13
Apr-14
May-16
Apr-18
May-20
Apr-22
May-24
Dates
Copper
Iron
Alkalinity as CaCO3
TDS (Cond - Calc)


SW-20
1000.000
100.000
10.000
1.000
0.100
0.010
0.001
Concentration (mg/L)
Nov-01
Apr-03
Dec-04
Dec-05
Sep-06
Nov-08
Oct-09
Jul-11
Apr-13
Apr-14
May-16
Apr-18
May-20
Apr-22
May-24
Dates
Copper
Iron
Alkalinity as CaCO3
TDS (Cond - Calc)
Copper
Iron
Alkalinity as CaCO3