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**TOWNSHIP OF LEEDS AND THE THOUSAND ISLANDS**

**Leeds Waste Disposal Site  
2019 Annual Monitoring Report**



ECA No. A442002  
File No. 1040-115.00  
Submitted: March 2020

## 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.

<b>Monitoring Report and Site Information</b>	
<b>Waste Disposal Site Name</b>	Leeds Waste Disposal Site
<b>Location (e.g. street address, lot, concession)</b>	Lot 11, Concession 3, in the Township of Leeds and the Thousand Islands
<b>GPS Location (taken within the property boundary at front gate/ front entry)</b>	442335.57 N, 761114.93 W
<b>Municipality</b>	Township of Leeds and the Thousand Islands
<b>Client and/or Site Owner</b>	The Corporation of the Township of Leeds and the Thousand Islands
<b>Monitoring Period (Year)</b>	2019
This Monitoring Report is being submitted under the following:	
<b>Environmental Compliance Approval Number:</b>	A442002
<b>Director's Order No.:</b>	NA
<b>Provincial Officer's Order No.:</b>	NA
<b>Other:</b>	NA

<b>Report Submission Frequency</b>	<input checked="" type="radio"/> <b>Annual</b> <input type="radio"/> <b>Other</b>		
<b>The site is:</b> <b>(Operation Status)</b>	<input type="radio"/> <b>Open</b> <input type="radio"/> <b>Inactive</b> <input checked="" type="radio"/> <b>Closed</b>		
<b>Does your Site have a Total Approved Capacity?</b>	<input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>		
<b>If yes, please specify Total Approved Capacity</b>		<i>Units</i>	Cubic Metres
<b>Does your Site have a Maximum Approved Fill Rate?</b>	<input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>		
<b>If yes, please specify Maximum Approved Fill Rate</b>	NA	<i>Units</i>	
<b>Total Waste Received within Monitoring Period (Year)</b>	NA	<i>Units</i>	
<b>Total Waste Received within Monitoring Period (Year)</b> <i>Methodology</i>	NA		
<b>Estimated Remaining Capacity</b>	NA	<i>Units</i>	
<b>Estimated Remaining Capacity</b> <i>Methodology</i>			
<b>Estimated Remaining Capacity</b> <i>Date Last Determined</i>	Select Date		
<b>Non-Hazardous Approved Waste Types</b>	<input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Industrial, Commercial & Institutional (IC&I) <input type="checkbox"/> Source Separated Organics (Green Bin) <input type="checkbox"/> Tires	<input type="checkbox"/> Contaminated Soil <input type="checkbox"/> Wood Waste <input type="checkbox"/> Blue Box Material <input type="checkbox"/> Processed Organics <input type="checkbox"/> Leaf and Yard Waste	<input type="checkbox"/> Food Processing/Preparation Operations Waste <input type="checkbox"/> Hauled Sewage Other: <input type="text"/>
<b>Subject Waste Approved Waste Classes: Hazardous &amp; Liquid Industrial</b> <i>(separate waste classes by comma)</i>			
<b>Year Site Opened</b> <i>(enter the Calendar Year only)</i>	<input type="text"/>	<b>Current ECA Issue Date</b>	March 21, 2016
<b>Is your Site required to submit Financial Assurance?</b>	<input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>		
<b>Describe how your Landfill is designed.</b>	<input checked="" type="radio"/> <b>Natural Attenuation only</b> <input type="radio"/> <b>Fully engineered Facility</b> <input type="radio"/> <b>Partially engineered Facility</b>		
<b>Does your Site have an approved Contaminant Attenuation Zone?</b>	<input type="radio"/> <b>Yes</b> <input checked="" type="radio"/> <b>No</b>		

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

Amended ECA A442002 dated March 21, 2016.

**Has the nature of the operations at the site changed during this monitoring period?**

Yes

No

**If yes, provide details:**

Type Here

**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:

<p>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:</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>If no, list exceptions (Type Here):</p>
<p>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):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>	<p>If no, list exceptions below or attach information.</p>

Groundwater Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
MW104	not able to obtain samples due to dry conditions	May 2019
MW102, MW103, MW104	not able to obtain samples due to dry conditions	October 2019
Type Here	Type Here	Select Date

3) a) Is landfill gas being monitored or controlled at the site?		<input checked="" type="radio"/> Yes <input type="radio"/> 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?		<input type="radio"/> Yes <input checked="" type="radio"/> 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 , or MECP concurrence.		<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not Applicable	If no, list exceptions below or attach additional information.
<b>Groundwater Sampling Location</b>	<b>Description/Explanation for change (change in name or location, additions, deletions)</b>	<b>Date</b>	
Type Here	Type Here	Select Date	
Type Here	Type Here	Select Date	
Type Here	Type Here	Select Date	
Type Here	Type Here	Select 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):		<input checked="" type="radio"/> Yes <input type="radio"/> No	See report for details.

## Sampling and Monitoring Program Results/WDS Conditions and Assessment:

<p>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.</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p>	<p>Additional buffer lands are in the process of being evaluated in discussion with MECP. See report for details.</p>	
<p>6) The site meets compliance and assessment criteria.</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p>	<p>See previous comment and report for details.</p>	
<p>7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	<p>If no, list exceptions and explain reason for increase/change (Type Here):</p>	
<p>1) Is one or more of the following risk reduction practices in place at the site:</p> <p>(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</p> <p>(b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or</p> <p>(c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation):</p> <p><i>i.</i> The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and</p> <p><i>ii.</i> Seasonal and annual water levels and water quality fluctuations are well understood.</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	<p><b>Note which practice(s):</b></p>	<p><input type="checkbox"/> (a)</p> <p><input type="checkbox"/> (b)</p> <p><input checked="" type="checkbox"/> (c) As discussed in report.</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Applicable</p>	<p>See report for discussion.</p>	



## 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, as deemed appropriate for this Site in my professional judgement, 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 analyzed 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.

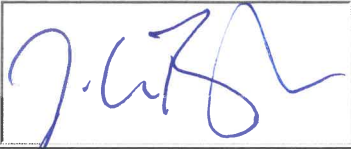


The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MECP to undertake a complete review the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. The Checklist should in no way supersede the MECP's responsibility to undertake their complete review of our report(s) to ensure Site compliance with environmental regulations, standards and/or approvals. 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:

Select Date

## Recommendations:

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

<p><input checked="" type="radio"/> <b>No changes to the monitoring program are recommended</b></p> <p><input type="radio"/> <b>The following change(s) to the monitoring program is/are recommended:</b></p>	<p>The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MECP, to undertake a complete review of the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. This Checklist should in no way supersede the MECP's responsibility to undertake their complete review of our report(s) to ensure compliance with the environmental regulations, standards, and approvals.</p>
<p><input type="radio"/> <b>No Changes to site design and operation are recommended</b></p> <p><input checked="" type="radio"/> <b>The following change(s) to the site design and operation is/are recommended:</b></p>	<p>Additional buffer lands are being evaluated.</p>

<b>Name:</b>	John Pyke		
<b>Seal:</b>	Add Image		
<b>Signature:</b>		<b>Date:</b>	March 29, 2019
<b>CEP Contact Information:</b>	John Pyke		
<b>Company:</b>	Malroz Engineering Inc.		
<b>Address:</b>	308 Wellington St., 2nd Floor, Kingston ON		
<b>Telephone No.:</b>	613-548-3446 ext. 34	<b>Fax No.:</b>	Type Here
<b>E-mail Address:</b>	pyke@malroz.com		
<b>Co-signers for additional expertise provided:</b>			
<b>Signature:</b>		<b>Date:</b>	Select Date
<b>Signature:</b>		<b>Date:</b>	Select 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)	Unnamed creek, marshland, see report.
Distance(s)	Along eastern property boundary, southeast of the Site, see report.

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:	<input checked="" type="radio"/> Yes <input type="radio"/> No	See report for discussion. We remain cautious in our interpretation of the background surface water quality data provided at SW7 considering its source. See report.
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):	<input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> 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
SW3	Not sampled due to dry conditions, see report.	October 2019
Type Here	Type Here	Select Date

<p>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, or MECP concurrence.</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Applicable</p>
--	---

<p>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:</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input checked="" type="radio"/> Not Applicable</p>	<p>If no, specify below or provide details in an attachment.</p>
--	---	--

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

<p>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):</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	<p>See report for discussion.</p>
--	---	-----------------------------------

## 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 exceedences of criteria, based on MECP 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 report for discussion and Table 4 in Appendix B.		

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

see report

<p>7) <b>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.</b></p>	<p><input checked="" type="radio"/> <b>Yes</b></p> <p><input type="radio"/> <b>No</b></p>	<p>If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range (Type Here)</p>
<p>8) <b>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)):</b></p>	<p><input checked="" type="radio"/> <b>Yes</b></p> <p><input type="radio"/> <b>No</b></p> <p><input type="radio"/> <b>Not Known</b></p> <p><input type="radio"/> <b>Not Applicable</b></p>	<p>If yes, provide details and whether remedial measures are necessary (Type Here):</p> <p>See report for discussion. Surface water criteria is used to evaluate potential impacts arising from groundwater leachate discharge to surface water.</p>
<p>9) <b>Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</b></p>	<p><input type="radio"/> <b>Yes</b></p> <p><input type="radio"/> <b>No</b></p> <p><input checked="" type="radio"/> <b>Not Applicable</b></p>	<p>If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):</p> <p>See report for discussion. Trigger in discussion with MECF.</p>

## 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, as deemed appropriate for this Site in my professional judgement, the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MECP, 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.

The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MOE to undertake a complete review the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. This Checklist should in no way supersede the MECP responsibility to undertake their complete review of our report(s) to ensure compliance with environmental regulations, standards and approvals.

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:

<p><input checked="" type="radio"/> <b>No Changes to the monitoring program are recommended</b></p> <p><input type="radio"/> <b>The following change(s) to the monitoring program is/are recommended:</b></p>	<p>The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MECP, to undertake a complete review of the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. This Checklist should in no way supersede the MECP's responsibility to undertake their complete review of our report(s) to ensure compliance with the environmental regulations, standards, and approvals.</p>
<p><input checked="" type="radio"/> <b>No changes to the site design and operation are recommended</b></p> <p><input type="radio"/> <b>The following change(s) to the site design and operation is/are recommended:</b></p>	<p>Type Here</p>

<b>CEP Signature</b>		
<b>Relevant Discipline</b>	Geoscientist with relevant experience and training.	
<b>Date:</b>	March 29, 2019	
<b>CEP Contact Information:</b>	John Pyke	
<b>Company:</b>	Malroz Engineering Inc.	
<b>Address:</b>	308 Wellington St., 2nd Floor, Kingston ON	
<b>Telephone No.:</b>	613-548-3446 ext. 34	
<b>Fax No. :</b>	Type Here	
<b>E-mail Address:</b>	pyke@malroz.com	
<b>Save As</b>		<b>Print Form</b>



### Notice To Reader

This document has been prepared by Malroz Engineering Inc. (Malroz) on behalf of the Township of Leeds and the Thousand Islands (TLTI), in fulfilment of Condition 2(5) of Amended Environmental Compliance Approval No. A442002.

Malroz has relied upon TLTI staff to provide historical data upon which current data interpretation and the conceptual understanding of the site are partially based. Malroz accepts no responsibility for the integrity of the data provided by TLTI or for missing data. Any third-party use or reliance of this report, or decisions made based on this report, are the responsibility of the third party. Malroz accepts no responsibility for damages suffered by any third party as a result of decisions made or actions taken based on the contents of this report.

This document has been prepared for TLTI for submission to the Ministry of Environment, Conservation and Parks (MECP) as required by the ECA. Unauthorized re-use of this document for any other purpose, or by third parties without the express written consent of Malroz shall be at such party's sole risk.

This page is an integral part of this document and must remain with it at all times.

Respectfully Submitted,

MALROZ ENGINEERING INC.

per: Justina Poisson, B.Sc., A.Sc.T.  
Environmental Technologist

  
and: John Pyke, P.Geol.,  
Project Manager



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## 1.0 Introduction

The Leeds waste disposal site (the Site) operates under Amended Environmental Compliance Approval (ECA) No. A442002 issued by the Ministry of Environment and Climate Change (MOECC), now Ministry of the Environment, Conservation and Parks (MECP), on March 21, 2016 (see Appendix C). The Site is located at the eastern end of Pelow Road, north of Gananoque, in the Township of Leeds and the Thousand Islands (TLTI) (Figure 1, Appendix A). In accordance with the ECA, an Annual Monitoring Report (AMR) is to be submitted to the District Manager by March 31 of the year following the period being reported upon.

Malroz was retained by TLTI to conduct the semi-annual monitoring of the groundwater and surface water at the Site. This document presents the methodology, results and interpretation related to the monitoring and sampling program conducted at the Site in 2019. This report was prepared on behalf of the TLTI, using data collected by Malroz and available information provided by TLTI staff.

## 1.1 Ownership and Key Personnel

The Site is owned and maintained by the Corporation of the TLTI. Key Contacts for the Site are as follows:

### Municipal Contact

Mr. Adam Goheen  
Director of Public Works  
1233 Prince Street, P.O. Box 280  
Lansdowne, Ontario, K0E 1L0  
613-659-2415 ext. 211  
[agoheen@townshipleeds.on.ca](mailto:agoheen@townshipleeds.on.ca)

### Environmental Professional Contact

Mr. John Pyke, P.Geo.  
Project Manager  
308 Wellington Street  
Kingston, Ontario, K7K 7A8  
613-548-3446 ext. 34  
[pyke@malroz.com](mailto:pyke@malroz.com)

## **2.0 Background**

The geology, hydrogeology, physiography, and hydrology of the Site are described in the sections that follow. The descriptions provided are a summary of the investigations completed of the Site by Malroz, various previous consultants and TLTI staff.

### **2.1 Description of the Waste Disposal Site**

The Leeds Waste Disposal Site (WDS) is located approximately 13 km west of Lansdowne on Lot 11, Concession 3, in the Township of Leeds and the Thousand Islands (former Township of Front of Lansdowne) (Figure 1, Appendix A). Geodetic coordinates for the centre of the Site as follows (2015 AMR):

Zone:	NAD 83, 18T
Easting:	405419 m (+/- 10 m)
Northing:	4916242 m (+/- 10 m)

The Site operates under Environmental Compliance Approval (ECA) No. A442002 which permitted a 0.8-hectare waste fill area within a total Site area of 1.7 hectares. The Site was closed in December 1991, and details of the closure plan are outlined in the 1991 Report by Water and Earth Science Associates (WESA). At the time of closure, the Leeds WDS was a recognized 'overflow situation', and the ECA was amended to recognize the actual waste fill area of 1.5 hectares.

According to the 2015 AMR, TLTI established an exclusion zone of 500 metres around the Site to ensure that any potentially impacted groundwater is not sourced for drinking water.

### **2.2 Geological Setting**

Based on geological maps of the region, the geological setting at the Site consists of metasedimentary quartzite and/or quartzo-feldspathic rocks and a Precambrian basement granite (Jupe and Jackson, 1963). The Site is close to the geological boundary, meaning Precambrian granite may be exposed to the West of the Site. A dike and linear structural feature (either a fault or fold axis) are located just West of the Site (Jupe and Jackson, 1963). Borehole logs and previous descriptions of the geology at the Site suggest that the overburden is shallow and consists of 1.2 to 2.6 m of silty clay (Appendix J).

Results of the drilling program undertaken in 2018 identified between 1.2 to 2.6 metres of silty clay overlying bedrock in the vicinity of the waste site and surrounding area.

### **2.3 Hydrogeological Setting**

Based on Malroz site observations and descriptions by previous consultants, the hydrogeological setting at the Site is characterized by a bedrock aquifer and areas of

perched water in the overburden. It is possible that groundwater within the bedrock aquifer is discharging at or near the Site, based on artesian conditions observed historically during monitoring of a former well just North of the Site's Eastern boundary (former well 89-5).

A small creek is located along the Eastern property boundary of the Site. This creek flows southward into a marsh located approximately 100 m south of the Site, just beyond SW3. The marsh drains into a tributary, which flows south-west and is dammed just before SW6 (Figure 2, Appendix A). A beaver dam is located along the tributary, just upstream from SW6. Based on 2019 field notes, this dam is intact. According to previous monitoring reports, the tributary feeds into Sucker Brook.

## **2.4 MECP Correspondence**

On August 16<sup>th</sup>, 2019, the Ministry of Environment, Conservation and Parks (MECP) issued an amendment to the site ECA for Leeds WDS. The reasons for the amendment were to approve the groundwater and surface water monitoring program proposed by Malroz in a letter to the MECP dated May 8, 2019 and to streamline the approval process for changes to the monitoring plans and trigger mechanisms and contingency plans. The following outlines the amendments to the ECA:

- i. Groundwater and surface water monitoring shall be in accordance with Schedule "B". Schedule B includes modifications to the monitoring program including a reduction of VOC analysis (parameters as listed) to once every 5 years and only at monitoring wells 08-1 and MW101. Schedule B also includes adding newly installed monitoring wells MW101, MW102, MW103 and MW104 to the monitoring and sampling program and removing monitoring wells 00-1, 08-2, 89-7, 89-4, 89-1 and 89-5.
- ii. The owner may request to make changes to the monitoring programs, trigger mechanisms and/or contingency plan to the District Manager in accordance with the recommendations of the annual report. The Owner shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.
- iii. Within fourteen days of receiving the written correspondence from the District Manager confirming that the District Manager is in agreement with the proposed changes to the environmental monitoring program, trigger mechanisms and/or contingency plans, the Owner shall forward a letter identifying the proposed changes and a copy of the correspondences from the District Manager and all other correspondences and responses related to the changes, to the Director requesting the Approval be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

On June 19<sup>th</sup>, 2019, the Ministry of Environment, Conservation and Parks (MECP) surface water scientist, Dana Cruiskshank issued a memorandum to Nathalie Matthews, senior environmental officer. The memorandum was regarding the surface water components of the 2018 Annual Report for the Site. The following summarizes the contents of the memo:

- There was a perceived issue with the 2018 surface water sampling plan in that the sampled parameters were inconsistent between sample stations. In particular, the letter states that cadmium, phenols, and vanadium were not reported for some samples. All samples were indeed analyzed for a consistent suite of analyses and results for the aforementioned parameters were provided. However certain samples were not collected or limited volume was available to collect adequate sample for analyses as a result of dry conditions.
- The reviewer indicated a significant number of parameters that weren't listed in the 2018 Malroz landfill leachate parameters table could be considered leachate parameters when comparing average concentrations of background (SW2) to SW1 which is adjacent to the landfill. These additional LIP included ammonia, alkalinity, iron, manganese and copper which all exceeded the 25% difference threshold when compared to background in SW1.
- The reviewer indicates that contrary to Malroz's conclusion, the landfill is having a significant impact on water quality at SW6 when compared to background at SW7. We continue to disagree considering the historic analyses, the variability that has been observed in concentrations, and the nature of the surface water features being sampled.
- The reviewer indicated that a contingency plan was to be developed in 2015 and submitted to the MECP to address the issue associated with the beaver dam and increased upstream pond levels. The plan was to include diverting the tributary to the east to provide more buffer between the stream and waste area and the northeast area stripped of vegetation, re-shaped and capped and then re-vegetated. Further monitoring has not identified a requirement to complete these plans.
- Recommendations included providing an update on mitigation measures regarding the ponding associated with the beaver dam, replacing the staff gauge at SW1 with a water level recorder and sample all parameters at all stations during both spring and fall events moving forward. The water level data recorder was installed during 2019.
- The reviewer does not support the replacement of SW7 with SW4 as the background station.

## 2.5 Complaints

The municipality reports no complaints were received in 2019 regarding the closed WDS.

### **3.0 Description of Monitoring Program**

The 2019 groundwater and surface water monitoring events were conducted on May 2 and October 8. The locations of active sampling stations and wells are shown in Figure 2 (Appendix A).

#### **3.1 Groundwater Monitoring Program**

The groundwater program undertaken in 2019, including the suite of analyses performed, is presented in Appendix D. The groundwater program was conducted to satisfy Section 3. (2) of the site's ECA (Appendix C).

Prior to sampling, each well was monitored for depth to water, depth to bottom, and combustible gas vapours. During purging of groundwater, visual and olfactory observations were noted and recorded. Results of the groundwater monitoring are presented in Table 1, Appendix B.

Groundwater sampling was conducted using dedicated watterra tubing equipped with a foot-valve. Prior to sampling, 3 to 5 well volumes of groundwater were purged from each well or, wells were pumped dry 3 times. At the completion of purging, water quality was monitored, using a Horiba multi-parameter instrument, for the following parameters: temperature, pH, dissolved oxygen, oxidizing/reducing potential, conductivity, and turbidity. Samples for metals analyses were field-filtered using a disposable 0.45-micron inline filter. Samples were submitted to Caduceon Environmental Laboratories (Caduceon), a CALA accredited laboratory, for analyses.

#### **3.2 Surface Water Monitoring Program**

The surface water program undertaken in 2019, including the suite of analyses performed, is presented in Appendix D and was completed to satisfy Section 3. (2) of the site's ECA (to Appendix C). The suite of analyses performed is presented in Appendix D. The location of the sampling stations is shown in Figure 2 (Appendix A). Surface water station locations (UTMs) and observations are summarized in Table 7, Appendix B.

#### **3.3 Data Quality Evaluation**

Caduceon was commissioned to undertake the water analyses. Caduceon is a Canadian Association for Laboratory Accreditation (CALA) certified laboratory that uses industry recognized methods to conduct laboratory analyses.

Malroz completed field activities in accordance with standard operating protocols to ensure precise sample collection and reduce the risk of cross-contamination.



### **3.4 Site Inspection**

Site inspections are conducted twice per year during monitoring events. Copies of the site inspections completed by Malroz in 2019 are included in Appendix F, and site photographs are presented in Appendix I.

The following observations were made by Malroz staff in 2019:

- A blocky iridescence was observed at surface water location SW1 during the fall sampling event.
- A section of the property along the northern extent of the landfill was not enclosed by a fence.
- Furniture was dumped outside the entrance gate.
- A pile of metal wire was present just inside the entrance gate.

The observations of illegal dumping were reported to TLTI for action.

### **3.5 Well Inspection**

A well inspection was undertaken by Malroz during the 2019 sampling events. The well inspection included a visual inspection of accessible portions of the well piezometer, casing, cap, lock, and well seal. Wells were assigned one of the following conditions:

Poor – well integrity is compromised and the well requires repair

Fair – exhibits some minor deficiencies, however well integrity is not compromised.

Good – the well is in good condition with no obvious signs of damage.

Results of the well inspection are presented in Table 2, Appendix B. No well repairs were noted as necessary.

### **3.6 Deviations from the Monitoring Plan**

Several parameters were not analyzed in the groundwater and surface water programs due to insufficient water or dry conditions at the well/station. As a result, the following analyses were not completed during the sampling events:

- MW103: no samples submitted (fall).
- MW104: no samples submitted (spring, fall).
- MW102: BOD, TSS, total phosphorous, TKN, total ammonia, DOC, phenolics, COD (spring). Samples were not submitted in the fall.
- 08-1: mercury (fall).
- SW3: no samples submitted (fall).
- SW5: no samples submitted (fall).

Based on field activities over the past three years, dry conditions may present a recurring challenge to the sampling program.

Samples from monitoring well 08-1 and MW101 are analyzed for VOCs every 5 years from 08-1 and MW101. VOCs were last analyzed at the aforementioned wells in 2018 and are scheduled to be analyzed again in 2023.

#### **4.0 Groundwater Monitoring Program Results**

This section discusses the results of the monitoring events conducted in 2019. Results for the 2019 groundwater analyses are presented in Tables 3 (Appendix B). Results have been compared to relevant standards and observed exceedances are highlighted to allow for visual interpretation.

A level survey of the monitoring wells at the site was conducted in October 2019. Groundwater elevations calculations show that groundwater flows south-east across the Site (Figure 3, Appendix A). Considering the surrounding bedrock outcrops and intermittent dry conditions in MW101, MW102, MW103, and MW104, and in several surface water stations, it is possible that groundwater in the vicinity of the landfill is perched. Groundwater is anticipated to discharge to the stream to the east and to the wetland to the south, consistent with the previously reported conceptual site model.

Monitoring of well headspace for vapours was conducted during the May and October events using an Eagle 2 RKI. Methane concentrations were either below detection levels or were less than 1% of the lower explosive limit (LEL).

Results from the fall sampling event indicate low field pH and DO measurements across the site. Given the ubiquitous nature of these low values across the site, and disparity when compared to historic results, we infer that the pH values may be attributed to equipment error. DO values may be related to insufficient flow of water across the probe as a result of low flow conditions.

#### **4.1 Compliance Criteria**

The groundwater analyses at the Site has been characterized by five wells: 08-1, MW101, MW102, MW103, and MW104 (Figure 2, Appendix A). Monitoring well 89-4 has been previously used to characterize the background groundwater quality and showed elevated hardness, phosphorous, manganese and iron. In a memorandum dated October 17, 2017, the MECP indicated that monitoring well 89-1 was adopted to replace 89-4 as the background monitor, and that a replacement background well was needed. In February 2018, monitoring well 89-4 was replaced by MW102, which will be used to characterize background groundwater quality at the Site going forward.

Historically, the following parameters were used as leachate indicators at the Site: hardness, alkalinity, TKN, iron, manganese, and DOC (Day, 2015). However, many of these parameters are elevated in the background and are thus may not be ideal leachate indicators. The leachate indicator parameters (LIPs) are generally selected based on, among other factors, historical analyses, waste type, and the age of the landfill, as described in O. Reg. 232/98 and the Landfill Standards (Schedule 5, Column 2). Using the indicator table list for groundwater and surface water leachate (Columns 2 and 4 of Schedule 5, Landfill Standards), a total of thirteen parameters were selected from the list (Table 5, Appendix B). With the exception of boron, these parameters were selected because they can be used as indicators in both surface and groundwater. Considering the site conceptual model infers that groundwater discharges to the marsh directly south of the waste mound, using the same parameters to characterize the leachate in surface and groundwater will help trace the leachate plume as it discharges into the creek with greater accuracy.

Boron was kept in the list of parameters because the historical chemistry data shows that the boron concentrations at surface water stations proximal to the waste mound are elevated when compared to boron concentrations in the background. Since boron is a common leachate indicator for groundwater, and given the historical data for the Site, we have included boron as a LIP.

From the selected thirteen indicators, the list was further reduced using data from historical analyses: parameters which showed a differential below 50% between the background and suspected leachate concentrations for both surface water and groundwater were selected (Table 5, Appendix B). Preference was then given to parameters with associated Ontario standards (PWQO, ODWS, CCME, and APV). Based on this methodology, the following parameters were selected as leachate indicators for the Leeds WDS: alkalinity, chloride, nitrate, sulphate and boron. This varies slightly from the LIPs proposed by Marloz in 2018 with the addition of sulphate. Sulphate was also one of the parameters identified by the MECP as a potential LIP based on their review of the surface water chemistry (Appendix E) within the Malroz 2018 report.

## **4.2 Groundwater Quality**

Results from the 2019 sampling events show the following parameters exceed the ODWS criteria at one or more monitoring well location: alkalinity, DOC, hardness, TDS, aluminum, iron and manganese (Table 3, Appendix B).

Results of LIPs indicated the presence of leachate influence at monitoring wells 00-1/MW101 and 08-1 due to elevated levels of alkalinity, chloride, boron, and sulphate

during the spring event. Background conditions were not available during the fall event due to dry conditions at MW102, however, results from 00-1/MW101 and 08-1 continue to be elevated compared to spring results in MW102. However, concentrations of chloride and boron generally show that attenuation is occurring (historical groundwater chemistry, Appendix H).

Sample results were not available for monitoring well MW104 due to dry conditions in both the spring and fall. This was similar to 2018, where insufficient water was available, either to sample or to get a full sample set. Given that monitoring well MW 104 is set on bedrock, very little groundwater, if any is inferred to be present in this area.

LIPs at MW103 (sampled in the spring only) were below or consistent with the background concentrations, with the exception of boron (similar to 2018 concentrations) and sulphate. Boron concentrations were well below those reported in the leachate impacted wells (MW101 and 08-1), and an order of magnitude below the ODWS. It is possible that the source of boron is natural (originating in clay sediments or the regional geology) rather than indicative of leachate. Boron is known to be enriched in clays (Kot, 2009). Based on corresponding elevated TSS and the local geology, naturally elevated concentrations of boron in the marsh area is possible. Sulphate at MW103 was 22% of the leachate concentration in 2019 and 6% of the ODWS, and although elevated, is not considered significantly impacted. Therefore, monitoring well MW103 is considered to have little to no leachate impact.

As requested by the MECP, the groundwater results were compared to PWQO criteria. The following parameters did not meet the PWQO at one or more location during one or more sampling event: alkalinity, total phosphorous, aluminum, boron, cobalt, iron, uranium, and zinc (Table 3, Appendix B). Noted PWQO exceedances were observed to be within the RULs and/or historical range for given parameters.

Considering the PWQO are developed for surface water conditions, Malroz cautions on the comparison of groundwater analyses to the PWQO. The site conceptual model continues to suggest that groundwater is discharging to the marshy area south of the waste mound. The compliance mechanism described below (see section 6.0) is recommended to monitor the potential impact to surface water quality.

## **5.0 Surface Water Monitoring Program Results**

The surface water monitoring program at the Site is comprised of six sampling stations: SW1, SW2, SW3, SW5, SW6 and SW7 (Figure 2, Appendix A).

Surface water flows eastwards off the waste mound and into the ditch located along the eastern property boundary. This ditch flows southwards into a marshy area to the south of the Site. The marsh drains into a small creek, located in the neighbouring farmer's field, which flows to the southwest. A beaver dam is located along the creek, just north (upgradient) of surface water station SW6.

A logger was installed near surface water sample location SW1, at the deepest observed portion of the water, on July 30, 2019 and was programmed to collect measurements at 20-minute intervals until September 29, 2019. The logger was left in place with data downloaded on October 8, 2019. The intention of installing the logger was to evaluate water flow in the creek. Based on the logger information, dry periods were observed in August and September, 2019 (Figure 5). Water levels were reported at near dry conditions (<0.1m) approximately 45% of the period during the which the logger was deployed..

## **5.1 Compliance Criteria**

Surface water quality at the Site is characterized by six (6) surface water stations: SW1, SW2, SW3, SW5, SW6, and SW7 (refer to Figure 2). Station SW7 has historically been used to characterize the background water quality, however this sampling location is not located on the stream running adjacent to the landfill and may only be suitable for assessing background conditions upgradient of SW6. Results from SW7 from the 2019 events indicate background loading of iron (Table 4, Appendix B). Surface water station SW2 is located upgradient of the landfill and may also be used to evaluate surface water quality entering onto the site. Results from SW2 indicate background loading of orthophosphate, aluminum, cadmium, cobalt, iron and zinc. Surface water results are compared to the Provincial Water Quality Objectives, the Canadian Water Quality Guidelines (Table B), and the Aquatic Protection Values (Table A).

The following leachate indicator parameters (LIPs) have been selected for the Site: alkalinity, chloride, nitrate, boron and sulphate (refer to section 4.1 and Table 6, Appendix B for rationale).

## **5.2 Surface Water Quality**

The following parameters exceed the PWQO at one or more location during the spring sampling event: phenols, total phosphorous, iron, and tungsten. The results from the spring sampling event also exceed the CWQG for phenols at one location (SW1).

Historic results indicate a high degree of variability for many LIPs (e.g. iron, sulphate and manganese), not only in the leachate impacted SW stations, but also in the background stations (SW2 and SW7). Therefore, we have elected to compare results to the 75<sup>th</sup> percentiles of the background stations to better represent the variability present within the

data. The 75<sup>th</sup> percentile calculation includes values that are less than the detection limit by converting the value to half the value of the minimum detection limit (MDL).

During the fall event, the following exceedances of PWQO were observed at one or more location: alkalinity, pH, cadmium, total phosphorous, aluminum, cadmium, cobalt, copper, iron, vanadium, and zinc. Surface water station SW1 exceeded the APVs criteria for iron and lead and SW2 exceeded the APVs for iron. SW6 exceeded the APVs for iron. Field parameters pH (fall event only) and DO also exceed the PWQO and APV, however as discussed in Section 4.0, there is reason to believe that this may be due to instrument error. With the exception of total phosphorous at location SW1, noted APV, CWQG, and PWQO exceedances are below historical maximums at the Site. An increased phosphorous concentration at SW1 could be due to low flow conditions and increased organic sediment present at the sample location during the fall event.

LIPs are elevated at surface water station SW1 compared to background conditions (SW2). Concentrations during the 2019 sampling events are generally lower at SW3 and SW5 compared to SW1 with some LIPs at or below the 75<sup>th</sup> percentile of background conditions at SW2 (chloride and sulphate). Concentrations further attenuated at SW6 and LIPs were reported at similar concentrations to the 75<sup>th</sup> percentile of both background stations (SW2 and SW7) with the exception of boron which exhibited an increase compared to the 75<sup>th</sup> percentile of historic data at SW2, however, concentrations remain within the historic range at this location and are below the PWQO.

An analyses of additional leachate indicators: ammonia, alkalinity, iron, manganese and copper was suggested by the MECP during their recent review. Our opinions on the additional parameters are below:

- Ammonia shows minor impact to the stream with the exception of SW1 and SW2. Downgradient surface water stations appear reasonably consistent with background conditions at SW7.
- Intermittent background loading of iron appears to be occurring at SW2 with occasional spikes at similar concentrations to those observed at SW1 in the historical data. Concentrations of iron at SW3, SW5, and SW6 in 2019 are within the historic 75<sup>th</sup> percentile of historic concentrations at background station SW2 and are below the maximum concentrations detected in background station SW7 indicating impacts downstream of SW6 are within the natural concentrations present in the stream.
- Manganese impacts are present at SW1 and at SW6, however a lack of results at SW3 and SW5 (due to dry conditions) allow for limited interpretation. Concentrations detected in 2019 were within the historic 75<sup>th</sup> percentile at SW2 with the exception of SW1 and SW6 in the fall. Although a PWQO for manganese have not been published, a short-term benchmark of 3.6 mg/l has been established

by the CWQGs which is 2.4 times greater than the highest concentration of manganese detected in the monitoring network in 2019. Given the intermittent nature of manganese loading at this stream, this benchmark may be applicable.

- Copper concentrations across the site monitoring network are generally consistent with the 75<sup>th</sup> percentile of historical data at SW2 and SW7.

While chemistry at SW1 and SW3 suggests some leachate impact, attenuation appears to be occurring further downstream (SW5 and SW6).

Results from 2019 suggest that there is minor leachate impact however, these impacts appear intermittent in nature and may also include influences from the setting of the area. Overall, the concentrations of LIPs remain below the historical maximum recorded at SW6 since 2003 (alkalinity), 2004 (chloride) and 2006 (boron) (Appendix H).

An elevation survey of the stream inverts was conducted by Malroz during the October 2019 monitoring event. Results of the survey indicated that the stream invert elevations between SW1 and SW3 are lower than groundwater elevations of monitoring well 08-1 and MW101 (Figure 4, Appendix A). These results support the inference that groundwater is discharging into the creek southeast of the waste site.

As noted in the 2018 AMR, surface water station SW7 is fed by a large pond located 100 m east of SW7. Most of the surface water that flows through the site appears to travel through agricultural fields to the north, and/or bedrock outcrops located between the Site and a large pond to the northeast of the Site. Both bedrock and agricultural fields can have significant impacts on surface water quality. We remain cautious in our interpretation of the background surface water quality data provided at SW7 considering its source.

## **6.0 Guideline B-7 Assessment**

The reasonable use policy (RUP) provides a mechanism to calculate the reasonable use limits (RUL) for the Site using historical data from background well MW102 (previously well 89-1), as per Ministry Guideline B-7. New monitoring wells were installed in 2018 to replace several damaged wells to facilitate the reasonable use policy calculations.

### **6.1 Compliance Assessment**

Several exceedances of RULs were observed in 2019 (Table 3, Appendix B) for the following parameters: alkalinity, DOC, hardness, TDS, aluminum, barium, iron, manganese and uranium.

In 2016, TLTI submitted a workplan to the MECP to address RUL non-compliance and implementation was generally completed in 2018. TLTI has initiated the process for obtaining a Certificate of Requirement (CoR) for the site and an allotment for the

acquisition of buffer lands was added to the Township's 2018 budget which constitutes the remaining tasks required to achieve B7 compliance.

At this time given the site conceptual model of groundwater discharging to surface water, a compliance assessment for surface water may be more appropriate for monitoring potential off-site impacts from Leeds WDS. Malroz has combined common industry practices and statistical methods to develop a compliance concentration for leachate indicator parameters in the surface water (Table 6, Appendix B). LIPs were used with the addition of iron, as the latter showed historic concentrations within background but in exceedance of the APV in 2019.

## **7.0 Conclusions and Recommendations**

The Leeds WDS is a closed site and is inferred to be in compliance with Ministry Guideline B-7, based on the understanding that leachate impacts discharge to the adjacent surface water body and the compliance assessment of surface water. As part of the work plan initiated in 2016, we understand the Township is in the process of obtaining a Certificate of Requirement and CAZ.

Groundwater chemistry results showed evidence of leachate at the southern and eastern extents of the waste mound. Since the groundwater is interpreted to discharge to surface south and east of the WDS, there is minimal risk to groundwater water quality beyond the discharge locations.

Surface water chemistry results suggest that there is potential leachate impact to the surface water east and south of the waste mound. However, results indicate attenuation within the current monitoring network is occurring and the potential influence of the site setting to the surface water chemistry. Compliance concentrations were met at SW6, suggesting that the landfill has little to no adverse affect to downstream surface waterways.

Historical trends show that LIPs are relatively stable in both surface water and groundwater at the Site, with the exception of alkalinity in the surface water at SW1 (Appendix K). The variability in alkalinity historically observed at SW1 is not reflected in compliance station SW6, the latter which shows concentrations comparable to background. Given these results, consideration for a reduction in the frequency of sampling and monitoring at Leeds is suggested.

The following recommendations are made for the Leeds WDS monitoring program:



1. Purchase land to form a CAZ which extends from the landfill's southern and eastern extent up to surface water station SW3. Purchasing CAZ beyond this point is not necessary given that leachate related impacts in SW3 do not exceed the PWQOs, Table A: APVs, or Table B: CWQGs and that leachate impacts are stable.
2. A reduction in the site inspections to annual from bi-annually as is currently required by CofA condition 2(2).
3. Considering the site has been closed since 1991, evaluate feasibility and options for full closure of the site with the purchase of the CAZ.

## 8.0 References

Andrew Day. 2015 Draft Annual Monitoring Report (ECA No. 442002), Township of Leeds and the Thousand Islands, March 2016.

Andrew Day. 2013-2014 Annual Monitoring Report (ECA No. 442002), Township of Leeds and the Thousand Islands, February 2015.

Hydrogeological Investigation and Operation/Closure Plan for Leeds WDS (ECA No. A442002). Prepared for the Township of Front of Leeds and Lansdowne by Water and Earth Science Associates Ltd., File No. 1774, April 1990.

Jupe, D.F., and B. Jackson, (1963), Map 2054 Gananoque Area. *Ontario Department of Mines*, 1:126,720.

Kot, F.S., (2009), Boron sources, speciation and its potential impact on health. *Environ. Sci. Biotechnol.*, 8, 3-28.

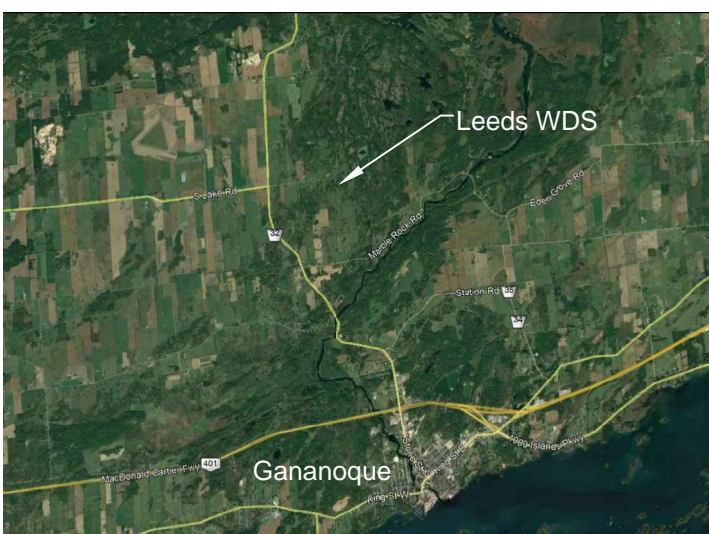
Landfill Standards: Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites. Queen's Printer for Ontario 2010 (revised January 2012). PIDS 7792e.

Ontario Drinking Water Standards (ODWS) from Ontario Regulation 169/03 of the Safe Drinking Water Act (2002). Last amendment: O. Reg. 373/15.

Provincial Water Quality Objectives (PWQO) from the Ministry of Environment and Energy's Water Management Policies & Guidelines, July 1994.

Technical Guidance Document: Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water. Ministry of the Environment, November 2010.

**Appendix A**  
**Figures**



Note: figure based on Malroz field observations and Google Earth imagery



### Site Location Plan

2019 Annual Monitoring Report  
 Closed Leeds WDS (A442002)  
 Pelow Road, Township of Leeds and the Thousand Islands, Ontario

File: 1040-115.00

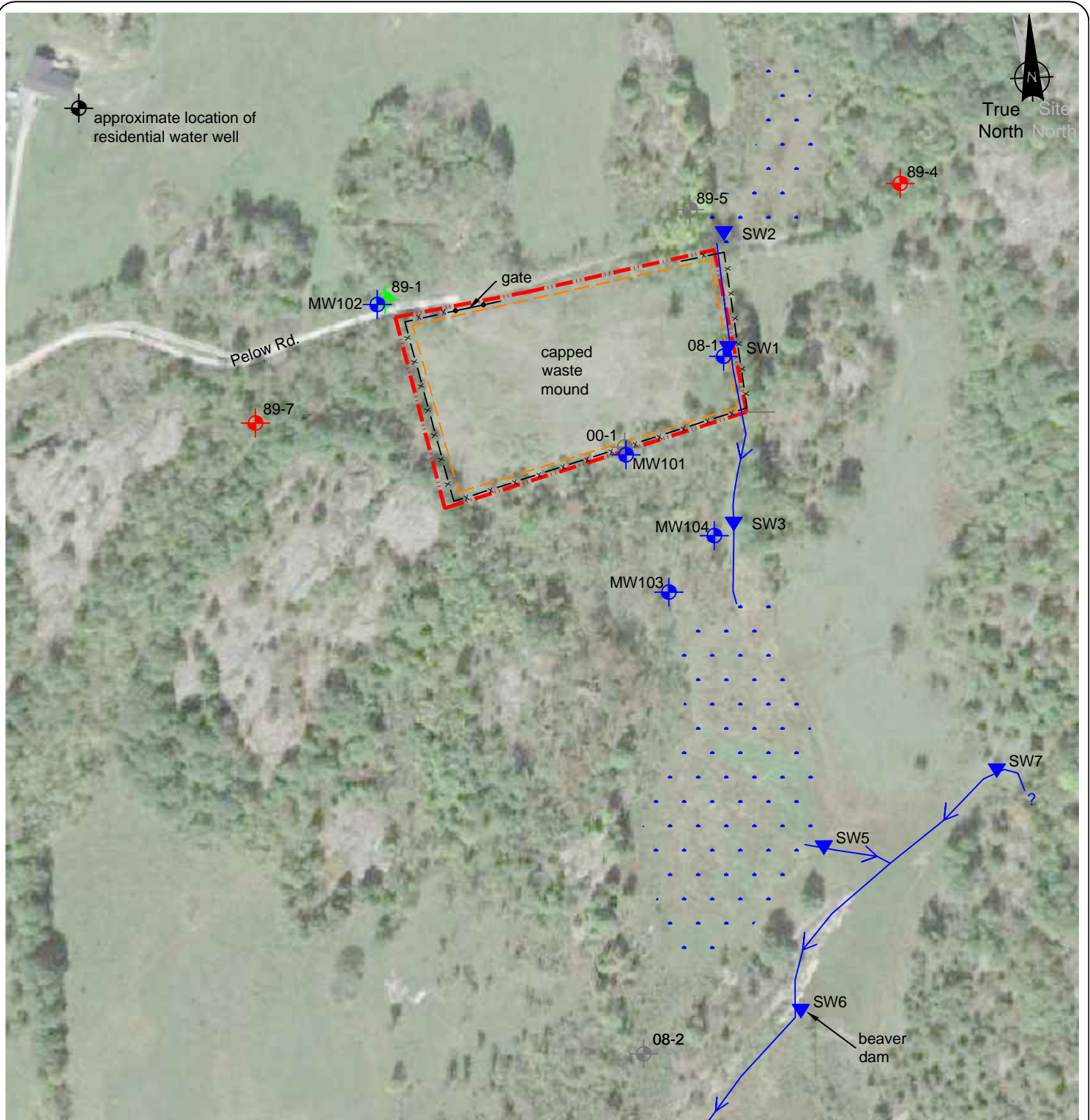
Figure

1

Approx. Scale (m)



Rev	Date	Description	By	Chkd
R0	20/01/06	issued in final	MW	ZL



**Legend**

approximate property boundary	89-1 abandoned and replaced monitoring well
fence	89-7 abandoned monitoring well
08-2 existing residential well	surface water feature
MW101 monitoring well installed by Malroz (2018)	stream and flow direction
00-1 monitoring well not located (assumed destroyed)	area of capped former waste mound
	SW1 surface water station

Note: figure based on Malroz field observations and Google Earth imagery

**Site Layout**

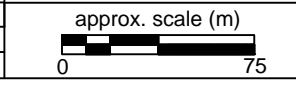
2019 Annual Monitoring Report  
 Closed Leeds WDS (A442002)  
 Pelow Rd, Township of Leeds and the Thousand Islands, Ontario

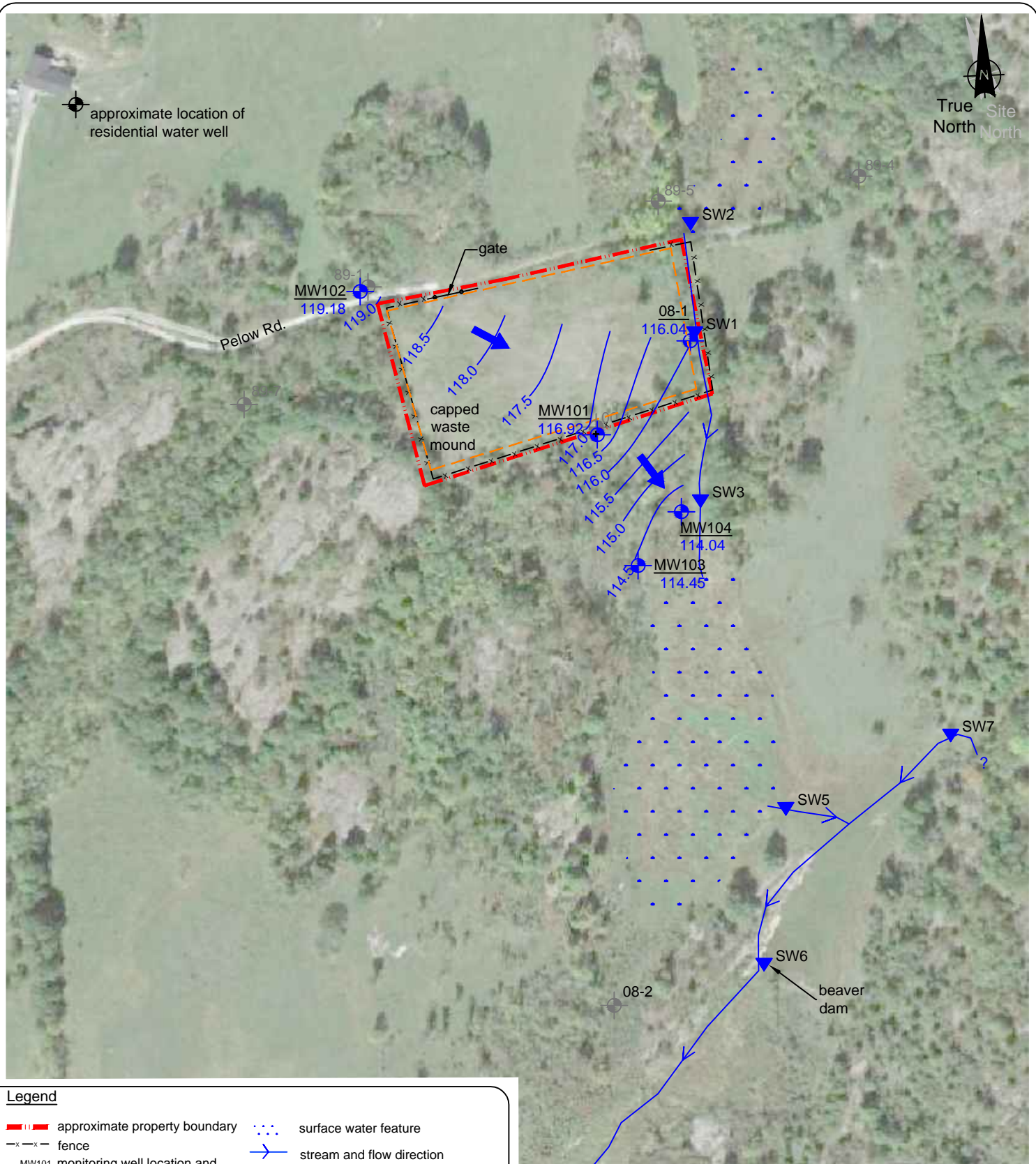
File: 1040-115.00

Figure  
**2**



Rev	Date	Description	By	Chkd
R0	20/01/06	issued in final	MW	ZL





**Legend**

approximate property boundary	surface water feature
fence	stream and flow direction
monitoring well location and groundwater elevation (October 8, 2019)	area of capped former waste mound
monitoring well not used in interpolation	surface water station
-90.0 groundwater elevation (October 8, 2019)	inferred groundwater flow direction

Note: figure based on Malroz field observations and Google Earth imagery

### Inferred Overburden Groundwater Contours (October 2019)

2019 Annual Monitoring Report  
 Closed Leeds WDS (A442002)  
 Pelow Road, Township of Leeds and the Thousand Islands, Ontario

File: 1040-115.00

Rev	Date	Description	By	Chkd
R0	20/01/06	issued in final	MW	ZL

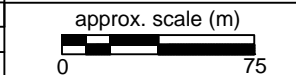
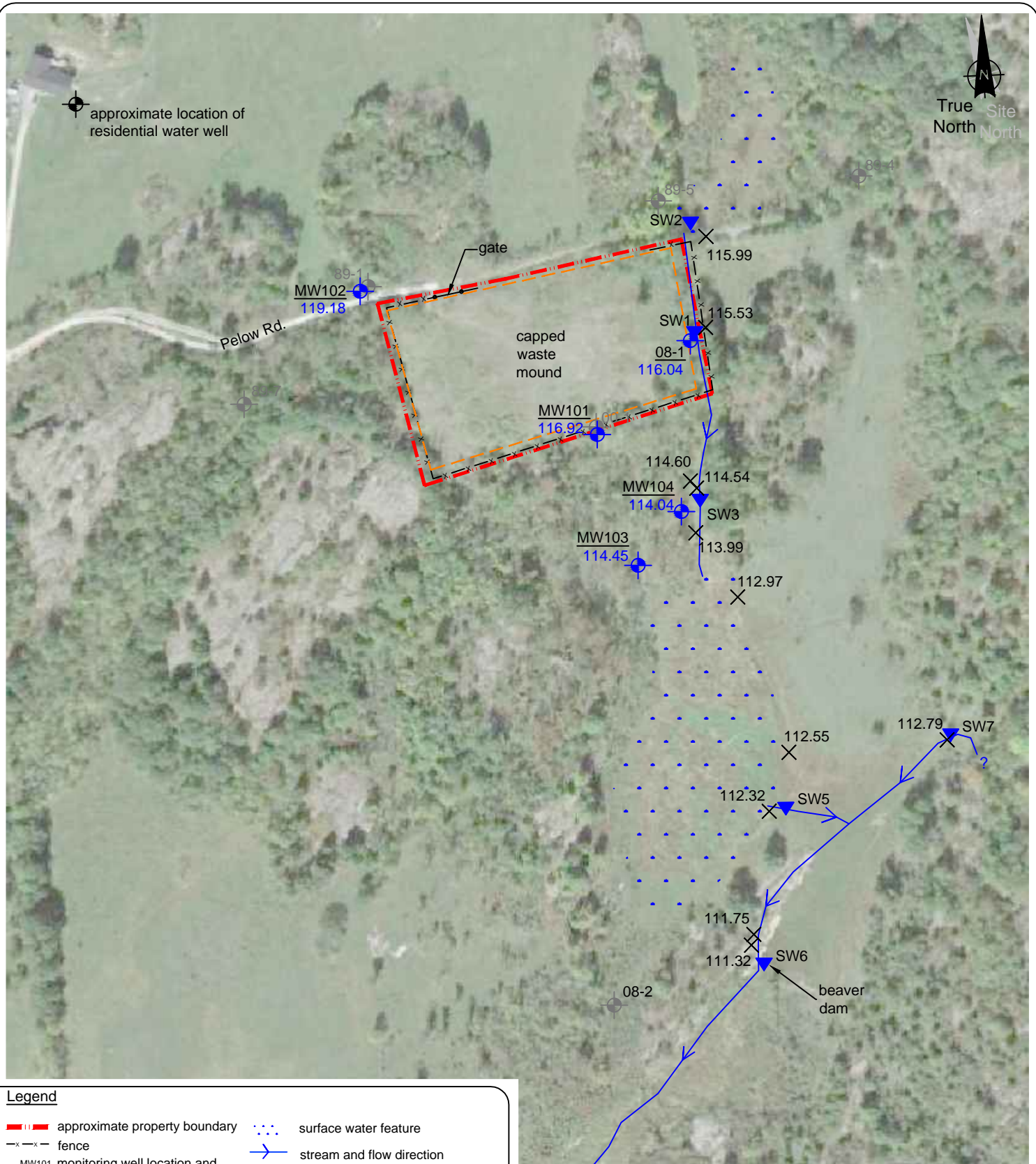


Figure  
**3**





**Legend**

approximate property boundary	surface water feature
fence	stream and flow direction
MW101 monitoring well location and groundwater elevation (October 8, 2019)	area of capped former waste mound
08-2 monitoring well not used in interpolation	SW1 surface water station
114.60 stream invert elevations (m)	

### Stream Invert and Groundwater Elevations (October 2019)

2019 Annual Monitoring Report  
 Closed Leeds WDS (A442002)  
 Pelow Road, Township of Leeds and the Thousand Islands, Ontario

Note: Figure based on Malroz field observations and Google Earth imagery. Elevations based on Malroz survey (October 8, 2019) using Trimble R10 GNSS.

Rev	Date	Description	By	Chkd
R0	20/01/06	issued in final	ZL	JMP

File: 1040-115.00

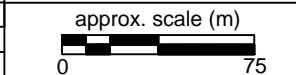
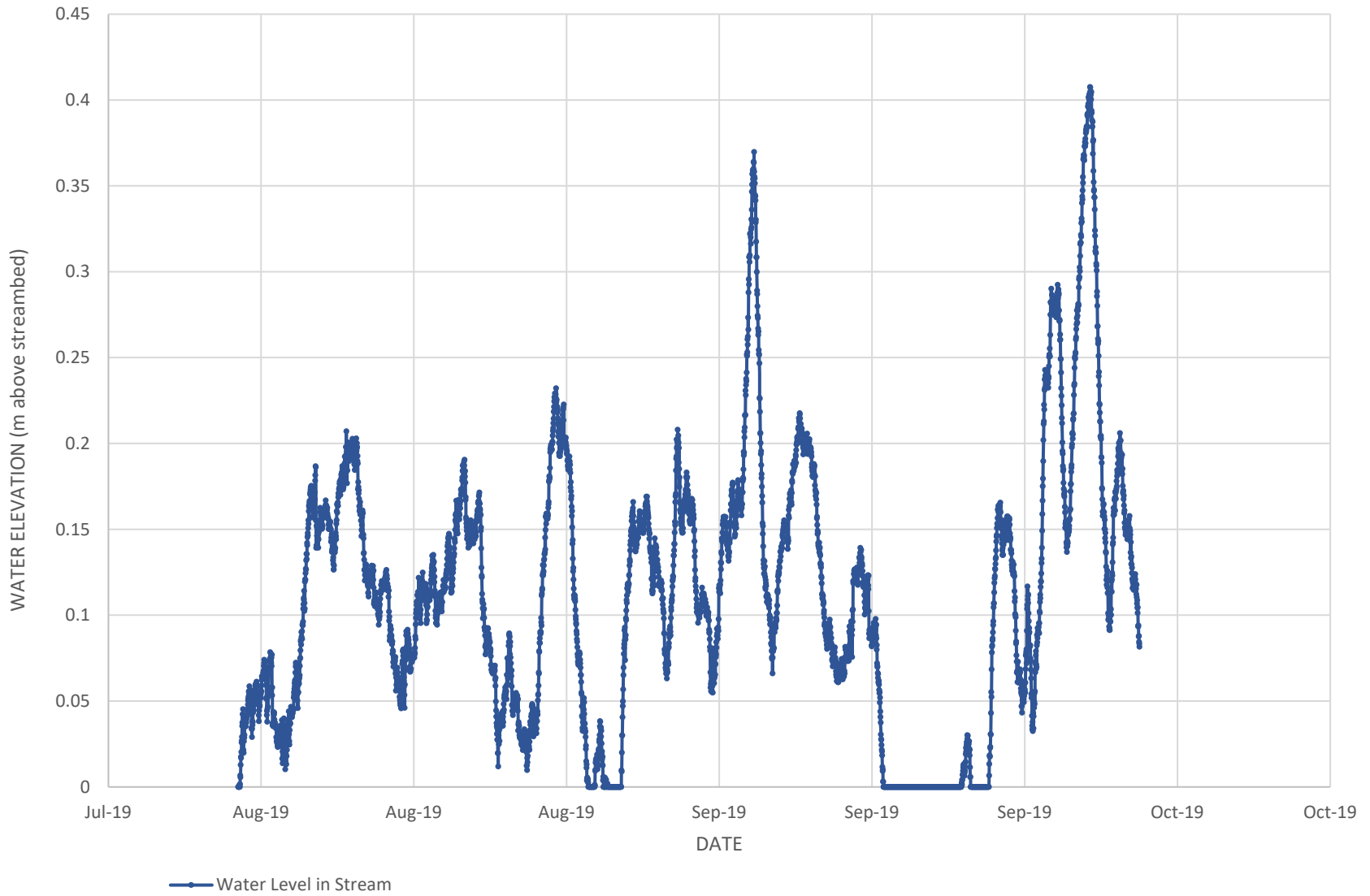


Figure  
**4**



Figure 5  
Stream Depth at SW1





**Appendix B**  
**Tables**

**Table 1  
 Groundwater Monitoring Results**

Location	DTW (mbTOP)	DTB (mbTOP)	TOP Elevation (masl)	Grade Elevation (masl)	Groundwater Elevation (masl)	Methane Concentration (%LEL)	Observations		
							Colour	Sediment	Odour
<b>May 2, 2019</b>									
08-1	2.56	4.38	119.03	118.11	116.47	<1 <sup>a</sup>	grey	some	none
MW101	1.40	3.50	118.48	117.45	117.08	<1 <sup>a</sup>	translucent grey	some	none
MW102	1.09	2.82	121.18	120.24	120.09	<1 <sup>a</sup>	brown grey	lots	none
MW103	1.21	2.28	116.00	114.30	114.79	<1 <sup>a</sup>	brown	adundant	none
MW104	1.40	1.89	115.70	114.56	114.30	<1 <sup>a</sup>	brown	lots	none
<b>October 8, 2019</b>									
08-1	2.99	4.49	119.03	118.11	116.04	nr	grey	lots	sulphur
MW101	1.56	3.50	118.48	117.45	116.92	nr	grey/brown turbid	lots	sulphur
MW102	2.00	2.93	121.18	120.24	119.18	nr	insufficient water for sample		
MW103	1.55	2.46	116.00	114.30	114.45	<1 <sup>a</sup>	brown	lots	none
MW104	1.66	2.13	115.70	114.56	114.04	nr	insufficient water for sample		

Notes

- LEL denotes lower explosive limit
- nr indicates no response
- DTW depth to water
- DTB depth to well bottom
- masl meters above mean sea level
- mbTOP denotes meters below top of piezometer

Elevations are geodetic, based on survey data obtained by Malroz Engineering from October 8, 2019, using the Trimble R10 GNSS

<sup>a</sup> methane elimination was not taken therefore this value refers to full gas response

Data Input: BL  
 Data Check: MW

**Table 2**  
**Well Inspection**

Well ID	Coordinates <sup>1</sup>		Well Type	Well Construction	Well Integrity			Well Observations
	Easting	Northing	Protective casing	Material	Locked	Capped	Condition <sup>2</sup>	Remarks
08-1	405559.87	4916212.46	PVC outer Casing	2" Schedule 40 PVC	Y	slip cap	good	-
MW101	405507.77	4916159.87	Monument Casing	2" Schedule 40 PVC	Y	J-Plug	good	installed February 2018
MW102	405375.09	4916240.16	Monument Casing	2" Schedule 40 PVC	Y	J-Plug	good	installed February 2018
MW103	405530.45	4916087.11	Monument Casing	1.25" Schedule 40 PVC	Y	J-Plug	good	installed February 2018
MW104	405554.87	4916116.72	Monument Casing	1.25" Schedule 40 PVC	Y	J-Plug	good	installed February 2018

Notes

Well inspection completed on May 2 and October 8, 2019

<sup>1</sup> Coordinates based on survey data obtained by Malroz Engineering from October 8, 2019, using the Trimble R10 GNSS

<sup>2</sup> Well conditions ranked as good (no maintenance required), fair (minor maintenance required), poor (requires maintenance or abandonment)

Data Input: MW

Data checked: JMP



Table 3  
2019 Groundwater Chemistry

Monitoring Location	Sample ID	Parameter (units)	General Inorganics														Anions					Metals														Field Parameters								
			Alkalinity	N - Ammonia	BOD	COD	DOC	Conductivity umho/cm	Hardness	pH	Phenols	Phosphorus (total)	O-Phosphate	TDS	TSS	N - Total Kjeldahl	Chloride	N - Nitrate	N - Nitrite	Sulphate	Mercury	Aluminum	Arsenic	Barium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Potassium	Silver	Sodium	Uranium	Vanadium	Zinc	Unionized Ammonia Calc (field) [9]	Temperature °C (field)	PH (Field)	DO
ODWS (mg/L)	30-500 <sup>OG</sup>	-	-	-	5 <sup>AO</sup>	80-100 <sup>OG</sup>	6.5-8.5 <sup>AO</sup>	-	-	-	500 <sup>AO</sup>	-	-	N - Total Kjeldahl	250 <sup>AO</sup>	10 <sup>CS</sup>	1.0 <sup>CS</sup>	500 <sup>AO</sup>	0.001 <sup>CS</sup>	0.1 <sup>OG</sup>	0.010 <sup>CS</sup>	1.0 <sup>CS</sup>	5.0 <sup>CS</sup>	0.005 <sup>CS</sup>	0.05 <sup>CS</sup>	0.001 <sup>CS</sup>	1 <sup>AO</sup>	0.3 <sup>AO</sup>	0.01 <sup>CS</sup>	-	0.05 <sup>AO</sup>	-	-	200 <sup>AO</sup>	0.02 <sup>CS</sup>	-	5 <sup>OG</sup>	-	15	6.5-8.5 <sup>AO</sup>	-	-		
PWQO (mg/L)	(note 1)	-	-	-	-	6.5-8.5	0.001	0.02	-	0.002	3	3	0.1	0.5	0.05	0.05	0.33	261	0.00033	0.063	0.0031	0.27	1.3	0.0013	0.02	0.001	0.0001	0.0001	0.0001	0.005	0.0002	0.02	0.001	0.1	0.0001	0.2	0.0005	0.005	0.005	0.001	-	6.5-8.5	-	-
2019 RL (mg/L)	5	0.01	3	5	0.2	1	1	0.002	0.01	0.002	3	3	0.1	0.5	0.05	0.05	0.33	261	0.00033	0.063	0.0031	0.27	1.3	0.0013	0.02	0.001	0.0001	0.0001	0.0001	0.005	0.0002	0.02	0.001	0.1	0.0001	0.2	0.0005	0.005	0.005	0.001	-	6.5-8.5	-	-
2019 RUL	350	-	-	-	4.6	169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Date																																												
MW102 (formerly 89-1) background	19-W010 [8] dry	19-May-02	244	-	-	-	510	253	8.12	-	-	-	264	-	2.1	<	<	18	<	0.05	0.0001	0.024	0.014	<	68.2	<	<	0.0004	0.019	<	20.1	<	0.5	<	13.7	0.00074	<	<	-	7.99	7.25	12.42	0.498	
		19-Oct-08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW101 (formerly 00-1)	19-W006	19-May-02	750	0.06	<	67	14.8	1540	693	7.85	<	1.63	840	6000	0.9	8.7	<	<	131	<	0.10	0.0006	0.046	0.447	0.000018	174	0.001	0.0003	0.0008	<	0.00010	62.7	0.360	1.5	<	54.3	0.00287	<	<	6.45	7.17	10.71	1.05	
	19-W015	19-Oct-08	714	0.07	<	78	17.0	1440	822	7.88	<	3.67	782	1880	1.2	10.0	<	<	140	<	0.12	0.0012	0.060	0.693	< 0.000029	203	<	0.0009	0.0014	0.032	0.00011	76.5	0.400	2.4	<	82.4	0.00523	<	<	15.57	5.85	22.29	2.43	
08-1	19-W007	19-May-02	807	7.54	<	45	16.0	1550	793	7.64	<	0.41	846	880	8.8	16.4	<	<	36	<	0.10	0.0007	0.281	0.731	0.000067	204	0.001	0.0016	0.0002	19.0	0.00005	68.8	1.92	29.2	<	31.9	0.00025	<	0.142	0.009	9.34	6.85	6.92	1.59
	19-W016	19-Oct-08	804	7.18	18	295	22.0	1530	874	8.01	<	15.4	835	13400	16.3	20.1	<	<	54	<	0.12	0.0010	0.281	0.975	0.000036	216	<	0.0033	0.0010	7.90	< 0.00009	81.3	4.12	32.7	<	49.1	0.00065	<	0.012	<	-	-	-	-
MW103 (installed in 2018)	19-W005	19-May-02	176	0.13	5	2400	7.3	415	211	7.95	<	55.6	-	215	103000	45.2	2.8	<	<	32	<	0.04	0.0002	0.031	0.105	<	48.2	0.001	0.0003	0.0006	<	0.00002	22.1	0.091	0.5	<	12.4	0.00066	<	<	6.33	7.14	2.71	0.488
	dry	19-Oct-08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MW104 (installed in 2018)	dry	19-May-02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	dry	19-Oct-08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:  
 1 Alkalinity should not decrease by more than 25% of the natural concentration.  
 2 Aluminum standard for PWQO is pH dependent (4.5 to 5.5 = 0.015mg/L, 5.5 to 6.5 = <10% above background, 6.5 to 9.0 = 0.075 mg/L)  
 3 Cadmium criteria: 0-100 mg/L Hardness = 0.0001 mg/L, >100 mg/L Hardness = 0.0005 mg/L.  
 4 Chromium reported as total, published standards are for Chromium VI (0.001 mg/L) and Chromium III (0.0089 mg/L).  
 5 Copper criteria: if <20 mg/L Hardness = 0.001 mg/L; if >20 mg/L Hardness = 0.005 mg/L.  
 6 Lead criteria: if <30 mg/L Hardness = 0.001 mg/L; if 30 to 80 mg/L Hardness = 0.003 mg/L; if >80 mg/L Hardness = 0.005 mg/L.  
 7 Beryllium criteria: <75 mg/L Hardness = 0.011 mg/L, >75 mg/L Hardness = 1.1 mg/L  
 8 Insufficient sample quantity for full parameter analysis  
 9 Unionized ammonia calculated using field parameters for pH and temperature.  
 "-" denotes not analyzed  
 "RL" denotes reporting limit  
 "<" denotes results below reporting limit  
 "<#" denotes elevated reporting limit  
 "MW###" and "#-#" denote groundwater monitoring well  
 groundwater samples analyzed for metals were field filtered using 0.45 micron filters  
 AO indicates aesthetic objective OG indicates operational objective CS Chemical standards  
 shading indicates ODWS exceedance  
 indicates PWQO exceedance  
 indicates RUL exceedance

Input: AP  
Checked: MW

Table 4  
2019 Surfacewater Chemistry

Monitoring Location	Sample ID	Parameter	General Inorganics																Anions										Metals																			Field Parameters												
			Alkalinity	N - Ammonia	N - Ammonia(U)(lab)	BCD	COD	DOC	Conductivity µmho/cm	Hardness	pH	Phenols	o-Phosphate (P)	Phosphorus (total)	TDS	TSS	N - Total Kjeldahl	Chloride	N - Nitrate	N - Nitrite	Sulphate	Aluminum (total)	Aluminum (dissolved)	Mercury	Arsenic	Barium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Silver	Sodium	Strontium	Vanadium	Zinc	Silicon	Uranium	Antimony	Beryllium	Thallium	Tin	Titanium	Tungsten	Molybdenum	Un-ionized Ammonia, Calc (field) [j]	Temperature °C (field)	pH (Field)	DO	Conductivity			
		PWQO (mg/L)	(note a)	0.020					6.5-8.5	0.001		0.02								0.075 [k]	0.075 [k]	0.0002	0.0005		0.200	0.0001 [d]		(note e)	0.0009	0.005 [f]	0.3	(note g)			0.025	0.0001				0.006	0.02		0.005	0.02	(note h)				0.03	0.04	0.020		6.5-8.5	[j]						
		Table A: Aquatic Protection Value (mg/L)		0.100					6.0-9.0	0.04 [h]															180																										0.100		6.0-9.0							
		Table B: Canadian Water Quality Guideline (mg/L)							0.004 [h]																128	2.9	0.06																																	
		2019 RL (mg/L)	5	0.01	0.01	3	5	0.2	1	1		0.001	0.002	0.01	3	3	0.1	0.5	0.05	0.01	0.01	0.00002	0.0001	0.001	0.005	0.000015	0.02	0.001	0.0001	0.0001	0.005	0.00002	0.02	0.001	0.0002	0.1	0.0001	0.2	0.001	0.005	0.005	0.01	0.00005	0.0001	0.002	0.00005	0.05	0.005	0.01	0.0001	0.001									
		Sample Date																																																										
SW1	19-W008	19-May-02	53	0.04	<	<	18	9.2	117	78	7.67	0.005	0.072	0.01	59	14	0.3	0.7	<	<	<	<	<	<	0.038	0.05	<	21.5	0.001	<0.0001	0.0006	0.268	0.00007	5.94	0.029	0.0006	0.8	<	3.8	0.137	<	0.013	2.36	0.00006	<	<	<	<	0.006	0.05	0.0002	<	8.75	7.52	7.17	0.134				
	19-W017	19-Oct-08	120	0.71	0.01	13	103	14.2	268	126	7.55	<	2.41	55.9	137	4500	104	<	<	<	11	4.70	0.03	<	0.0024	0.228	0.116	0.000159	33.7	0.006	0.0052	0.0053	50.8	0.00314	10.1	1.06	0.005	3.3	-	4.9	-	0.012	0.054	12.7	0.00029	-	-	0.00005	<	<	<	<	0.011	0.09	0.0002	<	7.15	7.24	8.69	0.158
SW2	19-W009	19-May-02	30	0.04	<	<	25	5	66	58	7.33	<	0.028	0.03	33	16	0.4	0.5	<	<	<	<	<	<	0.0001	0.037	0.038	0.000016	15.8	0.002	0.0002	0.0011	0.500	0.00019	4.54	0.022	0.0007	0.400	<	3.3	0.102	<	0.017	2.63	<	0.0001	<	<	<	0.016	0.04	0.0002	<	9.49	7.01	3.88	0.060			
	19-W011	19-Oct-08	8	0.09	<	<	48	16.8	53	22	6.46	<	0.078	0.14	27	92	1.2	<	<	<	7	0.28	0.22	<	0.0003	0.029	0.007	0.000106	6.51	<	0.0013	0.0013	2.43	0.00062	1.44	0.136	0.0011	0.6	-	2.7	-	<	0.021	3.55	0.00008	-	-	<	<	<	<	9.27	4.47	5.49	0.221					
		75th percentile	58	0.09	0.025	3.5	49	11.5	134	75.8	7.24	0.001	-	0.193	97.8	132	1	1	0.2	0.05	7.2	0.686	-	0.00005	0.0007	0.0413	0.019	0.0001	18.0	0.0045	0.00317	0.00323	4.33	0.00195	7.39	0.6025	0.0045	1.525	0.000	2.93	0.136	0.0025	0.0245	5.605	0.00059	0.0003	1.1	0.00005	0.025	0.001	0.005	0.005	-	-	-	-	-	-		
SW3	19-W001	19-May-02	71	0.03	<	<	21	6.2	158	100	7.86	<	0.013	<	80	28	0.3	1.1	<	<	5	0.03	-	<	0.0001	0.039	0.067	<	26.8	0.002	0.0001	0.0011	0.255	0.00011	8.00	0.012	0.0008	1.3	<	4.6	0.169	<	0.013	2.63	0.00013	<	<	<	<	0.011	0.09	0.0002	<	7.15	7.24	8.69	0.158			
	dry	19-Oct-08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
SW5	19-W004	19-May-02	82	0.05	<	<	29	10.3	187	114	7.67	<	0.05	0.05	95	6	0.5	1.3	<	<	7	0.03	-	<	0.0002	0.043	0.076	<	29.9	<	0.0002	0.0005	0.535	0.00006	9.61	0.020	0.0007	1.4	<	5.6	0.181	<	0.012	1.44	0.00011	0.0003	<	<	<	<	0.005	0.05	0.0002	<	6.46	6.75	0.05	0.182		
	dry	19-Oct-08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
SW6	19-W003	19-May-02	72	0.06	<	<	25	9.7	164	104	7.72	<	0.024	0.01	83	<	0.5	1.2	<	<	6	0.02	-	<	0.0002	0.038	0.071	<	27.6	0.002	0.0001	0.0012	0.273	0.00006	8.51	0.036	0.0009	1.2	<	5.1	0.169	<	0.009	1.50	0.00008	<	<	<	<	0.04	0.0003	<	6.86	6.98	10.12	0.175				
	dry	19-Oct-08	46	0.08	<	<	20	13.9	113	54	7.15	<	0.106	0.15	57	16	1	<	<	<	4	0.12	0.03	<	0.0003	0.023	0.032	<	15.2	<	0.0009	0.0004	2.53	0.00017	3.97	1.48	0.0004	1.5	<	2.3	-	<	0.009	3.95	<	<	<	<	<	<	11.4	5.46	4.37	0.251						
SW7 (background)	19-W012	19-May-02	18	0.07	<	<	18	7.3	47	48	7.38	<	0.015	0.01	24	5	0.4	0.7	<	<	2	0.01	-	<	0.0001	0.028	0.047	<	14.1	0.002	0.0001	0.0009	0.58	0.00015	3.20	0.046	0.0005	0.5	<	2.8	0.084	<	0.009	1.98	<	0.0001	<	<	<	0.008	0.04	0.0002	<	9.43	6.82	12.76	0.048			
	19-Oct-08	44	0.06	<	<	<	7.1	89	45	7.57	<	0.032	0.04	45	<	0.4	<	<	<	2	0.08	0.02	<	0.0002	0.009	0.019	<	13.6	<	0.0002	0.0003	0.546	0.00007	2.66	0.079	0.0019	0.6	-	1.0	-	<	0.006	2.61	<	-	<	<	<	<	10.24	5.44	11.15	0.174							
	75th percentile	43.5	0.06	0.005	2.25	39.3	8.0	92.6	48.7	7.64	0.00225	-	0.068	78	23.45	0.61	0.9	0.233	0.05	2.25	0.226	-	0.0005	0.00055	0.0155	0.0318	0.00005	14.225	0.00265	0.00081	0.00175	0.9208	0.0009	3.195	0.041	0.0017	0.771	0.000	1.1	0.060	0.0025	0.0098	-	-	-	-	-	-	-	-	-	-	-	-	-	-				

Notes:  
 [a] Alkalinity should not be decreased by more than 25% of the natural concentration  
 [b] Table A and Table B standards apply only to Phenol  
 [c] Aluminum standard for PWQO is pH dependent: 4.5 - 5.5 = 0.015 mg/L, >5.5 - 6.5 = no more than 10% above background, >6.5 - 9.0 = 0.075 mg/L, if background is above the PWQOs, no conditions is permitted that increases the aluminum greater than %10.  
 [d] Cadmium criteria: 0-100 mg/L Hardness = 0.0001 mg/L, >100 mg/L Hardness = 0.0005 mg/L  
 [e] Chromium reported as total, published standards are for chromium VI (0.001 mg/L) and chromium III (0.0089 mg/L)  
 [f] Copper criteria: 0-20 mg/L Hardness = 0.001 mg/L, >20 mg/L Hardness = 0.005 mg/L  
 [g] Lead criteria: <30 mg/L Hardness = 0.001 mg/L, 30 to 80 mg/L Hardness = 0.003 mg/L, >80 mg/L Hardness = 0.005 mg/L  
 [h] Beryllium criteria: <75 mg/L Hardness = 0.011 mg/L, >75 mg/L Hardness = 1.1 mg/L  
 [i] DO criteria: 0°C-5°C = ≥7mg/L, 5°C-10°C = ≥ 6mg/L, 10°C-20°C = ≥5mg/L, 20°C-25°C = ≥ 4mg/L  
 [j] Un-ionized ammonia calculated using field parameters for pH and temperature.  
 Metals are reported as "total" with the exception of Mercury (reported as dissolved)  
 - not analyzed/not available  
 Provincial Water Quality Objectives (PWQOs)  
 Aquatic Protection Value (APV)  
 Canadian Water Quality Guidelines (CWQG)

Input: AP  
Checked: MW

**Table 5**  
**Leachate Indicator Parameter Rationale**

Leachate Indicator	Units	Groundwater					Surface Water			
		ODWS	RUL	Background Concentration <sup>A</sup>	Leachate Concentration <sup>B</sup>	Difference (L/B)	Standard (see notes)	Background Concentration <sup>C</sup>	Leachate Concentration <sup>D</sup>	Difference (L/B)
Alkalinity	mg/L	30-500	350	198	892.5	5	(P) see note <sup>1</sup>	37.5	94.0	3
Ammonia	mg/L			0.06	6.8	113	0.02 (P) <sup>2</sup>	0.05	0.03	1
Chloride	mg/L	250	127	4.90	26.3	5	128 (C)	0.50	4.00	8
Conductivity	uS/cm			443	1645	4		81.5	227	3
Iron	mg/L	0.3	0.18	0.05	8.7	175		0.51	0.49	1
Nitrate	mg/L	10	2.6	0.09	0.20	2	2.9 (C)	0.050	0.20	4
pH	-	6.5-8.5		7.7	7.4	1	6.5-8.5 (P)	7.6	7.7	1
Total Suspended Solids	mg/L			1270	3740	3		13	16	1
Total Dissolved Solids	mg/L	500	364	219	919	4		39.0	125	3
Sulphate	mg/L	500	261	23	47.0	2	100 (A)	2.00	16.0	8
BOD	mg/L			1.0	11	11		1.0	1.0	1
COD	mg/L			48.0	122	3		25.0	21.0	1
Boron	mg/L	5	1	0.01	0.9	62	0.2 (P) <sup>3</sup>	0.02	0.05	2

<sup>A</sup> The background GW concentration is the median concentration at 89-1 between 1990 and 2018 (some years do not have data)

<sup>B</sup> The GW leachate concentration is the median concentration at 08-1 between 2008 and 2018

<sup>C</sup> The background SW concentration was determined using data from SW7 between 2013 and 2018

<sup>D</sup> The SW leachate concentration was determined using data from SW3 (station receiving GW discharge, according to site conceptual model) between 1993 and 2018

L/B Leachate concentration/Background concentration

(P) Provincial Water Quality Objective

(C) CWQG, Table B

(A) Aquatic Protection Value, Table A

<sup>1</sup>Alkalinity should not decrease by more than 25% of the background condition

<sup>2</sup>Ammonia also has criteria of 0.1 (A) mg/L

<sup>3</sup>Boron also has criteria of 3.55 (A) and 1.5 (C) mg/L

Historical non-detects were incorporated into the median calculation as half the value of the detection limit

Un-ionized ammonia was used for the SW parameter

Parameters chosen as leachate indicators based on a factor differential of at least 2x between leachate and background, for both SW and GW data, and presence of relevant Ontario standards

RUL denotes Reasonable Use Limit

ODWS denotes Ontario Drinking Water Standards

Data Input: JMP

Data Check: ZL

**Table 6**  
**Surface Water Compliance Concentrations**

Indicator Parameter	Background Range Lower Limit (mg/L)	Median (mg/L)	Background Range Upper Limit (mg/L)	N	Standard deviation	TL (mg/L)	PWQO (mg/L)	Compliance Concentration (mg/L)	Compliance Station SW6	
									2-May-19	19-Oct-19
Alkalinity	21	38	73	10	14	78	see note (1)	16 - 78	72	46
Chloride	0.25	0.50	1.0	8	0.26	1.3	128 (2)	1.3	1.2	<0.5
Nitrate	0.025	0.050	0.50	10	0.16	0.51	2.9 (2)	0.51	<0.05	<0.05
Iron	0.309	0.513	3.27	10	0.98	3.38	0.30	3.38	0.273	2.53
Boron	0.012	0.021	0.034	10	0.008	0.043	0.20	0.20	0.071	0.032
Sulphate	0.500	1.50	3.80	10	1.091	4.68	100 (3)	25	6	4
Sulphate (based on SW2)	0.5	4.5	45	38	8.3	22	100 (3)	22	6	4

Data Input: JMP  
 Data Check: ZL

- Notes:**
- N number of observations
  - mg/L milligrams per litre
  - TL upper tolerance limit
  - no PWQO
  - 1 Alkalinity should not be decreased by more than 25% of the background concentration (25% of background lower range is 16 mg/L)
  - 2 Canadian Water Quality Guideline (CWQG) (Table B)
  - 3 Aquatic Protection Value (APV)
  - PWQO Provincial Water Quality Objectives
  - AO aesthetic objective
  - MAC maximum acceptable concentration
  - IMAC interim maximum acceptable concentration
  - † interim value
- Historical results below detection limit were considered as half the detection limit value  
 Background conditions represented by historical water quality data available at station SW7 (from 2013-2018)
- <sup>3</sup> alkalinity should not be decreased by more than 25% of the natural concentration
  - \* maximum reported concentration exceeds PWQO
  - \*\* concentration based on 100% of the Reasonable Use Performance Objective
- Red and bold** value exceeds the compliance concentration for given parameter  
 compliance concentration for sulphat set to 25 mg/L to account for loading of the stream at background station SW2.



**Table 7**  
**Surface Water Station Observations**

Station	UTMs (NAD 83, Zone 18T)		Flow Conditions		Notes
	Northing (m)	Easting (m)	2019-May-02	2019-Oct-08	
SW1	4916214	405567	lotic	lentic	staining and blocky iridescence present during October event.
SW2	4916273	405568	lentic	lentic	
SW3	4916119*	405567*	lentic	dry	
SW5	4915959	405607	lotic	dry	
SW6	4915879 <sup>[1]</sup>	405596 <sup>[1]</sup>	lotic	lentic	
SW7	4915989	405703.7	lotic	lentic	

notes: \* denotes coordinates estimated based on Google Earth imagery  
 [1] denotes sample collected from an upstream location due to dry conditions at SW6

Data Input: AP  
 Data Check: JMP

**Appendix C**  
**ECA No. A442002**

**AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL**NUMBER A442002  
Issue Date: March 21, 2016

The Corporation of the Township of Leeds and the Thousand Islands  
1233 Prince St Lansdowne  
Post Office Box, No. 280  
Leeds and the Thousand Islands, Ontario  
K0E 1L0

Site Location: Leeds Waste Disposal Site (Closed)  
Twp. of Front of Leeds and Lansdowne  
Lot 11, Concession 3  
Leeds and the Thousand Islands Township, United Counties of Leeds and Grenville

*You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:*

the operation, monitoring and maintenance of a 0.8 hectare landfilling within a total waste disposal site area of 1.7 hectares.

*For the purpose of this environmental compliance approval, the following definitions apply:*

*"Approval "* means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation listed in Schedule "A".

*"Director"* means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the EPA as a Director for the purposes of Part II.1 of the EPA;

*"District Manager"* means the District Manager of the local district office of the *Ministry* in which the *Site* is geographically located;

*"EPA"* means *Environmental Protection Act* , R.S.O. 1990, c. E. 19, as amended;

*"Ministry"* means the Ontario Ministry of the Environment and Climate Change;

*"Owner"* means any person that is responsible for the establishment or operation of the *Site* being approved by this *Approval*, and includes The Corporation of the Township of Leeds and the Thousand Islands its successors and assigns;

"*Regional Director* " means the Regional Director of the local Regional Office of the *Ministry* in which the *Site* is located;

"*Regulation 903*" means Regulation 903, R.R.O. 1990, made under the *OWRA*, as amended; and

"*Site* " means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone at Leeds Waste Disposal Site (Closed), Lot 11, Concession 3, Leeds and the Thousand Islands Township, United Counties of Leeds and Grenville.

*You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:*

## **TERMS AND CONDITIONS**

### **1. GENERAL**

#### **Compliance**

- (1) The *Owner* and *Operator* shall ensure compliance with all the conditions of this *Approval* and shall ensure that any person authorized to carry out work on or operate any aspect of the *Site* is notified of this *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
- (2) Any person authorized to carry out work on or operate any aspect of the *Site* shall comply with the conditions of this *Approval* .

#### **In Accordance**

- (3) Except as otherwise provided by this *Approval*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule "A".

#### **Interpretation**

- (4) Where there is a conflict between a provision of any document listed in Schedule "A" in this *Approval*, and the conditions of this *Approval*, the conditions in this *Approval* shall take precedence.
- (5) Where there is a conflict between the application and a provision in any document listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the *Ministry* approved the amendment.
- (6) Where there is a conflict between any two documents listed in Schedule "A", the document bearing the most recent date shall take precedence.

- (7) The conditions of this *Approval* are severable. If any condition of this *Approval*, or the application of any condition of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

### **Other Legal Obligations**

- (8) The issuance of, and compliance with, this *Approval* does not:
- (a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
  - (b) limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Approval*.

### **Adverse Effect**

- (9) The *Owner* shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the *Site*, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.
- (10) Despite an *Owner* or any other person fulfilling any obligations imposed by this *Approval* the person remains responsible for any contravention of any other condition of this *Approval* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

### **Change of Ownership**

- (11) The *Owner* shall notify the *Director*, in writing, and forward a copy of the notification to the *District Manager*, within 30 days of the occurrence of any changes in the following information:
- (a) the ownership of the *Site*;
  - (b) the *Operator* of the *Site*;
  - (c) the address of the *Owner* or *Operator*; and
  - (d) the partners, where the *Owner* or *Operator* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act*, R. S. O. 1990, c. B.17, shall be included in the notification.
- (12) No portion of this *Site* shall be transferred or encumbered prior to or after closing of the *Site* unless the *Director* is notified in advance and sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out.
- (13) In the event of any change in ownership of the *Site*, other than change to a successor municipality, the *Owner* shall notify the successor of and provide the successor with a copy of this *Approval*, and the *Owner* shall provide a copy of the notification to the *District Manager* and the *Director*.

## **Certificate of Requirement/Registration on Title**

- (14) Prior to dealing with the property in any way, the *Owner* shall provide a copy of this *Approval* and any amendments, to any person who will acquire an interest in the property as a result of the dealing.
- (15) (a) Within ninety (90) calendar days from the date of issuance of this *Approval*, the *Owner* shall submit to the *Director* a completed Certificate of Requirement which shall include:
- (i) a plan of survey prepared, signed and sealed by an Ontario Land Surveyor, which shows the area of the *Site* where waste has been or is to be deposited at the *Site*;
  - (ii) proof of ownership of the *Site*;
  - (iii) a letter signed by a member of the Law Society of Upper Canada or other qualified legal practitioner acceptable to the *Director*, verifying the legal description provided in the Certificate of Requirement;
  - (iv) the legal abstract of the property; and
  - (v) any supporting documents including a registerable description of the *Site*.
- (b) Within fifteen (15) calendar days of receiving a Certificate of Requirement authorized by the *Director*, the *Owner* shall:
- (i) register the Certificate of Requirement in the appropriate Land Registry Office on the title to the property; and
  - (ii) submit to the *Director* written verification that the Certificate of Requirement has been registered on title.

## **2. INSPECTIONS, RECORD KEEPING AND REPORTING**

### **Inspections and Log Book**

- (1) An inspection of the entire *Site* for the following shall be carried out a minimum of twice per year during monitoring events:
- (a) integrity of the final cover and landscaping;
  - (b) presence of any leachate seeps;
  - (c) that the *Site* is not causing any nuisances or any adverse effects on the environment;
  - (d) the *Site* is secure; and
  - (e) that the *Site* is being operated in compliance with this *Approval*.
- (2) Any deficiencies discovered as a result of the inspection shall be remedied immediately.
- (3) Presence of any leachate seeps shall be reported verbally to the *District Manager* within one (1) business day.
- (4) A record of the inspections shall be kept in a log book that includes:
- (a) the name and signature of person that conducted the inspection;

- (b) the date and time of the inspection;
- (c) the list of any deficiencies discovered;
- (d) the recommendations for remedial action; and
- (e) the date, time and description of actions taken.

### **Annual Report**

- (5) A written report on the operation, maintenance and monitoring of the *Site*, shall be completed annually (the “Annual Report”). The Annual Report shall be submitted to the *District Manager*, by March 31st of the year following the period being reported upon.
- (6) The Annual Report shall include but not be limited to the following information:
  - (a) the results and an interpretive analysis of the results of all leachate, groundwater and surface water monitoring, including an assessment of the need to amend the monitoring programs;
  - (b) an assessment on the *Site's* compliance with Guideline B7;
  - (c) a summary of any complaints received and the responses made;
  - (d) a summary of the findings during inspections and a summary of any remedial work conducted at the *Site*.
  - (e) a report on the status of all monitoring wells and a statement as to compliance with *Ontario Regulation 903*; and
  - (f) any other information with respect to the *Site* which the *District Manager* may require from time to time.

## **3. LANDFILL MONITORING**

### **Compliance**

- (1) The *Site* shall be operated/maintained in such a way as to ensure compliance with the following:
  - (a) Reasonable Use Guideline B-7 for the protection of the groundwater at the *Site*; and
  - (b) Provincial Water Quality Objectives included in the July 1994 publication entitled *Water Management Policies, Guidelines, Provincial Water Quality Objectives*, as amended from time to time or limits set by the *Regional Director*, for the protection of the surface water at and off the *Site*.

### **Surface Water and Groundwater**

- (2) Within two (2) months from the date of this *Approval*, the *Owner* shall submit to the *Director* for approval, with copies to the *District Manager*, a report detailing the current groundwater and surface water monitoring program for the *Site* and a revised groundwater and surface water monitoring plan which fully delineate the horizontal and vertical extent of leachate migration

resulting from the landfilling activities at the *Site*. The report shall include but not be limited to the following:

- (a) a drawing showing the sampling locations;
  - (b) current parameters that are analyzed and any revisions to the parameters;
  - (c) the sampling frequency;
  - (d) the groundwater measurement, flow measurement and sampling protocols;
  - (e) the latest annual report summary and interpretation of historical environmental monitoring data collected at the *Site*; and
  - (f) sketch of historical waste placement with respect to monitoring locations and current businesses/operations at the *Site*.
- (3) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic training and experience shall execute or directly supervise the execution of the groundwater monitoring and reporting program.

### **Trigger Mechanisms and Contingency Plans**

- (4)
  - (a) Within two (2) months from the date of this *Approval*, the *Owner* shall submit to the *Director*, for approval, and copies to the *District Manager*, details of a trigger mechanisms plan for surface water and groundwater quality monitoring for the purpose of initiating investigative activities into the cause of increased contaminant concentrations.
  - (b) Within two (2) months from the date of this *Approval*, the *Owner* shall submit to the *Director* for approval, and copies to the *District Manager*, details of a contingency plan to be implemented in the event that the surface water or groundwater quality exceeds any trigger mechanism.
- (5) In the event of a confirmed exceedance of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate, the *Owner* shall immediately notify the *District Manager*, and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the *Owner* in accordance with the approved trigger mechanisms and associated contingency plans.
- (6) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the *Owner* shall ensure that the following steps are taken:
  - (a) The *Owner* shall notify the *District Manager*, in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedances;
  - (b) Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the *Owner* to the *District Manager* for approval; and
  - (c) The contingency measures shall be implemented by the *Owner* upon approval by the *District Manager*.



- (7) The *Owner* shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to the surface water or groundwater, are approved in advance by the *Director* via an amendment to this *Approval*.

### **Groundwater Wells and Monitors**

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

### **Changes to the Monitoring Plan**

- (10) The *Owner* may request to make changes to the monitoring program(s) to the *District Manager* in accordance with the recommendations of the annual report. The *Owner* shall make clear reference to the proposed changes in separate letter that shall accompany the annual report.
- (11) Within fourteen (14) days of receiving the written correspondence from the *District Manager* confirming that the *District Manager* is in agreement with the proposed changes to the environmental monitoring program, the *Owner* shall forward a letter identifying the proposed changes and a copy of the correspondences from the *District Manager* and all other correspondences and responses related to the changes to the monitoring program, to the *Director* requesting the *Approval* be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.
- (12) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the *Owner* shall follow current ministry procedures for seeking approval for amending the *Approval*.

#### 4. CLOSURE PLAN

- (1) Except as otherwise provided by these conditions, the *Site* shall be closed in accordance with report titled "Groundwater and Surface Water Sampling Update and Revised Closure Plan, Leeds Waste Disposal Site, Township of Front of Leeds and Lansdowne" dated January 1994 and prepared by Water and Earth Science Associates Ltd.
- (2) This landfill has been closed since December 1991 and no waste shall be accepted for disposal at the *Site*.
- (3) Waste deposited within the 0.7 hectare beyond the approved limits of 0.8 hectare is hereby recognized. Boundary of the total waste disposal foot print of 1.5 hectares shall be marked with visible markers.

#### SCHEDULE "A"

1. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an approval of a Waste Disposal Site date June 1, 1971.
2. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an approval of a Waste Disposal Site (Transfer) date June 19, 1990.
3. Letter from Mr. J.D. Bishop (Kingston District Office), to Mr. J. Raycroft (Township of Front of Leeds and Lansdowne), dated November 28, 1991.
4. Letter from Mr. D.J. Andrijiw (Approvals Branch), to Mr. J. Raycroft (Township of Front of Leeds and Lansdowne), dated December 18, 1991.
5. Report titled "Groundwater and Surface Water Sampling Update and Revised Closure Plan, Leeds Waste Disposal Site, Township of Front of Leeds and Lansdowne" dated January 1994 and prepared by Water and Earth Science Associates Ltd.
6. Facsimile transmission from Mrs. A. Mitton (Southeastern Region), to Mr. O. Ibrahim (Approvals Branch), dated December 20, 1993.

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

#### **GENERAL**

- The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9) and (10) is to clarify the legal rights and responsibilities of the *Owner* under this *Approval* .
- The reasons for Condition 1(3) is to ensure that the *Site* is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the *Owner*, and not in a manner which the *Director* has not been asked to consider.

- The reasons for Condition 1(11) are to ensure that the *Site* is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the *Director* is informed of any changes.
- The reasons for Condition 1(12) are to restrict potential transfer or encumbrance of the *Site* without the approval of the *Director* and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this *Approval* .
- The reason for Condition 1(13) is to ensure that the successor is aware of its legal responsibilities.
- The reason for Condition 1(14) and (15) are that the Part II.1 *Director* is an individual with authority pursuant to Section 197 of the Environmental Protection Act to require registration on title and provide any person with an interest in property before dealing with the property in any way to give a copy of the *Approval* to any person who will acquire an interest in the property as a result of the dealing.

### **INSPECTIONS, RECORD KEEPING AND REPORTING**

- The reasons for Conditions 2(1), 2(2) and 2(3) are to ensure that the *Site* is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.
- The reason for Condition 2 (4) is to ensure that accurate records are maintained to ensure compliance with the conditions in this Approval (record keeping, annual reporting etc.), the EPA and its regulations.
- The reasons for Conditions 2(5) and 2(6) are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

### **LANDFILL MONITORING**

- Condition 3(1) is included to provide the groundwater and surface water limits to prevent water pollution at the *Site*.
- Conditions 3(2) and 3(3) is included to require the *Owner* to demonstrate that the *Site* is performing as designed and the impacts on the natural environment are acceptable. This condition is also to require the *Owner* to revise and update the monitoring plan. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
- Conditions 3(4), 3(5), 3(6) and 3(7) are included to ensure the integrity of the groundwater

monitoring network so that accurate monitoring results are achieved and the natural environment is protected.

- Reasons for conditions 3(8), 3(9) and 3(10) are included to streamline the approval of the changes to the monitoring plan.

### **CLOSURE PLAN**

- The reasons for Condition 4(1) and 4(2) are to ensure that final closure of the *Site* is completed in an aesthetically pleasing manner, in accordance with *Ministry* standards, and to ensure the long-term protection of the health and safety of the public and the environment.
- The reasons for Condition 4(3) are to allow the *Owner* to leave the waste deposited outside the approved limits in place and to ensure the long-term protection of the health and safety of the public and the environment.

**Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). A442002 issued on January 4, 1994 and associated notices of amendments.**

*In accordance with Section 139 of the Environmental Protection Act, 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 environmental compliance approval or each term or condition in the environmental compliance 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.

*Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.*

*The Notice should also include:*

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

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

*This Notice must be served upon:*

The Secretary\*  
Environmental Review Tribunal

The Director appointed for the purposes of Part II.1 of  
the Environmental Protection Act

655 Bay Street, Suite 1500  
Toronto, Ontario  
M5G 1E5

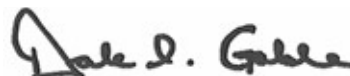
AND

Ministry of the Environment and Climate Change  
135 St. Clair Avenue West, 1st Floor  
Toronto, Ontario  
M4V 1P5

\* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or [www.ert.gov.on.ca](http://www.ert.gov.on.ca)**

*The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.*

DATED AT TORONTO this 21st day of March, 2016



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Dale Gable, P.Eng.  
Director  
appointed for the purposes of Part II.1 of the  
*Environmental Protection Act*

RM/  
c: District Manager, MOECC Kingston - District  
Vanessa Latimer

**Appendix D**  
**Monitoring Program**

**1040 Leeds Waste Disposal Site - Proposed Sampling Program**

**Semi Annual Monitoring Tasks**

1	Monitor groundwater elevation
2	GPS Wells and SW stations
3	Photo Wells and SW Stations
4	Site inspection
5	GW and SW Sampling
6	Measure DTW and DTB at monitoring wells

**Sampling Program**

Groundwater Monitoring Wells: 08-1, MW101, MW102, MW103, MW104  
 VOCs<sup>1</sup>: 08-1 and MW101 next sampling: 2023  
 total: 5  
 Lab criteria: ODWS

Surface Water Stations: SW1, SW2, SW3, SW5, SW6, SW7  
 total: 6  
 Lab criteria: PWQO

Monitoring Program	Groundwater		Surface Water	
	Spring and Fall		Spring and Fall	
<b>Parameters</b>	Alkalinity	Barium	Alkalinity	Mercury, dissolved
	N - Ammonia	Boron	N - Ammonia	Arsenic
	BOD	Cadmium	N - Ammonia(UI)	Barium
	COD	Calcium	BOD	Boron
	DOC	Chromium	COD	Cadmium
	Conductivity	Cobalt	DOC	Calcium
	Hardness	copper	Conductivity	Chromium
	pH	Iron	Hardness	Cobalt
	Phenols	Lead	pH	Copper
	Phosphorus (total)	Magnesium	Phenols	Iron
	TDS	Manganese	Phosphorus (total)	Lead
	TSS	Potassium	Phosphorus (dissolved)	Magnesium
	N - Total Kjeldahl	Silver	TDS	Manganese
	Chloride	Sodium	TSS	Nickel
	N - Nitrate	Vanadium	N - Total Kjeldahl	Potassium
	N - Nitrite	Zinc	Chloride	Silver
	Sulphate		N - Nitrate	Sodium
	Mercury		N - Nitrite	Strontium
	Aluminum		Sulphate	Vanadium
	Arsenic		Aluminum-dissolved	Zinc
	VOCs at MW101 and 08-1: <sup>1</sup>		Selenium	Antimony
	Acetone	Dichloropropene, trans-1,3-	Silicon	Beryllium
	Benzene	Dichloropropene, Total-1,3	Thallium	Molybdenum
	Bromodichloromethane	Ethylbenzene	Tungsten	Tin
	Bromoform	Hexane	Uranium	Titanium
	Bromomethane	Methyl Butyl Ketone		
	Carbon Tetrachloride	Methyl Ethyl Ketone		
	Chloroethane	Methyl Isobutyl Ketone		
	Chloroform	Methyl-t-butyl Ether		
	Chloromethane	Chlorobenzene		
	Dibromochloromethane	Styrene		
	Ethylene Dibromide	Tetrachloroethane, 1,1,1,2-		
	Dichlorobenzene, 1,2-	Tetrachloroethane, 1,1,2,2-		
	Dichlorobenzene, 1,3-	Tetrachloroethylene		
	Dichlorobenzene, 1,4-	Toluene		
	Dichlorodifluoromethane	Trichloroethane, 1,1,1-		
	Dichloroethane, 1,1-	Trichloroethane, 1,1,2-		
	Dichloroethane, 1,2-	Trichloroethylene		
	Dichloroethene, 1,1-	Trichlorofluoromethane		
	Dichloroethene, cis-1,2-	Trimethylbenzene, 1,3,5-		
	Dichloroethene, trans-1,2-	Vinyl Chloride		
	Dichloroethylene, Total-1,2	Xylene, m,p-		
	Methyl Chloride	Xylene, o-		
	Dichloropropane, 1,2-	Xylene, total		
	Dichloropropene, cis-1,3-			
<b>Field</b>	pH	N-NH3 unionized (Calc)	pH	N-NH3 unionized (Calc)
	Temperature	Turbidity	Temperature	Turbidity
	Dissolved Oxygen	ORP	Dissolved Oxygen	Turbidity
	Conductivity	Groundwater elevations	Conductivity	ORP

<sup>1</sup> VOC analysis will occur every 5 years starting in 2019 (next sampling 2023)

In: CM  
Chk: MW

**Appendix E**  
**MECP Correspondence**





**AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL**

NUMBER A442002

Notice No. 2

Issue Date: August 16, 2019

The Corporation of the Township of Leeds and the Thousand Islands  
1233 Prince St Lansdowne  
Post Office Box, No. 280  
Leeds and the Thousand Islands, Ontario K0E 1L0

Site Location: Leeds Waste Disposal Site (Closed)  
Twp. of Front of Leeds and Lansdowne  
Lot 11, Concession 3  
Leeds and the Thousand Islands Township, United Counties of Leeds and Grenville

*You are hereby notified that I have amended Approval No. A442002 issued on March 21, 2016 for the operation, monitoring and maintenance of a 0.8 hectare landfilling within a total waste disposal site area of 1.7 hectares, as follows:*

**Conditions 3(2), 3(10), 3(11) and 3(12) are hereby revoked and replaced with the following:**

**Surface Water and Groundwater**

3. (2) Groundwater and surface water monitoring shall be in accordance with the Schedule "B".

**Changes to the Monitoring Programs, Trigger Mechanisms and Contingency Plans**

3. (10) The *Owner* may request to make changes to the monitoring program(s), trigger mechanisms and/or contingency plan to the *District Manager* in accordance with the recommendations of the annual report. The *Owner* shall make clear reference to the proposed changes in a separate letter that shall accompany the annual report.
3. (11) Within fourteen (14) days of receiving the written correspondence from the *District Manager* confirming that the *District Manager* is in agreement with the proposed changes to the environmental monitoring program, trigger mechanisms and/or contingency plans, the *Owner* shall forward a letter identifying the proposed changes and a copy of the correspondences from the *District Manager* and all other correspondences and responses related to the changes, to the *Director* requesting the *Approval* be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

Schedule "B" is added to this *Approval*:

**Schedule "B"**  
**Groundwater and Surface Water Monitoring Program**

Groundwater Monitoring Wells: 08-1, MW101, MW102, MW103, MW104

VOCs: 08-1 and MW101

VOC analysis will occur every 5 years starting in 2019 (next sampling 2023)

Lab criteria: ODWS

Surface Water Stations: SW1, SW2, SW3, SW5, SW6, SW7

Lab criteria: PWQO

Monitoring Program	Groundwater		Surface Water	
	Spring and Fall		Spring and Fall	
Parameters	Alkalinity	Barium	Alkalinity	Mercury (dissolved)
	N - Ammonia	Boron	N - Ammonia	Arsenic
	BOD	Cadmium	N - Ammonia(UI)	Barium
	COD	Calcium	BOD	Boron
	DOC	Chromium	COD	Cadmium
	Conductivity	Cobalt	DOC	Calcium
	Hardness	Copper	Conductivity	Chromium
	pH	Iron	Hardness	Cobalt
	Phenols	Lead	pH	Copper
	Phosphorus (total)	Magnesium	Phenols	Iron
	Phosphorus (dissolved)	Manganese	Phosphorus (total)	Lead
	TDS	Potassium	Phosphorus (dissolved)	Magnesium
	TSS	Silver	TDS	Manganese
	N - Total Kjeldahl	Sodium	TSS	Nickel
	Chloride	Vanadium	N - Total Kjeldahl	Potassium
	N - Nitrate	Zinc	Chloride	Sodium
	N - Nitrite		N - Nitrate	Vanadium
	Sulphate		N - Nitrite	Zinc
	Mercury (total)		Sulphate	Molybdenum
	Aluminum (total)		Aluminum (dissolved)	
	Arsenic		Silicon	
Field	pH	N-NH3 unionized (Calc)	pH	N-NH3 unionized (Calc)
	Temperature	Turbidity	Temperature	
	Dissolved Oxygen	ORP	Dissolved Oxygen	Turbidity
	Groundwater elevations	Conductivity	Conductivity	ORP

**Schedule "B", Groundwater and Surface Water Monitoring Program  
(continued for Groundwater only)**

Monitoring Program	Groundwater	
	Spring and Fall	
Parameters	Acetone	Dichloropropene, trans-1,3-
	Benzene	Dichloropropene, Total-1,3
	Bromodichloromethane	Ethylbenzene
	Bromoform	Hexane
	Bromomethane	Methyl Butyl Ketone
	Carbon Tetrachloride	Methyl Ethyl Ketone
	Chloroethane	Methyl Isobutyl Ketone
	Chloroform	Methyl-t-butyl Ether
	Chloromethane	Chlorobenzene
	Dibromochloromethane	Styrene
	Ethylene Dibromide	Tetrachloroethane, 1,1,1,2-
	Dichlorobenzene, 1,2-	Tetrachloroethane, 1,1,2,2-
	Dichlorobenzene, 1,3-	Tetrachloroethylene
	Dichlorobenzene, 1,4-	Toluene
	Dichlorodifluoromethane	Trichloroethane, 1,1,1-
	Dichloroethane, 1,1-	Trichloroethane, 1,1,2-
	Dichloroethane, 1,2-	Trichloroethylene
	Dichloroethene, 1,1-	Trichlorofluoromethane
	Dichloroethene, cis-1,2-	Trimethylbenzene, 1,3,5-
	Dichloroethene, trans-1,2-	Vinyl Chloride
	Dichloroethylene, Total-1,2	Xylene, m,p-
	Methyl Chloride	Xylene, o-
	Dichloropropane, 1,2-	Xylene, total
	Dichloropropene, cis-1,3-	

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

- Condition 3(2) is amended to approve the proposed groundwater and surface water monitoring plan.
- Conditions 3(10), 3(11) and 3(12) are replaced with conditions 3(10) and 3(11) to streamline the approval process for changes to the monitoring plans and trigger mechanisms and contingency plans.

**This Notice shall constitute part of the approval issued under Approval No. A442002 dated March 21, 2016 as amended**

*In accordance with Section 139 of the Environmental Protection Act, 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:*

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

*Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.*

*The Notice should also include:*

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

*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, Suite 1500  
Toronto, Ontario  
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act  
Ministry of the Environment, Conservation and Parks  
135 St. Clair Avenue West, 1st Floor  
Toronto, Ontario  
M4V 1P5

**\* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or [www.ert.gov.on.ca](http://www.ert.gov.on.ca)**

*The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.*

DATED AT TORONTO this 16th day of August, 2019



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Mohsen Keyvani, P.Eng.  
Director  
appointed for the purposes of Part II.1 of the  
*Environmental Protection Act*

RM/

c: District Manager, MECP Kingston - District  
Adam Goheen, The Corporation of the Township of Leeds and the Thousand Islands

**Ministry of the  
Environment,  
Conservation and Parks**  
Eastern Region  
*1259 Gardiners Road, Unit 3  
Kingston ON K7P 3J6*  
Phone: 613.549.4000  
or 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 800 267-0974



## MEMORANDUM

June 19, 2019

**TO:** Nathalie Matthews  
Sr. Environmental Officer  
Kingston District Office  
Eastern Region

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

**RE:** 2018 Annual Report  
Closed Leeds Waste Disposal Site: ECA #: A442002  
Part Lot 11, Conc. III, Township of Leeds and the Thousand  
Islands  
IDS Ref #: 3817-AXGRKF

---

I have reviewed the above report dated March 2019 prepared by Malroz for surface water concerns only.

### **Reviewer's Comments**

There are issues with the 2018 surface water sampling plan. Some parameters are analyzed at some stations and not at others. For example, cadmium was sampled at the inflow stream to the main receiver and showed guideline exceedances but weren't sampled at SW6 and SW7 in the receiver. Phenols weren't sampled in April. Vanadium showed PWQO exceedances in the past and wasn't analyzed in 2018.

Table 1 shows how the average concentrations of parameters in 2018 compared with the historical average data. Where differences in average concentrations of 2018 parameters exceeded the historical average by more than 25% (deemed significant) they were listed in the higher row of the table. The unknown row contains parameters that were either not sampled compared to historical or were sampled at some stations in 2018 but not at others. The remaining parameters either had a less than 25% difference or showed water quality improvement in 2018.

In general, there were more improvements in average concentrations of parameters in 2018 compared to the historical average than those with poorer water quality. Malroz in Table 6 of the 2018 report indicates that leachate indicator parameters be limited to alkalinity, chloride, nitrate and boron. The reviewer believes based on Table 2 below that a significant number of parameters could be considered as leachate parameters

when comparing average concentrations of background (SW2) to SW1 which is adjacent to the landfill.

**Table 1: 2018 vs Historical data**

Trend	SW1	SW2	SW5	SW6	SW7
<b>Higher</b>	TDS	Sulphate	TDS	TDS	TDS
	AmmoniaN	Chromium	Sulphate	Sulphate	BOD
	Chloride	Copper		Zinc	Phenols
	Copper	Lead		BOD	
	BOD	Nickel		Phenols	
	Phenols	Zinc			
	TKN	BOD			
		Phenols			
<b>Unknown</b>	Vanadium	Vanadium	Vanadium	Vanadium	Vanadium
		Nitrate	AmmoniaN		
		Boron	Nitrate	Nitrate	Nitrate
			Cadmium	Cadmium	Cadmium
			Chromium	Chromium	Chromium
			Cobalt		
			Copper		
			Zinc		
			Phenols		

When comparing the average concentrations of SW2 (background for tributary along landfill) to SW1 (adjacent to the landfill) a large number of parameters exceed the 25% difference threshold. In particular, ammonia, alkalinity, iron, manganese and copper stand out.

Table 2 also shows that for the majority of parameters, downstream SW6 has significantly higher concentrations than upstream SW7. SW1 and SW5 also show extremely elevated concentrations compared to SW7.

Malroz states in their conclusions that SW6 shows concentrations comparable to background. The above analysis shows, contrary to Malroz's conclusion that the landfill is having a significant impact on water quality at SW6 compared to background at SW7. Also, both SW1 and SW5 have significantly elevated average concentrations compared to SW7.

The 2018 report again does not indicate whether the proposed installation of a beaver baffle to ensure pond levels do not interact with the landfill and proposed years ago was implanted. A contingency plan was to be developed in 2015 and submitted to MECP for

Table 2: 2018 Average Concentrations (mg/L) and Percentage Differences.

Parameter	Average Concentrations					Percentage Differences			
	SW1	SW2	SW5	SW6	SW7	7 vs 6	7 vs 5	7 vs 1	2 vs 1
Conductivity	130.5	70.75	258	122.5	63.25	-94	-308	-106	-84
Hardness	61.5	35	126	58.25	30	-94	-320	-105	-76
pH	7.395	7.115	7.93	7.5775	7.6	0	-4	3	-4
TDS	66.5	35.5	132	61.75	31.75	-94	-316	-109	-87
TSS	35.5	20	7	8	8	0	13	-344	-78
Alkalinity	55.5	26	114	47.5	29.25	-62	-290	-90	-113
AmmoniaN	0.125	0.025		0.025	0.04	38		-213	-400
Chloride	1.1	0.825	2.4	1.125	0.6	-88	-300	-83	-33
NitrateN	0.09								
TKN	0.75	0.525	0.4	0.55	0.475	-16	16	-58	-43
TP	0.115	0.0625	0.04	0.0375	0.025	-50	-60	-360	-84
Sulphate	7	7	15	8.25	1	-725	-1400	-600	0
Aluminum	0.055	0.08	0.03	0.025	0.005	-400	-500	-1000	31
Barium	0.031	0.025	0.033	0.0205	0.00095	-2059	-3375	-3164	-24
Boron	0.022		0.061	0.0265	0.00145	-1728	-4108	-1418	
Cadmium	3.85E-05	4.75E-05							19
Calcium	16.85	11.025	31.3	17.25	0.84125	-1951	-3621	-1903	-53
Chromium	0.001	0.001							0
Cobalt	0.00045	0.0004		0.0001	1E-05	-900		-4401	-13
Copper	0.0075	0.0039		0.0006	4E-05	-1400		-18656	-95
Iron	1.902	0.8505	0.159	0.4085	0.04954	-725	-221	-3740	-124
Lead	0.0005	0.0008	0.00005	0.00013	1.6E-05	-681	-213	-2995	38
Magnesium	5.335	3.485	11.6	5.23	0.177	-2847	-6437	-2907	-53
Manganese	0.089	0.038	0.011	0.0275	0.0031	-802	-261	-2819	-134
Nickel	0.0015	0.0015	0.0015	0.0007	4E-05	-1525	-3651	-3651	0
Potassium	1.35	0.75	2.5	1.15	0.05	-2201	-4902	-2601	-80
Sodium	2.6	2.45	5.1	3	0.095	-3059	-5270	-2638	-6
Zinc	0.013	0.023		0.017	0.0009	-1901		-1430	43
BOD	5	5.75	3	3.75	4.5	17	33	-11	13
COD	24.5	23.25	25	20	23.25	14	-8	-5	-5
Phenols	0.002	0.002		0.002	0.003	33		33	0
DOC	6.75	8.725	7.9	8.525	6.875	-24	-15	2	23

#### PWQO Exceedances

approval. To my knowledge this has not occurred. The tributary to the east was to be diverted to provide more buffer between the stream and waste area and the northeast area stripped of vegetation reshaped and capped and then re-vegetated. It is unknown if any of these measures have been completed or are still on the table

In summary, leachate from Leeds Closed Landfill is having an impact on the tributary adjacent to the landfill. In turn, the water quality in the tributary is impacting on water quality in Sucker Creek. The only PWQO exceedance at SW6 in 2018 was for iron. While there are negative water impacts at SW6 none of the concentrations are likely to cause harm to aquatic life.

### Recommendations

1. An update is required on the status of several mitigation plans that were in the works outlined above.
2. Water quality impacts are difficult to interpret because the water quality is seasonally quite variable and limited in frequency. In addition, there is no consistency in the analysis of some parameters between years and even between stations within a year. In order to provide some robust data with a sampling frequency of only twice per year, all stations and all parameters are needed to be sampled during each sampling event. The proposed monitoring plan in Appendix D is acceptable with a sampling frequency of twice per year after a significant rainfall event.
3. The proposed staff gauge at SW1 should be replaced with a recording water level recorder so that more frequent measurements of the presence of water can be documented.
4. The reviewer does not support the replacing of SW7 with SW4. If they wish to sample SW4 that will be their decision. SW7 looks from the data to be an excellent background water quality station. I believe SW4 was dropped years ago because it was under the influence of buried metal waste.

If you have any questions regarding the above I would be happy to discuss them with you.



c: Shawn Trimper  
Roberto Sacilotto  
File SW LG-LT-03-06 (Leeds LFS)  
File SW-07-02-12-02-02 (tributary to Sucker Brook)



**Ministry of the  
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## MEMORANDUM

June 19, 2019

**TO:** Nathalie Matthews  
Sr. Environmental Officer  
Kingston District Office  
Eastern Region

**FROM:** Dana Cruikshank  
Surface Water Scientist  
Water Resources Group  
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**RE:** 2018 Annual Report  
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	Copper	Lead		BOD	
	BOD	Nickel		Phenols	
	Phenols	Zinc			
	TKN	BOD			
		Phenols			
<b>Unknown</b>	Vanadium	Vanadium	Vanadium	Vanadium	Vanadium
		Nitrate	AmmoniaN		
		Boron	Nitrate	Nitrate	Nitrate
			Cadmium	Cadmium	Cadmium
			Chromium	Chromium	Chromium
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c: Shawn Trimper  
Roberto Sacilotto  
File SW LG-LT-03-06 (Leeds LFS)  
File SW-07-02-12-02-02 (tributary to Sucker Brook)

**Appendix F**  
**Site Inspection**

**Leeds Site Inspection**

Date: May 2, 2019  
 Inspected by: EMM + MW  
 Weather Conditions: cloud, +10°C

Time: 2:30pm

Inspection Item	condition	notes
Condition of the waste cap (Erosion, repairs needed?)	Good.	
Are there seep present.	No	
Condition of perimeter fence and gate.	Great = West, South + East boundary	No perimeter fence along northern boundary
Is the site secure.	Gate is present + in good condition, but no fence along north	Site boundary.
Were vermin, vectors, dust or litter present.	No	pile of metal wire, a couch pillow, and other small items are located just East of the entrance gate.
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>*Note that rain event occurred yesterday and regional high water levels are reported regionally</p> </div>		

**General Comments** MW104 and MW102 were dry and we were not able to collect complete samples.

located

Signature CM







**Appendix G**  
**Laboratory Certificates**

C.O.C.: G77953

REPORT No. B19-11812

Rev. 1

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada

**Attention:** Camille Malcolm

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 02-May-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 18-Nov-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	19-W008	19-W009	19-W001	19-W004
Sample I.D.	B19-11812-1	B19-11812-2	B19-11812-3	B19-11812-4
Date Collected	02-May-19	02-May-19	02-May-19	02-May-19

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	07-May-19/O	53	30	71	82
pH @25°C	pH Units		SM 4500H	07-May-19/O	7.67	7.33	7.86	7.67
Conductivity @25°C	µmho/cm	1	SM 2510B	07-May-19/O	117	66	158	187
Chloride	mg/L	0.5	SM4110C	16-May-19/O	0.7	0.5	1.1	1.3
Nitrite (N)	mg/L	0.05	SM4110C	16-May-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	16-May-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Sulphate	mg/L	1	SM4110C	16-May-19/O	3	2	5	7
BOD(5 day)	mg/L	3	SM 5210B	06-May-19/K	< 3	< 3	< 3	< 3
Total Suspended Solids	mg/L	3	SM2540D	08-May-19/K	14	16	28	6
o-Phosphate (P)	mg/L	0.002	PE4500-S	07-May-19/K	0.072	0.028	0.013	0.050
Phosphorus-Total	mg/L	0.01	E3199A.1	14-May-19/K	0.01	0.03	< 0.01	0.05
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	14-May-19/K	0.3	0.4	0.3	0.5
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	07-May-19/K	0.04	0.04	0.03	0.05
Ammonia (N)-unionized	mg/L	0.01	CALC	07-May-19/K	< 0.01	< 0.01	< 0.01	< 0.01
Total Dissolved Solids	mg/L	3	SM 2540D	08-May-19/O	59	33	80	95
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	11-May-19/O	9.2	5.0	6.2	10.3
Phenolics	mg/L	0.001	MOEE 3179	08-May-19/K	0.005	< 0.001	< 0.001	< 0.001
COD	mg/L	5	SM 5220D	13-May-19/O	18	25	21	29
Hardness (as CaCO3)	mg/L	1	SM 3120	07-May-19/O	78	58	100	114
Aluminum	mg/L	0.01	SM 3120	08-May-19/O	0.02	0.02	0.03	0.03
Antimony	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	0.0001	< 0.0001	0.0003
Arsenic	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	0.0001	0.0001	0.0002
Barium	mg/L	0.001	SM 3120	07-May-19/O	0.038	0.037	0.039	0.043
Beryllium	mg/L	0.002	SM 3120	07-May-19/O	< 0.002	< 0.002	< 0.002	< 0.002
Boron	mg/L	0.005	SM 3120	07-May-19/O	0.050	0.038	0.067	0.076
Cadmium	mg/L	0.000015	EPA 200.8	07-May-19/O	< 0.000015	0.000016	< 0.000015	< 0.000015
Calcium	mg/L	0.02	SM 3120	07-May-19/O	21.5	15.8	26.8	29.9



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an \*

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

Michelle Dubien  
Lab Manager

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C.O.C.: G77953

REPORT No. B19-11812

Rev. 1

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada

**Attention:** Camille Malcolm

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 02-May-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 18-Nov-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	19-W008	19-W009	19-W001	19-W004
Sample I.D.	B19-11812-1	B19-11812-2	B19-11812-3	B19-11812-4
Date Collected	02-May-19	02-May-19	02-May-19	02-May-19

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Chromium	mg/L	0.001	EPA 200.8	07-May-19/O	0.001	0.002	0.002	< 0.001
Cobalt	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	0.0002	0.0001	0.0002
Copper	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0006	0.0011	0.0011	0.0005
Iron	mg/L	0.005	SM 3120	07-May-19/O	0.268	0.500	0.255	0.535
Lead	mg/L	0.00002	EPA 200.8	07-May-19/O	0.00007	0.00019	0.00011	0.00006
Magnesium	mg/L	0.02	SM 3120	07-May-19/O	5.94	4.54	8.00	9.61
Manganese	mg/L	0.001	SM 3120	07-May-19/O	0.029	0.022	0.012	0.020
Mercury	mg/L	0.00002	SM 3112 B	07-May-19/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Molybdenum	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0002	0.0002	0.0002	0.0002
Nickel	mg/L	0.0002	EPA 200.8	07-May-19/O	0.0006	0.0007	0.0008	0.0007
Potassium	mg/L	0.1	SM 3120	07-May-19/O	0.8	0.4	1.3	1.4
Selenium	mg/L	0.001	EPA 200.8	07-May-19/O	< 0.001	< 0.001	< 0.001	< 0.001
Silicon	mg/L	0.01	SM 3120	07-May-19/O	2.36	2.63	2.63	1.44
Silver	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.2	SM 3120	07-May-19/O	3.8	3.3	4.6	5.6
Strontium	mg/L	0.001	SM 3120	07-May-19/O	0.137	0.102	0.169	0.181
Thallium	mg/L	0.00005	EPA 200.8	07-May-19/O	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Tin	mg/L	0.05	SM 3120	07-May-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Titanium	mg/L	0.005	SM 3120	07-May-19/O	0.006	0.016	0.011	0.005
Tungsten	mg/L	0.01	SM 3120	07-May-19/O	0.05	0.04	0.09	0.05
Uranium	mg/L	0.00005	EPA 200.8	07-May-19/O	0.00006	< 0.00005	0.00013	0.00011
Vanadium	mg/L	0.005	SM 3120	07-May-19/O	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	mg/L	0.005	SM 3120	07-May-19/O	0.013	0.017	0.013	0.012

1 Revised to correct sample IDs



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an \*

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

Michelle Dubien  
Lab Manager

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C.O.C.: G77953

REPORT No. B19-11812

Rev. 1

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada

**Attention:** Camille Malcolm

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 02-May-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 18-Nov-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

<b>Client I.D.</b>	19-W003	19-W002		
<b>Sample I.D.</b>	B19-11812-5	B19-11812-6		
<b>Date Collected</b>	02-May-19	02-May-19		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	07-May-19/O	72	18		
pH @25°C	pH Units		SM 4500H	07-May-19/O	7.72	7.38		
Conductivity @25°C	µmho/cm	1	SM 2510B	07-May-19/O	164	47		
Chloride	mg/L	0.5	SM4110C	16-May-19/O	1.2	0.7		
Nitrite (N)	mg/L	0.05	SM4110C	16-May-19/O	< 0.05	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	16-May-19/O	< 0.05	< 0.05		
Sulphate	mg/L	1	SM4110C	16-May-19/O	6	2		
BOD(5 day)	mg/L	3	SM 5210B	06-May-19/K	< 3	< 3		
Total Suspended Solids	mg/L	3	SM2540D	08-May-19/K	< 3	5		
o-Phosphate (P)	mg/L	0.002	PE4500-S	07-May-19/K	0.024	0.015		
Phosphorus-Total	mg/L	0.01	E3199A.1	14-May-19/K	0.01	0.01		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	14-May-19/K	0.5	0.4		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	07-May-19/K	0.06	0.07		
Ammonia (N)-unionized	mg/L	0.01	CALC	07-May-19/K	< 0.01	< 0.01		
Total Dissolved Solids	mg/L	3	SM 2540D	08-May-19/O	83	24		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	11-May-19/O	9.7	7.3		
Phenolics	mg/L	0.001	MOEE 3179	08-May-19/K	< 0.001	< 0.001		
COD	mg/L	5	SM 5220D	13-May-19/O	25	18		
Hardness (as CaCO3)	mg/L	1	SM 3120	07-May-19/O	104	48		
Aluminum	mg/L	0.01	SM 3120	08-May-19/O	0.02	0.01		
Antimony	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	0.0001		
Arsenic	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0002	0.0001		
Barium	mg/L	0.001	SM 3120	07-May-19/O	0.038	0.028		
Beryllium	mg/L	0.002	SM 3120	07-May-19/O	< 0.002	< 0.002		
Boron	mg/L	0.005	SM 3120	07-May-19/O	0.071	0.047		
Cadmium	mg/L	0.000015	EPA 200.8	07-May-19/O	< 0.000015	< 0.000015		
Calcium	mg/L	0.02	SM 3120	07-May-19/O	27.6	14.1		



R.L. = Reporting Limit

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

Michelle Dubien  
Lab Manager

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C.O.C.: G77953

REPORT No. B19-11812

Rev. 1

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada

**Attention:** Camille Malcolm

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 02-May-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 18-Nov-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

<b>Client I.D.</b>	19-W003	19-W002		
<b>Sample I.D.</b>	B19-11812-5	B19-11812-6		
<b>Date Collected</b>	02-May-19	02-May-19		

Parameter	Units	R.L.	Reference Method		Date/Site Analyzed			
Chromium	mg/L	0.001	EPA 200.8	07-May-19/O	0.002	0.002		
Cobalt	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0001	0.0001		
Copper	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0012	0.0009		
Iron	mg/L	0.005	SM 3120	07-May-19/O	0.273	0.580		
Lead	mg/L	0.00002	EPA 200.8	07-May-19/O	0.00006	0.00015		
Magnesium	mg/L	0.02	SM 3120	07-May-19/O	8.51	3.20		
Manganese	mg/L	0.001	SM 3120	07-May-19/O	0.036	0.046		
Mercury	mg/L	0.00002	SM 3112 B	07-May-19/O	< 0.00002	< 0.00002		
Molybdenum	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0003	0.0002		
Nickel	mg/L	0.0002	EPA 200.8	07-May-19/O	0.0009	0.0005		
Potassium	mg/L	0.1	SM 3120	07-May-19/O	1.2	0.5		
Selenium	mg/L	0.001	EPA 200.8	07-May-19/O	< 0.001	< 0.001		
Silicon	mg/L	0.01	SM 3120	07-May-19/O	1.50	1.98		
Silver	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	< 0.0001		
Sodium	mg/L	0.2	SM 3120	07-May-19/O	5.1	2.8		
Strontium	mg/L	0.001	SM 3120	07-May-19/O	0.169	0.084		
Thallium	mg/L	0.00005	EPA 200.8	07-May-19/O	< 0.00005	< 0.00005		
Tin	mg/L	0.05	SM 3120	07-May-19/O	< 0.05	< 0.05		
Titanium	mg/L	0.005	SM 3120	07-May-19/O	< 0.005	0.008		
Tungsten	mg/L	0.01	SM 3120	07-May-19/O	0.04	0.04		
Uranium	mg/L	0.00005	EPA 200.8	07-May-19/O	0.00008	< 0.00005		
Vanadium	mg/L	0.005	SM 3120	07-May-19/O	< 0.005	< 0.005		
Zinc	mg/L	0.005	SM 3120	07-May-19/O	0.009	0.009		

1 Revised to correct sample IDs



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

Michelle Dubien  
Lab Manager

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**C.O.C.: G77952**

**REPORT No. B19-11817**

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada

**Attention:** Camille Malcolm

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 02-May-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 17-May-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Client I.D.		19-W005	19-W006	19-W007	19-W010
			Reference Method	Date/Site Analyzed	B19-11817-1	B19-11817-2	B19-11817-3	B19-11817-4
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	07-May-19/O	176	750	807	244
pH @25°C	pH Units		SM 4500H	07-May-19/O	7.95	7.85	7.64	8.12
Conductivity @25°C	µmho/cm	1	SM 2510B	07-May-19/O	415	1540	1550	510
Chloride	mg/L	0.5	SM4110C	16-May-19/O	2.8	8.7	16.4	2.1
Nitrite (N)	mg/L	0.05	SM4110C	16-May-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	16-May-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Sulphate	mg/L	1	SM4110C	16-May-19/O	32	131	36	18
BOD(5 day)	mg/L	3	SM 5210B	06-May-19/K	5	< 3	< 3	
Total Suspended Solids	mg/L	3	SM2540D	08-May-19/K	103000	6000	880	
Phosphorus-Total	mg/L	0.01	E3199A.1	10-May-19/K	55.6	1.63	0.41	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	10-May-19/K	45.2	0.9	8.8	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	07-May-19/K	0.13	0.06	7.54	
Total Dissolved Solids	mg/L	3	SM 2540D	08-May-19/O	215	840	846	264
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	11-May-19/O	7.3	14.8	16.0	
Phenolics	mg/L	0.002	MOEE 3179	08-May-19/K	< 0.002	< 0.002	< 0.002	
COD	mg/L	5	SM 5220D	10-May-19/O	2400	67	45	
Hardness (as CaCO3)	mg/L	1	SM 3120	08-May-19/O	211	693	793	253
Aluminum	mg/L	0.01	SM 3120	08-May-19/O	0.04	0.10	0.10	0.05
Arsenic	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0002	0.0006	0.0007	0.0001
Barium	mg/L	0.001	SM 3120	08-May-19/O	0.031	0.046	0.281	0.024
Boron	mg/L	0.005	SM 3120	08-May-19/O	0.105	0.447	0.731	0.014
Cadmium	mg/L	0.000015	EPA 200.8	07-May-19/O	< 0.000015	0.000018	0.000067	< 0.000015
Calcium	mg/L	0.02	SM 3120	08-May-19/O	48.2	174	204	68.2
Chromium	mg/L	0.001	EPA 200.8	07-May-19/O	0.001	0.001	0.001	< 0.001
Cobalt	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0003	0.0003	0.0016	< 0.0001
Copper	mg/L	0.0001	EPA 200.8	07-May-19/O	0.0006	0.0008	0.0002	0.0004
Iron	mg/L	0.005	SM 3120	08-May-19/O	< 0.005	< 0.005	19.0	0.019



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

Michelle Dubien  
Lab Manager

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**C.O.C.: G77952**

**REPORT No. B19-11817**

**Report To:**

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 308 Wellington Street, 2nd Floor  
 Kingston ON K7K 7A8 Canada

**Attention:** Camille Malcolm

**Caduceon Environmental Laboratories**

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 Tel: 613-544-2001  
 Fax: 613-544-2770

DATE RECEIVED: 02-May-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 17-May-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.	19-W005	19-W006	19-W007	19-W010
					Sample I.D.	B19-11817-1	B19-11817-2	B19-11817-3	B19-11817-4
Date Collected					02-May-19	02-May-19	02-May-19	02-May-19	02-May-19
Lead	mg/L	0.00002	EPA 200.8	07-May-19/O	0.00002	0.00010	0.00005	< 0.00002	
Magnesium	mg/L	0.02	SM 3120	08-May-19/O	22.1	62.7	68.8	20.1	
Manganese	mg/L	0.001	SM 3120	08-May-19/O	0.091	0.360	1.92	< 0.001	
Mercury	mg/L	0.00002	SM 3112 B	07-May-19/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002	
Potassium	mg/L	0.1	SM 3120	08-May-19/O	0.5	1.5	29.2	0.5	
Silver	mg/L	0.0001	EPA 200.8	07-May-19/O	< 0.0001	< 0.0001	< 0.0001	< 0.0001	
Sodium	mg/L	0.2	SM 3120	08-May-19/O	12.4	54.3	31.9	13.7	
Uranium	mg/L	0.00005	EPA 200.8	07-May-19/O	0.00066	0.00287	0.00025	0.00074	
Vanadium	mg/L	0.005	SM 3120	08-May-19/O	< 0.005	< 0.005	< 0.005	< 0.005	
Zinc	mg/L	0.005	SM 3120	08-May-19/O	< 0.005	< 0.005	0.142	< 0.005	

1. Results unavailable for certain requested parameters due to low sample volumes



Michelle Dubien  
 Lab Manager

R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an \*

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

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**C.O.C.: G91341**

**REPORT No. B19-32485**

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada

**Attention:** Mallory Wright

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 08-Oct-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 25-Oct-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	R.L.	Client I.D.		19-W011	19-W012	19-W013	19-W017
			Reference Method	Date/Site Analyzed	B19-32485-1	B19-32485-2	B19-32485-3	B19-32485-4
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	10-Oct-19/O	8	44	46	120
pH @25°C	pH Units		SM 4500H	10-Oct-19/O	6.46	7.57	7.15	7.55
Conductivity @25°C	µmho/cm	1	SM 2510B	10-Oct-19/O	53	89	113	268
Chloride	mg/L	0.5	SM4110C	18-Oct-19/O	< 0.5	< 0.5	< 0.5	< 0.5
Nitrite (N)	mg/L	0.05	SM4110C	18-Oct-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	18-Oct-19/O	< 0.05	< 0.05	< 0.05	< 0.05
Sulphate	mg/L	1	SM4110C	18-Oct-19/O	7	< 1	4	11
BOD(5 day)	mg/L	3	SM 5210B	10-Oct-19/K	< 3	< 3	< 3	13
Total Suspended Solids	mg/L	3	SM2540D	09-Oct-19/K	92	< 3	16	4500
o-Phosphate (P)	mg/L	0.002	PE4500-S	10-Oct-19/K	0.078	0.032	0.106	2.41
Phosphorus-Total	mg/L	0.01	E3199A.1	09-Oct-19/K	0.14	0.04	0.15	55.9
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	09-Oct-19/K	1.2	0.4	1.0	104
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	10-Oct-19/K	0.09	0.06	0.08	0.71
Ammonia (N)-unionized	mg/L	0.01	CALC	10-Oct-19/K	< 0.01	< 0.01	< 0.01	0.01
Total Dissolved Solids	mg/L	3	SM 2540D	15-Oct-19/O	27	45	57	137
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	15-Oct-19/O	16.8	7.1	13.9	14.2
Phenolics	mg/L	0.001	MOEE 3179	10-Oct-19/K	< 0.001	< 0.001	< 0.001	< 0.001
COD	mg/L	5	SM 5220D	18-Oct-19/O	48	< 5	20	103
Hardness (as CaCO3)	mg/L	1	SM 3120	15-Oct-19/O	22	45	54	126
Aluminum	mg/L	0.01	SM 3120	15-Oct-19/O	0.22	0.02	0.03	0.03
Aluminum (total)	mg/L	0.01	SM 3120	15-Oct-19/O	0.28	0.08	0.12	4.70
Arsenic	mg/L	0.0001	EPA 200.8	15-Oct-19/O	0.0003	0.0002	0.0003	0.0024
Barium	mg/L	0.001	SM 3120	15-Oct-19/O	0.029	0.009	0.023	0.228
Boron	mg/L	0.005	SM 3120	15-Oct-19/O	0.007	0.019	0.032	0.116
Cadmium	mg/L	0.000015	EPA 200.8	15-Oct-19/O	0.000106	< 0.000015	< 0.000015	0.000159
Calcium	mg/L	0.02	SM 3120	15-Oct-19/O	6.51	13.6	15.2	33.7
Chromium	mg/L	0.001	EPA 200.8	15-Oct-19/O	< 0.001	< 0.001	< 0.001	0.006



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Michelle Dubien  
Lab Manager

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C.O.C.: G91341

REPORT No. B19-32485

**Report To:**

**Malroz Engineering Inc.**  
308 Wellington Street, 2nd Floor  
Kingston ON K7K 7A8 Canada  
**Attention:** Mallory Wright

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 08-Oct-19  
DATE REPORTED: 25-Oct-19  
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Leeds  
P.O. NUMBER: 1040  
WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.	19-W011	19-W012	19-W013	19-W017
					Sample I.D.	B19-32485-1	B19-32485-2	B19-32485-3	B19-32485-4
Date Collected					08-Oct-19	08-Oct-19	08-Oct-19	08-Oct-19	08-Oct-19
Cobalt	mg/L	0.0001	EPA 200.8	15-Oct-19/O	0.0013	0.0002	0.0009	0.0052	
Copper	mg/L	0.0001	EPA 200.8	15-Oct-19/O	0.0023	0.0003	0.0004	0.0053	
Iron	mg/L	0.005	SM 3120	15-Oct-19/O	2.43	0.546	2.53	50.8	
Lead	mg/L	0.00002	EPA 200.8	15-Oct-19/O	0.00062	0.00007	0.00017	0.00314	
Magnesium	mg/L	0.02	SM 3120	15-Oct-19/O	1.44	2.66	3.97	10.1	
Manganese	mg/L	0.001	SM 3120	15-Oct-19/O	0.136	0.079	1.48	1.06	
Mercury	mg/L	0.00002	SM 3112 B	15-Oct-19/O	< 0.00002	< 0.00002	< 0.00002	< 0.00002	
Nickel	mg/L	0.0002	EPA 200.8	15-Oct-19/O	0.0011	0.0019	0.0004	0.0050	
Potassium	mg/L	0.1	SM 3120	15-Oct-19/O	0.6	0.6	1.5	3.3	
Silicon	mg/L	0.01	SM 3120	15-Oct-19/O	3.55	2.61	3.95	12.7	
Sodium	mg/L	0.2	SM 3120	15-Oct-19/O	2.7	1.0	2.3	4.9	
Thallium	mg/L	0.00005	EPA 200.8	15-Oct-19/O	< 0.00005	< 0.00005	< 0.00005	0.00005	
Tungsten	mg/L	0.01	SM 3120	15-Oct-19/O	< 0.01	< 0.01	< 0.01	< 0.01	
Uranium	mg/L	0.00005	EPA 200.8	15-Oct-19/O	0.00008	< 0.00005	< 0.00005	0.00029	
Vanadium	mg/L	0.005	SM 3120	15-Oct-19/O	< 0.005	< 0.005	< 0.005	0.012	
Zinc	mg/L	0.005	SM 3120	15-Oct-19/O	0.021	0.006	0.009	0.054	



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

Michelle Dubien  
Lab Manager

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C.O.C.: G91342

REPORT No. B19-32486

**Report To:**

**Malroz Engineering Inc.**  
 308 Wellington Street, 2nd Floor  
 Kingston ON K7K 7A8 Canada

**Attention:** Mallory Wright

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 08-Oct-19

JOB/PROJECT NO.: Leeds

DATE REPORTED: 30-Oct-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

<b>Client I.D.</b>	19-W015	19-W016		
<b>Sample I.D.</b>	B19-32486-1	B19-32486-2		
<b>Date Collected</b>	08-Oct-19	08-Oct-19		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	10-Oct-19/O	714	804		
pH @25°C	pH Units		SM 4500H	10-Oct-19/O	7.88	8.01		
Conductivity @25°C	µmho/cm	1	SM 2510B	10-Oct-19/O	1440	1530		
Chloride	mg/L	0.5	SM4110C	17-Oct-19/O	10.0	20.1		
Nitrite (N)	mg/L	0.05	SM4110C	17-Oct-19/O	< 0.05	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	17-Oct-19/O	< 0.05	< 0.05		
Sulphate	mg/L	1	SM4110C	17-Oct-19/O	140	54		
BOD(5 day)	mg/L	3	SM 5210B	10-Oct-19/K	< 3	18		
Total Suspended Solids	mg/L	3	SM2540D	09-Oct-19/K	1880	13400		
o-Phosphate (P)	mg/L	0.002	PE4500-S	21-Oct-19/K	1.65	4.63		
Phosphorus-Total	mg/L	0.01	E3199A.1	09-Oct-19/K	3.67	15.4		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	09-Oct-19/K	1.2	16.3		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	10-Oct-19/K	0.07	7.18		
Total Dissolved Solids	mg/L	3	SM 2540D	15-Oct-19/O	782	835		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	15-Oct-19/O	17.0	22.0		
Phenolics	mg/L	0.002	MOEE 3179	10-Oct-19/K	< 0.002	< 0.002		
COD	mg/L	5	SM 5220D	18-Oct-19/O	78	295		
Hardness (as CaCO3)	mg/L	1	SM 3120	15-Oct-19/O	822	874		
Aluminum	mg/L	0.01	SM 3120	15-Oct-19/O	0.12	0.12		
Arsenic	mg/L	0.0001	EPA 200.8	17-Oct-19/O	0.0012	0.0010		
Barium	mg/L	0.001	SM 3120	15-Oct-19/O	0.060	0.281		
Boron	mg/L	0.005	SM 3120	15-Oct-19/O	0.693	0.975		
Cadmium	mg/L	0.00015	EPA 200.8	17-Oct-19/O	< 0.000029	0.000036		
Calcium	mg/L	0.02	SM 3120	15-Oct-19/O	203	216		
Chromium	mg/L	0.001	EPA 200.8	17-Oct-19/O	< 0.001	< 0.001		
Cobalt	mg/L	0.0001	EPA 200.8	17-Oct-19/O	0.0009	0.0033		
Copper	mg/L	0.0001	EPA 200.8	17-Oct-19/O	0.0014	0.0010		



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Michelle Dubien  
 Lab Manager

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**C.O.C.: G91342**

**REPORT No. B19-32486**

**Report To:**

**Malroz Engineering Inc.**  
 308 Wellington Street, 2nd Floor  
 Kingston ON K7K 7A8 Canada  
**Attention:** Mallory Wright

**Caduceon Environmental Laboratories**

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

DATE RECEIVED: 08-Oct-19  
 DATE REPORTED: 30-Oct-19  
 SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: Leeds  
 P.O. NUMBER: 1040  
 WATERWORKS NO.

<b>Client I.D.</b>	19-W015	19-W016		
<b>Sample I.D.</b>	B19-32486-1	B19-32486-2		
<b>Date Collected</b>	08-Oct-19	08-Oct-19		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Iron	mg/L	0.005	SM 3120	15-Oct-19/O	0.032	7.90		
Lead	mg/L	0.00002	EPA 200.8	17-Oct-19/O	0.00011	< 0.00009		
Magnesium	mg/L	0.02	SM 3120	15-Oct-19/O	76.5	81.3		
Manganese	mg/L	0.001	SM 3120	15-Oct-19/O	0.400	4.12		
Mercury	mg/L	0.00002	SM 3112 B	11-Oct-19/O	< 0.00002			
Potassium	mg/L	0.1	SM 3120	15-Oct-19/O	2.4	32.7		
Silver	mg/L	0.0001	EPA 200.8	17-Oct-19/O	< 0.0001	< 0.0001		
Sodium	mg/L	0.2	SM 3120	15-Oct-19/O	82.4	49.1		
Uranium	mg/L	0.00005	EPA 200.8	17-Oct-19/O	0.00523	0.00065		
Vanadium	mg/L	0.005	SM 3120	15-Oct-19/O	< 0.005	< 0.005		
Zinc	mg/L	0.005	SM 3120	15-Oct-19/O	< 0.005	0.012		



Michelle Dubien  
 Lab Manager

R.L. = Reporting Limit

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

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**Appendix H**  
**Historic Chemistry**







**Appendix I**  
**Site Photographs**





Surface Water Location: SW1  
May-2019



Surface Water Location: SW2  
May-2019



Surface Water Location: SW3  
May-2019



Surface Water Location: SW5  
May-2019



Surface Water Location: SW6  
May-2019



Surface Water Location: SW7  
Oct-2019



Well ID: 08-1  
Oct-2019



Well ID: MW101  
May-2019



Well ID: MW102  
May-2019



Well ID: MW103  
May-2019



Well ID: MW104  
May-2019

**Appendix J**  
**Borehole Logs**



308 Wellington Street  
2nd Floor  
Kingston, ON K7K 7A8  
Canada

613-548-3446  
www.malroz.com

PROJECT:  
**1040 - Leeds Waste Disposal Site**

CLIENT:  
**Township of Leeds and the Thousand Islands**

BOREHOLE LOG:  
**BH101**

DRILLING CONTRACTOR: **Strata Drilling Group**

DRILLING EQUIPMENT: **GM100 GT**

DRILLING METHOD: **Macrocore**

SAMPLING METHOD: **5' Macrocore**

WELL ID: **MW101**  
WELL TAG#: -  
GROUND SURFACE ELEV.: -  
TOP ELEVATION: -

DATUM: **NAD 83 Zone 18**  
EASTING: **405507**  
NORTHING: **4916167**

LOGGED BY:  
**BC**

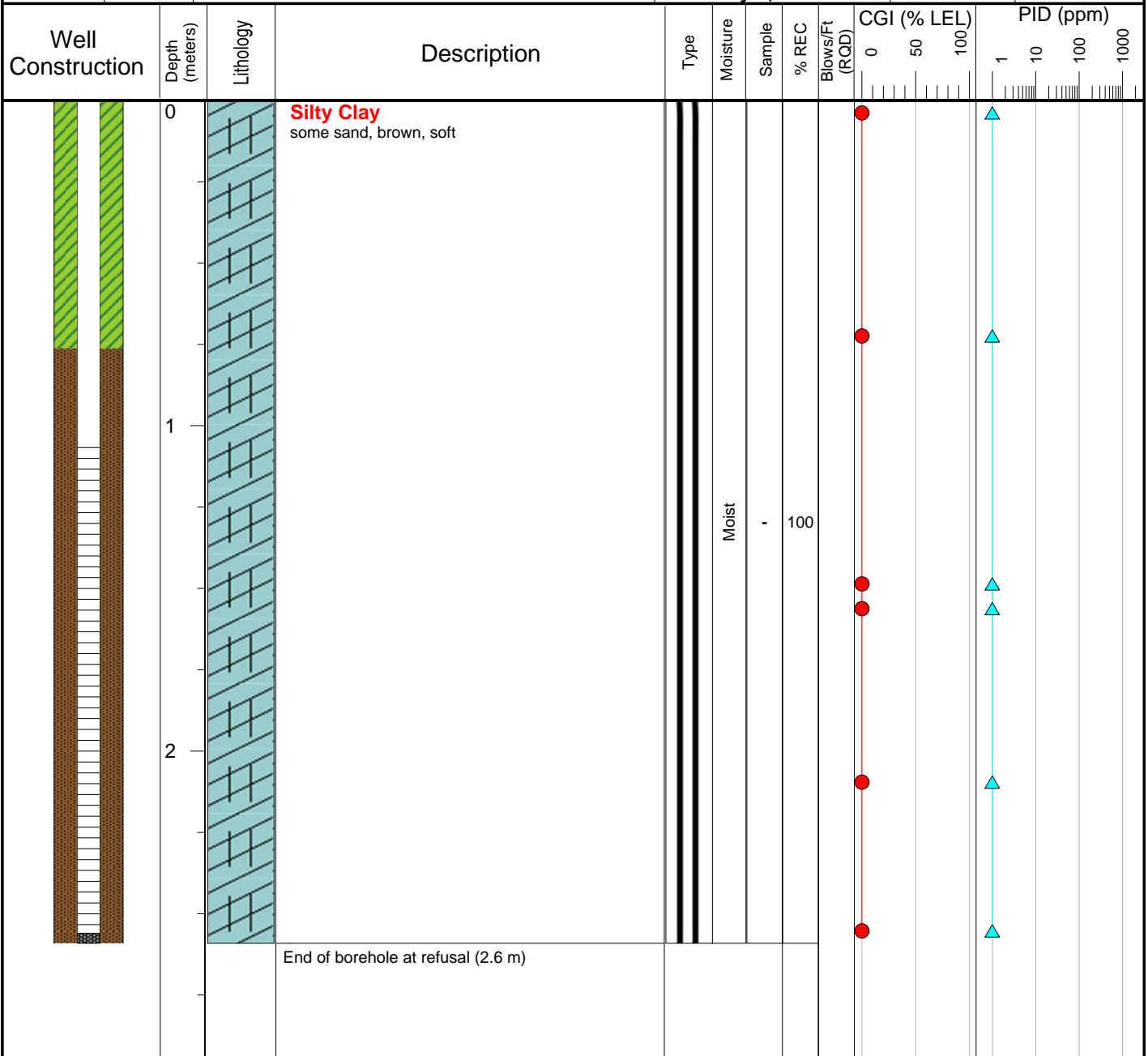
INPUT BY:  
**ZL**

FIELD INSTRUMENT(S):  
**RKI Eagle 2 CGI & PID**

DATE DRILLED:  
**February 5, 2018**

VALIDATED BY:  
**BC**

CHECK:



Notes: Well Construction Details  
steel monument casing  
50mm schedule 40 PVC  
0.25mm slotted screen  
1.5m screen  
#1 sand

Groundwater Monitoring Details  
yet to be monitored  
CGI: --  
CGI(ME): --  
PID: --

depth to water\*: --  
depth to bottom\*: --

\* measurements taken from top of piezometer

MW101 installed to replaced 00-1.

**THIS BOREHOLE LOG MUST BE READ TOGETHER WITH THE ACCOMPANYING REPORT**



308 Wellington Street  
2nd Floor  
Kingston, ON K7K 7A8  
Canada

613-548-3446  
www.malroz.com

PROJECT:  
**1040 - Leeds Waste Disposal Site**

CLIENT:  
**Township of Leeds and the Thousand Islands**

BOREHOLE LOG:  
**BH102**

DRILLING CONTRACTOR: **Strata Drilling Group**

DRILLING EQUIPMENT: **GM100 GT**

DRILLING METHOD: **Macrocore**

SAMPLING METHOD: **5' Macrocore**

WELL ID: **MW102**  
WELL TAG#:-  
GROUND SURFACE ELEV.: -  
TOP ELEVATION: -

DATUM: **NAD 83 Zone 18**  
EASTING: **405371**  
NORTHING: **4916244**

LOGGED BY:  
**BC**

INPUT BY:  
**ZL**

FIELD INSTRUMENT(S):  
**RKI Eagle 2 CGI & PID**

DATE DRILLED:  
**February 5, 2018**

VALIDATED BY:  
**BC**

CHECK:

Well Construction	Depth (meters)	Lithology	Description	Type	Moisture	Sample	% REC	Blows/Ft (RQD)	CGI (% LEL)			PID (ppm)			
									0	50	100	1	10	100	1000
	0		<b>Silty Clay</b> brown, soft		Moist	-	100								
	2.1														End of borehole at refusal (2.1 m)

Notes: Well Construction Details  
steel monument casing  
50mm schedule 40 PVC  
0.25mm slotted screen  
1.2m screen  
#1 sand

Groundwater Monitoring Details  
yet to be monitored  
CGI: --  
CGI(ME): --  
PID: --

depth to water\*: --  
depth to bottom\*: --

\* measurements taken from top of piezometer

MW101 installed to replaced 89-1.

**THIS BOREHOLE LOG MUST BE READ TOGETHER WITH THE ACCOMPANYING REPORT**



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2nd Floor  
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Canada

613-548-3446  
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PROJECT:  
**1040 - Leeds Waste Disposal Site**

CLIENT:  
**Township of Leeds and the Thousand Islands**

BOREHOLE LOG:  
**BH103**

DRILLING CONTRACTOR: **Strata Drilling Group**

DRILLING EQUIPMENT: **Pionjar**

DRILLING METHOD: **Macrocore**

SAMPLING METHOD: **2' Macrocore**

WELL ID: **MW103**  
WELL TAG#: **A189989**  
GROUND SURFACE ELEV.: -  
TOP ELEVATION: -

DATUM: **NAD 83 Zone 18**  
EASTING: **405529**  
NORTHING: **4916091**

LOGGED BY:  
**BC**

INPUT BY:  
**ZL**

FIELD INSTRUMENT(S):  
**RKI Eagle 2 CGI & PID**

DATE DRILLED:  
**February 5, 2018**

VALIDATED BY:  
**BC**

CHECK:

Well Construction	Depth (meters)	Lithology	Description	Type	Moisture		Sample	% REC	Blows/Ft (RQD)	CGI (% LEL)			PID (ppm)			
					Moist	Wet				0	50	100	1	10	100	1000
	0		<b>Silty Clay</b> grey, mottling, soft													
	1		increased gravel content at 1.2 m													
	2		End of borehole at refusal (1.5 m)													

Notes: Well Construction Details  
 steel monument casing  
 32mm schedule 40 PVC  
 0.25mm slotted screen  
 0.6m screen  
 #1 sand

Groundwater Monitoring Details  
 yet to be monitored  
 CGI: --  
 CGI(ME): --  
 PID: --

depth to water\*: --  
 depth to bottom\*: --

\* measurements taken from top of piezometer

**THIS BOREHOLE LOG MUST BE READ TOGETHER WITH THE ACCOMPANYING REPORT**



308 Wellington Street  
2nd Floor  
Kingston, ON K7K 7A8  
Canada

613-548-3446  
www.malroz.com

PROJECT:  
**1040 - Leeds Waste Disposal Site**

CLIENT:  
**Township of Leeds and the Thousand Islands**

BOREHOLE LOG:  
**BH104**

DRILLING CONTRACTOR: **Strata Drilling Group**

DRILLING EQUIPMENT: **Pionjar**

DRILLING METHOD: **Macrocore**

SAMPLING METHOD: **2' Macrocore**

WELL ID: **MW104**  
WELL TAG#: **A189974**  
GROUND SURFACE ELEV.: -  
TOP ELEVATION: -

DATUM: **NAD 83 Zone 18**  
EASTING: **405514**  
NORTHING: **4916114**

LOGGED BY:  
**BC**

INPUT BY:  
**ZL**

FIELD INSTRUMENT(S):  
**RKI Eagle 2 CGI & PID**

DATE DRILLED:  
**February 5, 2018**

VALIDATED BY:  
**BC**

CHECK:

Well Construction	Depth (meters)	Lithology	Description	Type	Moisture	Sample	% REC	Blows/Ft (RQD)	CGI (% LEL)			PID (ppm)						
									0	50	100	1	10	100	1000			
	0		<b>Silty Clay</b> grey, soft		Wet	-	100											
	1.2		End of borehole at refusal (1.2 m)															
	2																	

Notes: Well Construction Details  
steel monument casing  
32mm schedule 40 PVC  
0.25mm slotted screen  
0.5m screen  
#1 sand

Groundwater Monitoring Details  
yet to be monitored  
CGI: --  
CGI(ME): --  
PID: --

depth to water\*: --  
depth to bottom\*: --

\* measurements taken from top of piezometer

**THIS BOREHOLE LOG MUST BE READ TOGETHER WITH THE ACCOMPANYING REPORT**



**Appendix K**  
**Historical Trends**

