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TOWNSHIP OF LEEDS AND THE THOUSAND ISLANDS

**Leeds Waste Disposal Site
2018 Annual Monitoring Report**



Appendix D-Monitoring and Screening Checklist

General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.

Instructions: A complete checklist consists of:

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

Definition of Groundwater CEP:

For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:

- (a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
- (b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..

Definition of Surface water CEP:

A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

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

Monitoring Report and Site Information	
Waste Disposal Site Name	Leeds Waste Disposal Site
Location (e.g. street address, lot, concession)	Lot 11, Concession 3, in the Township of Leeds and the Thousand Islands
GPS Location (taken within the property boundary at front gate/ front entry)	442335.57 N, 761114.93 W
Municipality	Township of Leeds and the Thousand Islands
Client and/or Site Owner	The Corporation of the Township of Leeds and the Thousand Islands
Monitoring Period (Year)	2018
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	A442002
Director's Order No.:	NA
Provincial Officer's Order No.:	NA
Other:	NA

Report Submission Frequency	<input checked="" type="radio"/> Annual <input type="radio"/> Other		
The site is: (Operation Status)	<input type="radio"/> Open <input type="radio"/> Inactive <input checked="" type="radio"/> Closed		
Does your Site have a Total Approved Capacity?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
If yes, please specify Total Approved Capacity		<i>Units</i>	Cubic Metres
Does your Site have a Maximum Approved Fill Rate?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
If yes, please specify Maximum Approved Fill Rate	NA	<i>Units</i>	
Total Waste Received within Monitoring Period (Year)	NA	<i>Units</i>	
Total Waste Received within Monitoring Period (Year) Methodology	NA		
Estimated Remaining Capacity	NA	<i>Units</i>	
Estimated Remaining Capacity Methodology			
Estimated Remaining Capacity Date Last Determined	Select Date		
Non-Hazardous Approved Waste Types	<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"/>
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial <i>(separate waste classes by comma)</i>			
Year Site Opened <i>(enter the Calendar Year only)</i>	<input type="text"/>	Current ECA Issue Date	March 21, 2016
Is your Site required to submit Financial Assurance?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Describe how your Landfill is designed.	<input checked="" type="radio"/> Natural Attenuation only <input type="radio"/> Fully engineered Facility <input type="radio"/> Partially engineered Facility		
Does your Site have an approved Contaminant Attenuation Zone?	<input type="radio"/> Yes <input checked="" type="radio"/> No		

<p>If closed, specify C of A, control or authorizing document closure date:</p>	<p>Amended ECA A442002 dated March 21, 2016.</p>
<p>Has the nature of the operations at the site changed during this monitoring period?</p>	<p> <input type="radio"/> Yes <input checked="" type="radio"/> No </p>
<p>If yes, provide details:</p>	<p>Type Here</p>
<p>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)</p>	<p> <input type="radio"/> Yes <input checked="" type="radio"/> No </p>

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, MW103	Not able to obtain complete sample set due to dry conditions, see report	April 2018
MW104, MW103, MW102, MW101	Not able to obtain complete sample set due to dry conditions, see report	November 2018
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	
Groundwater Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
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 <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 <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 <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: (a) There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or (b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or (c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation): <i>i.</i> The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and <i>ii.</i> Seasonal and annual water levels and water quality fluctuations are well understood.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Note which practice(s):</p>	<p><input type="checkbox"/> (a) <input type="checkbox"/> (b) <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 <input checked="" type="radio"/> No <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.

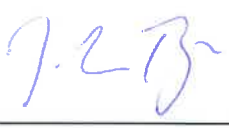
The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MECP to undertake a complete review the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. The Checklist 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"/> No changes to the monitoring program are recommended</p> <p><input type="radio"/> The following change(s) to the monitoring program is/are recommended:</p>	<p>See report</p>
<p><input type="radio"/> No Changes to site design and operation are recommended</p> <p><input checked="" type="radio"/> The following change(s) to the site design and operation is/are recommended:</p>	<p>Additional buffer lands are being evaluated.</p>

Name:	John Pyke		
Seal:	Add Image		
Signature:		Date:	March 29, 2019
CEP Contact Information:	John Pyke		
Company:	Malroz Engineering Inc.		
Address:	308 Wellington St., 2nd Floor, Kingston ON		
Telephone No.:	613-548-3446 ext. 34	Fax No. :	Type Here
E-mail Address:	pyke@malroz.com		
Co-signers for additional expertise provided:			
Signature:		Date:	Select Date
Signature:		Date:	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:

<p>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:</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>See report for discussion. We recommend further evaluation of the suitability of the current background surface water station (SW7). See report.</p>
<p>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):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not applicable (No C of A, authorizing / control document applies)</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
SW5	Not sampled due to dry conditions, see report.	November 2018
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 7. Surface water results met the compliance criteria, where applicable.		
		see report
6) In my opinion, any exceedences listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	<input type="radio"/> Yes <input checked="" type="radio"/> No	

<p>7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</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) 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)):</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> Not Known</p> <p><input type="radio"/> Not Applicable</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) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input checked="" type="radio"/> Not Applicable</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 MECP.</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"/> No Changes to the monitoring program are recommended</p> <p><input type="radio"/> The following change(s) to the monitoring program is/are recommended:</p>	<p>Type Here</p>
<p><input checked="" type="radio"/> No changes to the site design and operation are recommended</p> <p><input type="radio"/> The following change(s) to the site design and operation is/are recommended:</p>	<p>Type Here</p>

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

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 historic 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: Camille Malcolm, M.Sc., G.I.T.
Environmental Geoscientist



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



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Appendix C ECA No. A442002

Appendix D Monitoring Program

Appendix E MECP Correspondence

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Appendix I Site Photographs

Appendix J Borehole Logs

Appendix K Historic Trends

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) on March 21, 2016 (see Appendix C). The Site is located at the 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 31st 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 2018. 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

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

2.0 Background

The geology, hydrogeology, physiography, and hydrology of the Site are described in this section. 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 ‘overfill 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 0.2 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 at monitoring 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 2018 field notes, this dam is intact. According to previous monitoring reports, the tributary feeds into Sucker Brook.

2.4 MECP Correspondence

On August 16th, 2018, the Ministry of Environment, Conservation and Parks (MECP) issued a memorandum in response to the 2017 Annual Monitoring Report. The memorandum includes a review of the AMR and site characterization data. The reviewer makes the following recommendations and comments:

- i. Future AMRs should compare and discuss the groundwater quality data results from monitoring wells located adjacent to surface water to PWQOs.
- ii. Provide a formal discussion on Guideline B-7 assessment conducted in 2018.
- iii. An action plan was approved in 2016 to address Guideline B-7 non-compliance at the Site. The timing for the completion of additional required actions is unclear; however, it is understood that they are underway.
- iv. Conditions 3.4(a) and 3.4(b) require that within two (2) months from the issuance of the amended ECA, formal triggers and contingency plans be developed and provided. To my knowledge formal trigger mechanisms and contingency action plans have not be [sic] developed and provided, and the site is in non-compliance with conditions 3.4(a) and 3.4(b) of the ECA.
- v. Limited groundwater monitoring was conducted at the site in 2017 and does not comply with the approved groundwater monitoring program at the site.
- vi. Condition 3.2 of the d [sic] ECA requires, within two (2) months of the issuances of the ECA, that a report be prepared and provided that formally presents updated groundwater and surface water monitoring programs. To my knowledge, no such report has been received, and the site is in non-compliance with this condition. [Note: a monitoring plan was submitted to the MECP Director on June 11th, 2018].
- vii. I am generally supportive of the groundwater monitoring program proposed by *Malroz*; however, if all newly installed monitoring wells are non-detect for VOCs in 2018, I would support a reduction in VOC monitoring to once every two (2) years at selected monitoring wells (i.e. MW101 and 08-1).
- viii. Leachate impacted groundwater is expected to discharge to the unnamed tributary located east and southeast of the waste mound. A MECP Surface

Water Scientist should continue to be consulted with respect to surface water management associated with this site.

- ix. The current report contains only the 2017 monitoring data. Future monitoring reports should include all current and historical monitoring data. This request has made in my previous review; however, it has not been addressed.
- x. The geological and hydrogeological descriptions provided in the current report consist of quoted interpretations and descriptions provided in previous reports. The referenced material is professional interpretation of site observations, site conditions, and readily available information. Future monitoring reports should provide unique interpretations for these sections prepared by the authors of the report.
- xi. Future monitoring reports should include a formal discussion of background groundwater quality.
- xii. Future monitoring reports should provide a statement of compliance with respect to relevant conditions of the ECA.
- xiii. The current report was not accompanied by a completed monitoring and screening checklist. A completed and signed checklist should be submitted with all future reports.

In an email dated November 2nd, 2018, the MECP provided the following comments regarding the Monitoring Plan submitted to the Director on June 11th, 2018:

- The proposed monitoring well locations are appropriate.
- The proposed sampling frequency is acceptable. However, the provided chart indicates that VOCs will be monitored at all locations during all events. Shawn [Mr. Shawn Trimper] previously agreed that VOC monitoring may be reduced to a frequency of every 5 years at selected monitoring locations (08-1 and MW101).
- The proposed parameter list is acceptable; however, I note that the list of VOCs to be analysed has not been provided. VOC analysis should be conducted for a comprehensive list of parameters, consistent with those analysed during 2017.
- GW elevation monitoring should also be included in the table and should be conducted twice per year in the Spring and Fall.

Malroz met with the MECP on March 21, 2019 to review action items for the Site. The following items were discussed:

- i. The revised sampling and monitoring program is complete and will be submitted to the MECP separately in 2019.
- ii. The proposed CAZ to the south of the Site will be reviewed following the MECP technical evaluation of the 2018 AMR. Upon receipt of comments, next steps in evaluating the CAZ will be assessed.

- iii. An assessment of needed ECA amendments has begun and will continue following the receipt of MECP technical review of the proposed CAZ, and proposed revised sampling and monitoring program.

2.5 Complaints

The municipality reports no complaints were received in 2018 regarding the closed WDS.

3.0 Description of Monitoring Program

The 2018 groundwater and surface water monitoring events were conducted on April 26th and November 15th. 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 2018, including the suite of analyses performed, is presented in Appendix D and to satisfy Section 3. (2) of the site's ECA (refer to 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 2018, including the suite of analyses performed, is presented in Appendix D and was completed to satisfy Section 3. (2) of the site's ECA (refer 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 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 clean 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 2018 are included in Appendix F, and site photographs are presented in Appendix I.

The following observations were made by *Malroz* staff in 2018:

- The waste cap appeared to be in good condition.
- A potential organic sheen was observed in the stream to the East of the waste mound, upstream from SW1.
- 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.

3.5 Well Inspection

A well inspection was undertaken by *Malroz* during the 2018 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 at the well/station. As a result, the following analyses were not completed during the sampling events:

- MW103: BOD, DOC, TSS, field parameters (spring)

- MW104: no samples submitted (spring)
- MW101: phenols, mercury (fall)
- MW102: BOD, mercury (fall)
- MW103: BOD (fall)
- MW104: Only alkalinity, conductivity, pH and TDS analyses were completed (fall)
- SW5 no samples submitted (fall)

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

Results from the VOC analyses in 2018 included additional parameters when compared with the list of parameters in the monitoring plan. The tables in the report present only required parameters, however, the results of the additional parameters are shown in the laboratory certificates (Appendix G).

4.0 Groundwater Investigation Program

Well drilling at the Leeds WDS was completed on February 19 - 20, 2018 by the Strata Soil Sampling Group. Drilling was undertaken to satisfy requirements set out in the ECA and recommendations made by the MECP in a memorandum dated October 17, 2017. The purpose of the drilling program was to further delineate leachate impacts at the site and to replace and abandon damaged wells. The program included:

- the advancement of 2 new shallow overburden wells south of the landfill in the proposed contaminant attenuation zone (CAZ).
- replacement of two monitoring wells (00-1 and 89-1).
- abandonment of three wells (08-2, 89-4, and 89-7).

A monitoring well location plan depicting the locations of new, replaced and abandoned wells is presented in Figure 2, Appendix B.

Drilling was conducted using a GM100 GT drill rig for the majority of the work, with the exception of the two monitoring wells (MW103 and MW104) for which a Pionjar was used. A Pionjar rig was used at MW103 and MW104 due to limited access to the area south of the WDS given soft and wet soil conditions. Subsurface soils encountered consisted of silty clay to the termination of each borehole on bedrock between 1.2 and 2.6 metres below grade (mbg). An additional 3 boreholes were advanced to the south of the WDS during attempts to install MW103 and MW104. Overburden thickness in the three boreholes ranged between 0.15 and 0.6 mbg. The overburden thickness was insufficient for the installation of monitoring wells and the boreholes were abandoned. Copies of the borehole logs and water well records detailing the well installations and observations made during drilling are included in Appendix J.

5.0 Groundwater Monitoring Program Results

This section discusses the results of the monitoring events conducted in 2018. Results for the groundwater water analyses are presented in Tables 3 and 4 (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 November 2018. Survey data was collected from existing monitoring wells in November 2018. Groundwater elevations calculations show that groundwater flows south-east across the Site (Figure 3, Appendix A). Considering the surrounding bedrock outcrops, and adjacent to the ditch it is possible that MW101 is drilled into a local depression and adjacent to the ditch, area where groundwater may be perched. Groundwater is anticipated to discharge to the wetland to the south, consistent with the previously reported conceptual site model.

Monitoring of well headspace for vapours with an Eagle 2 RKI did not detect methane during the monitoring events in 2018.

5.1 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.

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, historic 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 6, 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 6, 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 Leeds WDS: alkalinity, chloride, nitrate, and boron.

5.2 Groundwater Quality

Results from the 2018 sampling events show the following parameters exceed the ODWS criteria at one or more location: alkalinity, DOC, hardness, TDS, aluminum, iron, manganese, and pH (Table 3, Appendix B). VOC analyses were carried out in the spring and fall of 2018. Only two parameters were detected among the newly installed wells: 1,4-dichlorobenzene and cis-1,2-dichloroethylene at MW101 (spring). These detections were below ODWS criteria. No detections were recorded during the fall VOC sampling; however, corresponding elevated reporting limits should be noted.

LIPs indicated the presence of leachate influence at MW101: For both the spring and fall events, concentrations of alkalinity, chloride, and boron are elevated when compared to background. Concentrations of chloride, nitrate and boron show that attenuation is occurring.

Limited data was obtained from MW104 due to dry conditions in both the spring and fall.

LIPs at MW103 were below or consistent with the background concentrations, with the exception of boron. Given that boron is the only LIP at MW103 which shows slightly elevated concentrations when compared to the background, it is possible that the source of boron is natural (originating in clay sediments) rather than indicative of leachate. Boron is known to be enriched in clays (Kot, 2009). Based on corresponding elevated TSS and the local geology, elevated concentrations of boron in the marsh area is possible.

As requested by the MECP, the groundwater results were compared to PWQO criteria. The following exceedances of PWQO were observed at one or more location: total

phosphorous, aluminum, boron, cadmium, cobalt, vanadium, and zinc (Table 3, Appendix B). Noted PWQO exceedances were observed to be within the RULs and/or historic 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 7.0) is recommended to monitor the potential impact to surface water quality.

6.0 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 B).

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 of surface water station SW6.

6.1 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. This station was not sampled during the August event due to dry conditions. Results from SW7 from December indicate background loading of iron (Table 5, Appendix C). Surface water results are compared to the Provincial Water Quality Objectives, the Canadian Water Quality Guideline (Table B), and the Aquatic Protection Values.

The following leachate indicator parameters (LIPs) have been selected for the Site: alkalinity, chloride, nitrate, and boron (refer to section 5.1 and Table 6, Appendix B for rationale).

6.2 Surface Water Quality

The following parameters exceed the PWQO at one or more location during the spring sampling event: total phosphorous, aluminum, copper, iron, and zinc. The results from the spring sampling event also exceed the CWQG for cadmium and zinc at one or more location.

During the fall event, the following exceedances of PWQO were observed at one or more location: total phosphorous, cobalt, iron, and zinc. Surface water stations SW1, SW2, and SW3 also exceeded the CWQG criteria for cadmium. The APV criteria for copper and iron

was exceeded by SW1, SW2, and/or SW3. Several field parameters also exceed the PWQO and APV, however, there is reason to believe that this may be due to instrument error caused by insufficient water. Noted APV, CWQG, and PWQO exceedances are below historic maximums at the Site.

LIPs are elevated at surface water stations SW1, SW3, and SW5. While chemistry at SW1 suggests some leachate impact, the LIP concentrations are more elevated at SW3 and SW5 (the latter for spring only). This is consistent with the inference that impacted groundwater is discharging to the creek south of the waste site. SW2 was previously considered a potential discharge zone for groundwater (Day, 2015), however, 2018 LIP analyses show no evidence of leachate at this location.

Results from 2018 suggest that there is minor leachate impact at SW6. However, concentrations appear to decrease between SW3 and SW6, suggesting attenuation is occurring. Overall, the concentrations of LIPs remain below the historic maximum recorded at SW6 since 2003 (Appendix H).

A review of surface water station SW7 indicated that it may not be best suited to characterize the background surface water quality at the Site. Satellite imagery suggests that SW7 is fed by a large pond located approximately 100 m east of SW7. However, most of the surface water which 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 impact on surface water quality. The current background (SW7), however, cannot account for the variable character of the surface water quality due to off-site activities. Historically, surface water station SW4 was included in the monitoring program and located northeast of the Site, upstream from SW2. We recommend that SW4 be monitored for water flow and considered to replace SW7 as the background surface water station.

7.0 Guideline B-7 Assessment

The reasonable use policy (RUP) provides a mechanism to calculate the reasonable use limits (RUL) for the Site using historic data from background well 89-4, as per Ministry Guideline B-7. However, over the last few years, there has been insufficient data to apply the reasonable use policy to the Site because several monitoring wells were damaged and recently replaced. The new monitoring wells installed in 2018 were intended to facilitate the reasonable use policy calculations. A trigger mechanism is being submitted to the MECP for review separately from this report.

7.1 Compliance Assessment

Based on the previous AMR, it is understood that the site does not confirm to the MECP B-7 Guideline and that exceedances of Reasonable Use Limits (RULs) are inferred. In 2016, TLTI submitted a workplan to the MECP to address non-compliance and

implementation continued into 2018. Several exceedances of RULs were observed in 2018 (Table 3, Appendix B) for the following parameters: alkalinity, DOC, hardness, TDS, aluminum, barium, boron, iron, and manganese.

Several components of the workplan have been completed including installation of new wells, maintenance of existing wells, and abandonment of unused wells. In addition to these tasks, TLTI 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. Tasks including acquisition of a CAZ and development of trigger mechanisms were dependant upon the results from the 2018 monitoring and sampling program, and as such were to be revisited in 2019.

At this time, and given the site conceptual model, 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 7, Appendix B). LIPs were used with the addition of iron, as the latter showed APV exceedances in 2018. Further details and methodology are presented separately in the 2019 Trigger Mechanism and Contingency Plan document.

Based on a preliminary assessment of compliance to the proposed trigger mechanism, the results from 2018 suggest that the site is in compliance (Table 7, Appendix B). Further evaluation of the extent of upper lands and CAZ will be evaluated in conjunction with the approval of the trigger mechanism.

It is notable that the current surface water background station may not be adequately characterizing off-site activities and/or geologic features which may be impacting water quality (refer to section 6.2).

8.0 Conclusions and Recommendations

The Leeds WDS is closed and is inferred to be in compliance with Ministry Guideline B-7, based on 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 extent 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. It is notable that the bedrock groundwater character is unknown at the Site.

Surface water chemistry results suggest that there is some leachate impact to the surface water south of the waste mound. However, results indicate attenuation within the current monitoring network is occurring. Compliance concentrations, from the proposed trigger mechanism, were met at SW6, suggesting that the landfill has little to no adverse affect to downstream surface waterways.

Historic 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. Monitoring should continue twice per year during the spring and fall. Sampling events should be scheduled to follow rain events where possible.
2. An inspection report should be completed biannually as per CofA condition 2(2).
3. Provide GPS coordinates for well locations and surface water stations.
4. Survey the stream invert to confirm whether overburden groundwater is discharging at SW1.
5. Reduce VOC analyses to every 5 years at 08-1 and MW101. The next VOC sampling being scheduled for 2023.
6. Use compliance concentrations to assess surface water impacts at Leeds WDS. Since groundwater appears to be discharging to surface water, impacts to surface water in our opinion are suitable to assessing migration of leachate impacts downgradient of the site.
7. Investigate the state of historic sampling station SW4. If it is suitable, consider replacing current surface water background station SW7 with historic station SW4.
8. Considering the site has been closed since 1991, evaluate feasibility and options for future reduced site monitoring.

9.0 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.

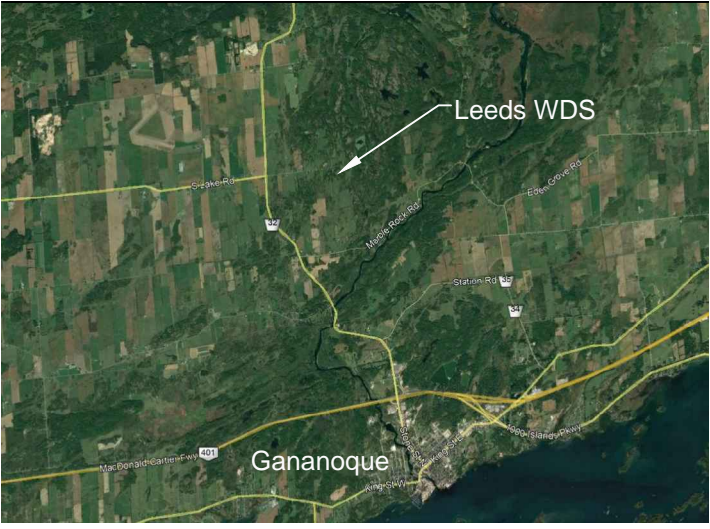
Landfill Standards: Guideline on the Regulatory and Approval Requirements for New or Expanding Landfilling Sites. Queen's Printer for Ontario 2010 (revised January 2012). PIDS 7792e.

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

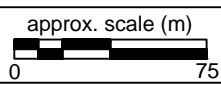


Site Location Plan

2018 Annual Monitoring Report
 Closed Leeds WDS (A442002)
 Pelow Road, Township of Leeds and the Thousand Islands, Ontario

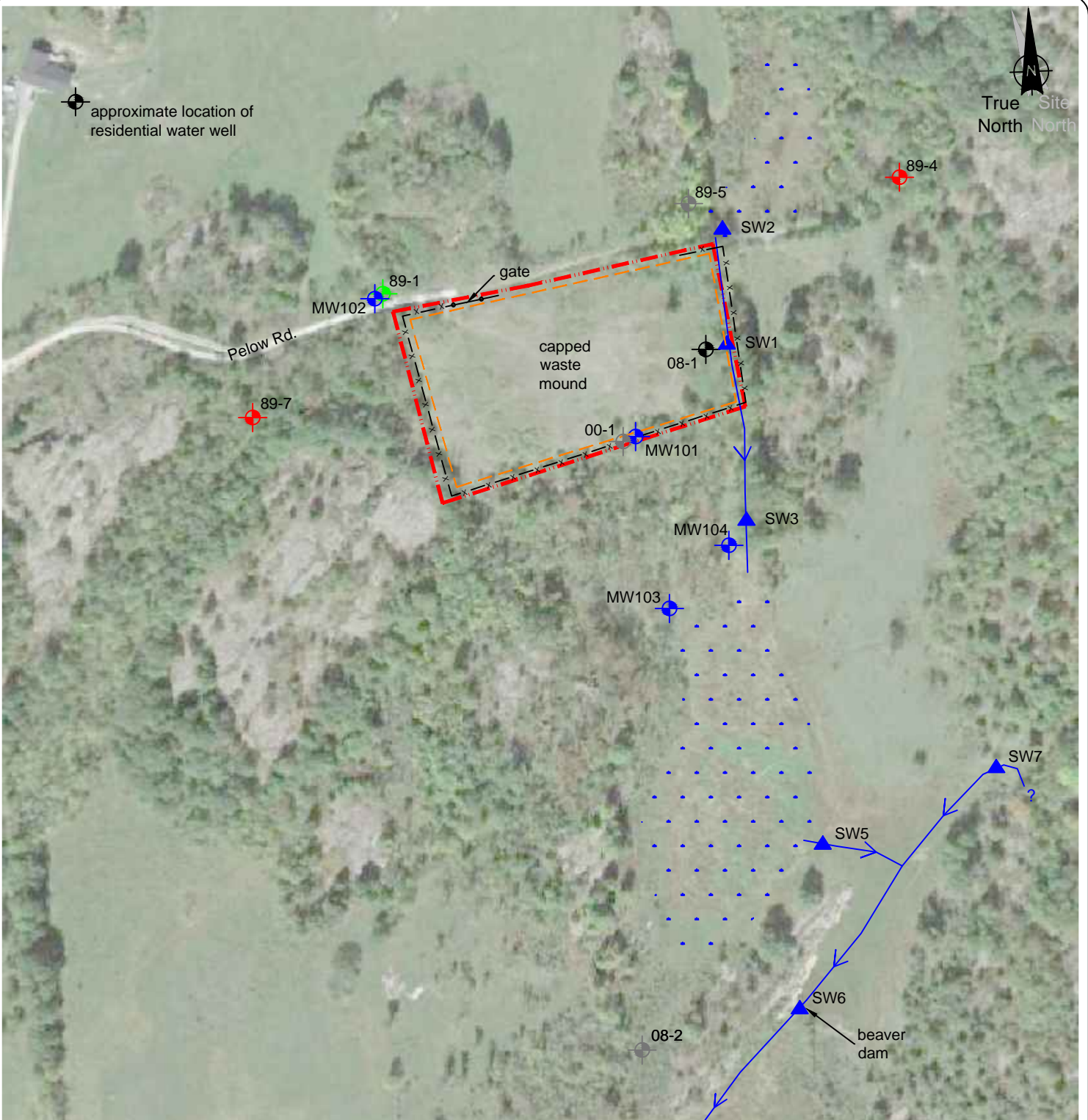
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Figure
1



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

Rev	Date	Description	By	Chkd
0	19/01/30	issued in final	ZL	JMP



Legend

	approximate property boundary		89-1 monitoring well abandoned and replaced
	fence		89-7 monitoring well abandoned
	08-2 existing monitoring 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
	shallow borehole advanced by Malroz		SW1 surface water station

Site Layout

2018 Annual Monitoring Report
 Closed Leeds WDS (A442002)
 Pelow Rd, Township of Leeds and the Thousand Islands, Ontario

File: 1040-112.00

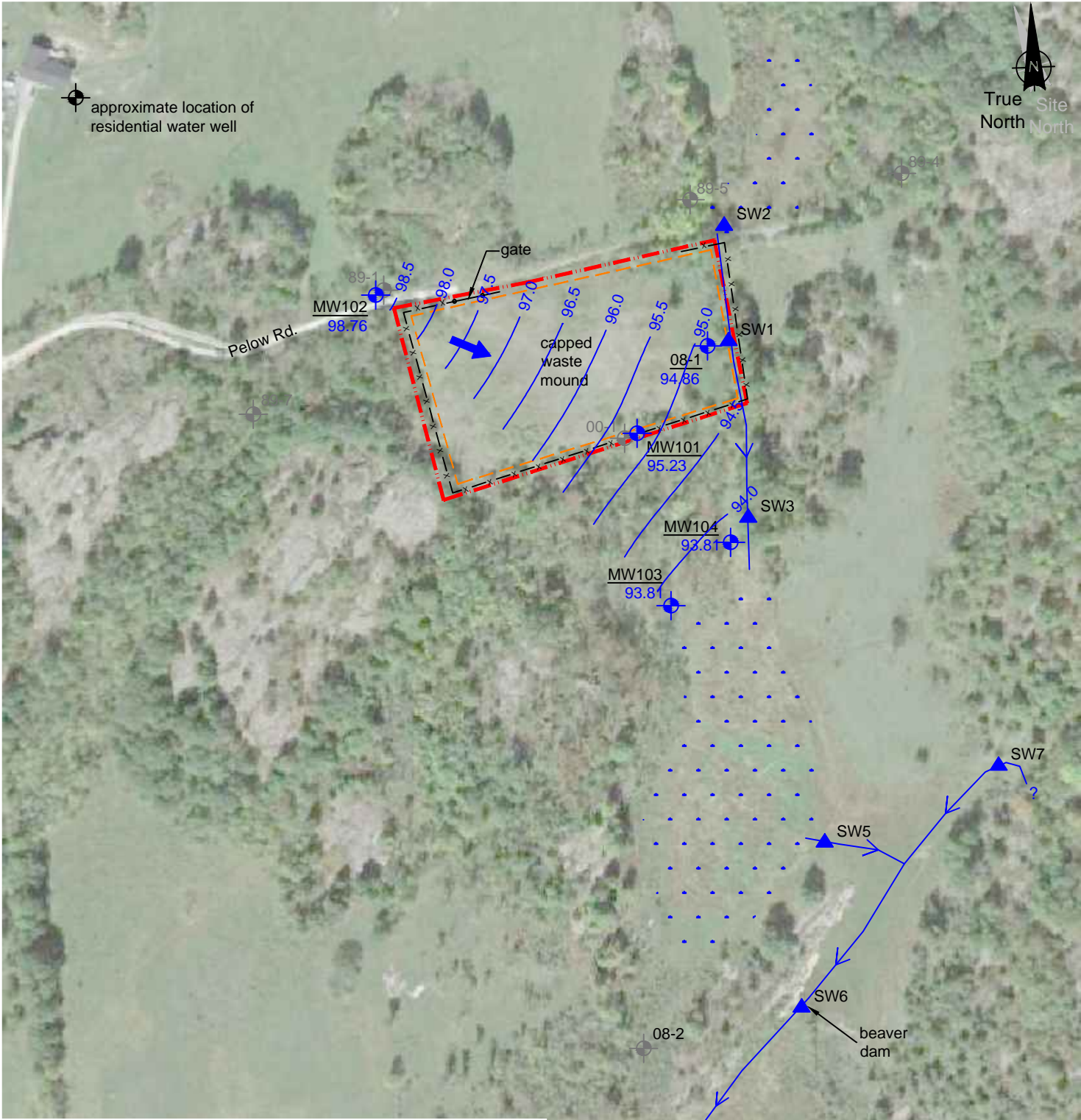
approx. scale (m)

Figure
2



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

Rev	Date	Description	By	Chkd
0	19/01/30	issued in final	ZL	JMP



Legend

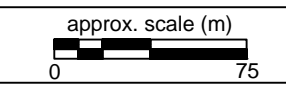
- - - - approximate property boundary
- x-x- fence
- monitoring well location and groundwater elevation (November 15, 2018)
- monitoring well not used in interpolation groundwater elevation (November 15, 2018)
- 90.0
- ⋯ surface water feature
- stream and flow direction
- - - - area of capped former waste mound
- ▲ SW1 surface water station
- inferred groundwater flow direction

Inferred Overburden Groundwater Contours

2018 Annual Monitoring Report
 Closed Leeds WDS (A442002)
 Pelow Road, Township of Leeds and the Thousand Islands, Ontario

File: 1040-112.00

Figure
3



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

Rev	Date	Description	By	Chkd
0	19/02/05	issued in final	ZL	RB

Appendix B
Tables

**Table 1
 Groundwater Monitoring Results**

Location	DTW (mbTOP)	DTB (mbTOP)	Groundwater Elevation (masl)	Methane Concentration (%LEL)	Observations		
					Colour	Sediment	Odour
April 26, 2018							
08-1	2.44	4.38	95.26	nr	dark brown	some	sulphur
MW101	1.00	3.45	95.64	nr	cloudy grey-brown	trace	none
MW102	1.00	2.94	99.00	nr	cloudy grey	trace	none
MW103	0.22	2.48	95.06	nr	-	-	-
MW104	1.28	2.15	94.07	nr	-	-	-
November 15, 2018							
08-1	2.84	4.47	94.86	nr	grey	lots	metallic
MW101	1.41	3.48	95.23	nr	light grey	trace	none
MW102	1.24	2.92	98.76	nr	light brown	some	none
MW103	1.47	2.46	93.81	nr	brown	lots	none
MW104	1.54	2.12	93.81	nr	brown	lots	none

notes

LEL denotes lower explosive limit
 nr indicates no response
 DTW depth to water
 DTB depth to well bottom
 - denotes not available/not measured
 masl meters above mean sea level
 mbTOP denotes meters below top of piezometer

Data Input: ZL

Data Check: RB

Elevations based on survey data obtained by Malroz Engineering from May 26, 2018.

Table 2
Well Inspection

Well ID	Well Type	Well Construction	Well Integrity			Well Observations
	Protective casing	Material	Locked	Capped	Condition ¹	Remarks
00-1	well not located- assumed to be destroyed					
08-1	PVC outer Casing	2" Schedule 40 PVC	Y	J-Plug	good	-
08-2	well not located, previously reported as damaged					
89-1	abandoned February 2018					
89-4	abandoned February 2018					
89-7	abandoned February 2018					
MW101	Monument Casing	2" Schedule 40 PVC	Y	J-Plug	good	installed February 2018
MW102	Monument Casing	2" Schedule 40 PVC	Y	J-Plug	good	installed February 2018
MW103	Monument Casing	1.25" Schedule 40 PVC	Y	J-Plug	good	installed February 2018
MW104	Monument Casing	1.25" Schedule 40 PVC	Y	J-Plug	good	installed February 2018

notes: Well inspection completed on November 15, 2018

¹ Well conditions ranked as good (no maintenance required),
 fair (minor maintenance required),
 poor (requires maintenance or abandonment)

Data Input: CM
 Data checked: MW

Table 3
Groundwater Analysis

Parameter	Units	Well ID Sample ID RL	April Sampling					November Sampling					OWDS	PWQO	RULs ²
			08-1	MW101	MW102	MW103	MW104	08-1	MW101	MW102	MW103	MW104			
			18-W008 18-Apr-26	18-W007 18-Apr-26	18-W010 18-Apr-26	18-W005 18-Apr-26	-	18-W018 18-Nov-15	18-W019 18-Nov-15	18-W020 18-Nov-15	18-W016 18-Nov-15	18-W017 18-Nov-15			
Alkalinity as CaCO3	mg/L	5	875	888	232	253	599	656	261	135	314	30-500 ^{AO}	(see note 3)	349	
Ammonia-N	mg/L	0.01	9.78	0.08	0.07	0.14	1.38	0.04	0.07	0.09	-				
Biochemical Oxygen Demand	mg/L	2	11	3	3	-	9	4	-	-	-				
Chemical Oxygen Demand	mg/L	5	79	49	48	577	80	33	50	463	-				
Dissolved Organic Carbon	mg/L	0.2	19.8	19.1	8.2	-	14.1	17.3	6.7	7.6	-	5 ^{AO}		4.575	
Conductivity	µmho/cm	1	1600	1690	458	595	1470	1360	524	343	748				
Hardness as CaCO3	mg/L	1	900	950	261	266	795	822	277	193	-	80-100 ^{OG}		162	
pH	pH Units	-	7.41	7.84	8.26	8.19	7.68	7.87	7.88	7.96	8.08	6.5-8.5 ^{OG}	6.5 - 8.5		
Phenols	mg/L	0.001	<	<	<	<	< 0.002	-	< 0.002	0.002	-		0.001		
Total Phosphorus	mg/L	0.01	1.13	1.12	9.58	18.3	1.36	0.15	1.81	26.6	-		0.03		
Total Dissolved Solids	mg/L	3	875	926	251	309	801	738	271	176	391	500 ^{AO}		359.5	
Total Suspended Solids	mg/L	3	1250	1030	5130	-	2600	260	1000	51000	-				
Total Kjeldahl Nitrogen-N	mg/L	0.1	12.2	0.9	4.7	15.3	3.1	0.7	0.5	27.8	-				
Chloride	mg/L	0.5	16.4	14.1	2.4	6.8	14.0	9.7	3.2	3.0	-	250 ^{AO}		127	
Nitrate-N	mg/L	0.05	0.08	<	<	0.07	1.74	0.06	0.09	0.08	-	10.0		2.575	
Nitrite-N	mg/L	0.05	0.05	<	<	<	0.06	<	<	<	-	1.0		0.33	
Sulphate	mg/L	1	83	149	19	52	217	140	21	38	-	500 ^{AO}		262	
Mercury	ug/L	0.02	<	<	<	<	<	<	<	<	-	1.0	0.2	0.33	
Aluminum	µg/L	10	100	110	50	40	100	100	50	30	-	100 ^{AO}	75	63	
Arsenic	µg/L	0.1	1.0	0.9	0.4	0.2	0.6	0.5	<	0.1	-	10 ^A	100	3.3	
Barium	µg/L	1	291	57	29	33	258	60	37	27	-	1000		270	
Boron	µg/L	5	835	662	17	39	1280	656	27	39	-	5000	200	1263	
Cadmium	µg/L	0.015	0.062	0.079	0.018	0.017	1.08	0.059	<	<	-	5	(see note 4)	1.29	
Calcium	µg/L	20	234000	233000	70400	58200	206000	204000	75800	43200	-				
Chromium	µg/L	1	10	5	2	<	<	<	<	<	-	50	(see note 5)	13	
Cobalt	µg/L	0.1	1.8	0.9	0.4	0.2	1.5	0.4	0.1	0.2	-		0.9		
Copper	µg/L	0.1	0.6	2.4	0.4	1.6	2.3	3.2	0.8	1.1	-	1000 ^{AO}	(see note 6)	500.7	
Iron	µg/L	5	22100	24	32	<	2500	14	<	<	-	300 ^{AO}	300	175	
Lead	µg/L	0.02	<	<	<	0.06	0.03	0.04	0.07	0.06	-	10	(see note 7)	2.65	
Magnesium	µg/L	20	76700	89300	20800	29400	68200	75800	21300	20700	-				
Manganese	µg/L	1	1550	1290	41	34	1330	290	13	8	-	50 ^{AO}		30	
Potassium	µg/L	100	42800	2200	600	1100	37100	2300	700	400	-				
Silver	µg/L	0.02	<	<	<	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-		0.1		
Sodium	µg/L	200	32800	81800	14900	17100	36400	89400	15000	14400	-	200000 ^{AO}		1000018	
Uranium	µg/L	0.05	0.26	4.62	0.73	2.27	0.41	4.37	0.83	0.86	-	20	5	5.15	
Vanadium	µg/L	5	6	<	<	13	<	<	<	<	-		6		
Zinc	µg/L	5	77	<	<	<	560	<	5	<	-	5000 ^{AO}	20	2503	
Field Parameters															
pH	pH Units	-	6.89	6.95	6.88	insufficient water	insufficient water	8.10	8.54	9.08	8.36	8.80	6.5-8.5 ^{OG}	6.5-8.5	
Temperature	° Celcius	-	9.65	8.48	7.20	insufficient water	insufficient water	4.70	5.14	4.92	3.70	1.42	15 ^{AO}		
Dissolved Oxygen	mg/L	-	0.00	0.00	6.15	insufficient water	insufficient water	2.52	10.12	5.46	4.55	11.70			
Conductivity	mS/cm	-	6.77	1.77	0.495	insufficient water	insufficient water	1.66	1.65	0.631	0.492	0.930			
Unionized Ammonia (Calculated) ¹	mg/L	0.01	0.01	<	<	insufficient water	insufficient water	0.02	<	0.01	<	-			

Notes:
 "-" denotes not analyzed, in some cases insufficient water to analyze.
 "RL" denotes reporting limit.
 "<" denotes results below reporting limit.
 "<#" denotes elevated reporting limit due to laboratory variance.
 "MW###" and "# - #" denote groundwater monitoring well.
 "18-W###" denotes sample identification number.
^A effective January 1, 2018 standard for Arsenic is 10 µg/L.

1. Unionized Ammonia calculated using field parameters for pH and temperature.
2. Reasonable Use Limits calculated using historical background concentrations from MW101 and 89-1.
3. Alkalinity should not decrease by more than 25% of the natural concentration.
4. Cadmium criteria: 0-100 mg/L Hardness = 0.1 ug/L, >100 mg/L Hardness = 0.5 ug/L.
5. Chromium reported as total, published standards are for Chromium VI (1.0 µg/L) and Chromium III (8.9 µg/L).
6. Copper criteria: if 0-20 mg/L Hardness = 1 ug/L; if >20 mg/L Hardness = 5 ug/L.
7. Lead criteria: if <30 mg/L Hardness = 1 µg/L; if 30 to 80 mg/L Hardness = 3 µg/L; if >80 mg/L Hardness = 5 µg/L.

Shading indicates parameters exceeding guideline criteria.
 denotes exceedance of Ontario Drinking Water Standards (2018)
 denotes concentration exceeds the Provincial Water Quality Objectives.
black, bold and underlined denotes RL greater than PWQO criteria.
 AO indicates aesthetic objective OG indicates operational objective
 Groundwater samples analyzed for metals were field filtered using disposable 0.45 micron filters.
 compliance parameter exceeds the reasonable use policy.

Data Input: RF
Data Check: MW

Table 4
Groundwater VOC Analysis

Parameter	Units	Well ID Sample ID RL	April Sampling					November Sampling					ODWS
			08-1	MW101	MW102	MW103	MW104	08-1	MW101	MW102	MW103	MW104	
			18-W008 18-Apr-26	18-W007 18-Apr-26	18-W010 18-Apr-26	- 18-Apr-26	- 18-Apr-26	18-W018 18-Nov-15	18-W019 18-Nov-15	18-W020 18-Nov-15	18-W016 18-Nov-15	18-W017 18-Nov-15	
Acetone	µg/L	2	<	<	<		< 30	< 30	< 30	< 30	< 30		
Benzene	µg/L	0.5	<	<	<		<	<	<	<	<	1	
Bromobenzene	µg/L	0.1	<	<	<		<	<	<	<	<		
Bromoform	µg/L	0.1	<	<	<		< 5	< 5	< 5	< 5	< 5		
Bromomethane	µg/L	0.3	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Carbon Tetrachloride	µg/L	0.2	<	<	<		<	<	<	<	<	2	
Chlorobenzene	µg/L	0.2	0.4	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	80	
Chloroethane	µg/L	0.08	< 0.1	< 0.1	< 0.1		<	<	<	<	<		
Chloroform	µg/L	0.3	<	<	<		< 1	< 1	< 1	< 1	< 1		
Chloromethane	µg/L	0.06	< 0.3	< 0.3	< 0.3		<	<	<	<	<		
Dibromochloromethane	µg/L	0.1	<	<	<		< 2	< 2	< 2	< 2	< 2		
1,2-Dichlorobenzene	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	200	
1,3-Dichlorobenzene	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,4-Dichlorobenzene	µg/L	0.2	<	0.3	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5	
Dichlorodifluoromethane	µg/L	1	<	<	<		< 2	< 2	< 2	< 2	< 2		
1,1-Dichloroethane	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,2-Dichloroethane	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5	
1,1-Dichloroethylene	µg/L	0.01	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	14	
cis-1,2-Dichloroethylene	µg/L	0.1	<	0.4	<	Insufficient water for analysis of VOCs	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
trans-1,2-Dichloroethylene	µg/L	0.01	<	<	<	Insufficient water to sample	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,2-Dichloroethylene, total	µg/L	0.3	-	-	-		-	-	-	-	-		
1,2-Dichloropropane	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,3-Dichloropropane	µg/L	0.1	< 0.2	< 0.2	< 0.2		<	<	<	<	<		
1,2-Dichloropropane	µg/L	0.2	< 0.2	< 0.2	< 0.2		<	<	<	<	<		
1,3-Dichloropropene, total	µg/L	0.5	<	<	<		<	<	<	<	<		
cis-1,3-Dichloropropene	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
trans-1,3-Dichloropropene	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Ethylbenzene	µg/L	0.5	<	<	<		<	<	<	<	<	140	
Hexane	µg/L	1	<	<	<		< 5	< 5	< 5	< 5	< 5		
Methyl Ethyl Ketone	µg/L	1	<	<	<		< 20	< 20	< 20	< 20	< 20		
Methyl Butyl Ketone	µg/L	10	<	<	<		<	<	<	<	<		
Methyl Isobutyl Ketone	µg/L	1	<	<	<		< 20	< 20	< 20	< 20	< 20		
Methyl tert-butyl ether	µg/L	1	<	<	<		< 2	< 2	< 2	< 2	< 2		
Methylene Chloride	µg/L	0.3	<	<	<		<	<	<	<	<		
Styrene	µg/L	0.5	<	<	<		<	<	<	<	<		
1,1,1,2-Tetrachloroethane	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1,1,2,2-Tetrachloroethane	µg/L	0.4	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Tetrachloroethylene	µg/L	0.2	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	10	
Toluene	µg/L	0.5	<	<	<		<	<	<	<	<	60	
1,1,1-Trichloroethane	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
1,1,2-Trichloroethane	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Trichloroethylene	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5	
Trichlorofluoromethane	µg/L	0.1	<	<	<		< 5	< 5	< 5	< 5	< 5		
Vinyl Chloride	µg/L	0.2	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1	
m,p-Xylene	µg/L	0.4	<	<	<		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
o-Xylene	µg/L	0.1	<	<	<		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		
Xylenes, total	µg/L	0.4	<	<	<		< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	90	

Notes:
 "-" denotes not analyzed or sample not submitted due to insufficient water
 "RL" denotes reporting limit
 "<" denotes results below reporting limit
 "<##" denotes elevated RL due to laboratory variance
 "## - F" or "MW##" denotes groundwater monitoring well ID
 "18-W##" denotes sample identification number

shading indicates parameters exceeding Ontario Drinking Water Standards

Data Input: RF
Data Check: MW

Table 5
Surface Water Analyses

Parameter	Units	Station ID Sample ID Flow Conditions RL	April Sampling							November Sampling					PWQO	CWQG	APV	
			SW1	SW2	SW3	SW5	SW6	SW7	SW1	SW2	SW3	SW5	SW6	SW7				
			18-W009 lotic	18-W001 lotic	18-W006 lotic	18-W003 lotic	18-W004 lotic	18-W002 lotic	18-W014 frozen	18-W011 frozen	18-W015 frozen	18-W015 frozen	18-W013 lotic	18-W012 lotic				
Hardness as CaCO3	mg/L	1	78	50	121	126	74	21	45	30	76			53	33	(see note 3)		
Alkalinity as CaCO3	mg/L	5	75	32	99	114	55	21	36	24	62			45	32			
Ammonia-N	mg/L	0.01	0.2	0.01	0.09	<	0.01	0.04	0.05	0.03	0.05			0.03	0.04	0.02		0.100
Unionized Ammonia-N (Lab)	mg/L	0.01	<	<	<	<	<	<	<	<	<			<	<			
Biochemical Oxygen Demand	mg/L	2	<	5	3	3	3	3	5	6	4			4	5			
Chemical Oxygen Demand	mg/L	5	18	21	21	25	20	18	31	24	22			20	25			
Dissolved Organic Carbon	mg/L	0.2	6.2	5.8	6.4	7.9	7.1	4.7	7.3	9.7	7.3			9.0	7.6			
Conductivity	µmho/cm	1	163	67	223	258	127	49	98	72	161			121	68			
pH	pH Units	-	7.57	7.37	8.01	7.93	7.90	7.57	7.22	7.03	7.45			7.47	7.61	6.5 - 8.5		
Phenols	mg/L	0.001	<	<	<	<	<	<	< 0.002	< 0.002	< 0.002			< 0.002	0.003	0.001	0.004 ⁴	6.0-9.0 0.04 ⁴
Total Phosphorus	mg/L	0.01	0.06	0.1	0.04	0.04	0.03	0.04	0.17	0.05	0.25			0.04	0.02	0.03		
o-Phosphate	mg/L	0.01	0.01	0.02	0.01	0.01	<	0.01	0.12	0.03	0.05			0.04	<			
Total Dissolved Solids	mg/L	3	83	34	114	132	64	25	50	36	82			61	34			
Total Suspended Solids	mg/L	3	11	20	9	7	8	8	60	<	18			<	<			
Total Kjeldahl Nitrogen-N	mg/L	0.1	0.6	0.6	0.4	0.4	0.4	0.4	0.9	0.5	0.8			0.6	0.5			
Chloride	mg/L	0.5	1.3	0.9	1.9	2.4	1.2	0.6	0.9	0.8	1.5			1.1	<	128 ⁸ reported		180
Nitrate-N	mg/L	0.05	0.09	<	0.14	<	<	<	<	<	<			<	<	2.9		100
Nitrite-N	mg/L	0.05	<	<	<	<	<	<	<	<	<			<	<	0.06		
Sulphate	mg/L	1	5	<	9	15	6	1	9	7	12			9	<			
Mercury	µg/L	0.02	<	<	<	<	<	<	<	<	<			<	<	0.2		
Aluminum	µg/L	10	80	120	60	30	30	50	30	40	30			20	<	75 ⁵		150
Antimony	µg/L	0.1	-	-	-	-	-	-	<	0.3	<			0.2	0.3	20		2300
Arsenic	µg/L	0.1	0.4	0.7	0.9	0.8	0.4	0.7	0.3	0.2	0.2			0.2	0.2	5		150
Barium	µg/L	1	27	31	42	33	26	8	35	19	50			15	11			2300
Beryllium	µg/L	2	-	-	-	-	-	-	<	<	<			<	<			
Boron	µg/L	5	36	<	63	61	27	12	8	<	26			26	17	(see note 6)	1500	3550
Cadmium	µg/L	0.015	0.020	0.072	0.019	<	<	<	0.057	0.023	0.082			<	<	(see note 7)	0.017 ⁶ minimum	0.21
Calcium	µg/L	20	20600	13300	31400	31300	19600	6130	13100	8750	20800			14900	10700			
Chromium	µg/L	1	<	1	<	<	<	<	<	1	2			<	<	(see note 8)		64
Cobalt	µg/L	0.1	0.20	0.4	0.2	<	0.1	0.1	0.7	0.4	1.0			0.1	0.1	0.9		
Copper	µg/L	0.1	<	6.8	<	<	<	<	7.5	0.9	8.7			0.6	0.4	(see note 9)		6.9
Iron	µg/L	5	554	661	428	159	341	525	3250	1040	1990			476	466	300		1000
Lead	µg/L	0.02	0.1	1.41	0.19	0.05	0.11	0.19	0.85	0.19	1.28			0.14	0.13	(see note 10)		2.0
Magnesium	µg/L	20	6520	4130	10300	11600	6110	1440	4150	2840	6750			4350	2110			
Manganese	µg/L	1	81	42	59	11	47	34	97	34	443			8	27			
Molybdenum	µg/L	10	-	-	-	-	-	-	<	<	<			<	<			40
Nickel	µg/L	0.2	1.4	2.4	1.9	1.5	0.8	0.5	1.6	0.6	2.0			0.5	0.3			25
Potassium	µg/L	100	1700	700	2800	2500	1200	500	1000	800	1400			1100	500			
Selenium	µg/L	1	-	-	-	-	-	-	<	<	<			<	<	100		
Silicon	µg/L	10	-	-	-	-	-	-	4990	4150	5340			2420	1370			
Silver	µg/L	0.02	<	<	<	<	<	<	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1	0.1		
Sodium	µg/L	200	2800	2900	5100	5100	3700	900	2400	2000	3500			2300	1000			
Strontium	µg/L	1	128	90	209	179	116	28	69	44	112			72	47			
Thallium	µg/L	0.05	-	-	-	-	-	-	<	<	<			<	<	0.3		
Tin	µg/L	50	-	-	-	-	-	-	<	<	<			<	<			
Titanium	µg/L	5	-	-	-	-	-	-	47	18	77			11	5			
Tungsten	µg/L	10	-	-	-	-	-	-	<	<	20			<	<	30		
Uranium	µg/L	0.05	-	-	-	-	-	-	0.59	<	0.67			<	<	5		
Vanadium	µg/L	5	<	<	<	<	<	<	<	<	<			<	<	6		
Zinc	µg/L	5	10	36	22	<	24	8	16	10	24			10	9	20	30	89
Field Parameters																		
pH	pH Units	-	7.00	5.60	6.64	6.15	6.66	5.98	8.91	9.91	8.58			8.87	9.10	6.5 - 8.5		6.0-9.0
Temperature	° Celsius	-	10.33	9.78	10.36	9.61	10.95	11.28	0.35	5.15	0.10			1.19	3.72			
Dissolved Oxygen	mg/L	-	5.93	12.27	5.70	5.84	6.56	9.22	5.51	8.60	2.44			7.22	7.54	(see note 2)		
Conductivity	mS/cm	-	0.190	0.630	0.239	0.275	0.136	0.064	0.105	0.075	0.166			0.120	0.068			
Unionized Ammonia (Calculated) ¹	mg/L	0.01	<	<	<	<	<	<	<	0.02	<			<	<	0.02		0.100

Notes:

- *-> denotes not analyzed
- "RL" denotes reporting limit
- "<" denotes result below reporting limit
- "SW ###" denotes surface water station ID
- "<##" denotes elevated reporting limit due to laboratory variance
- 1 Unionized Ammonia calculated using field parameters for pH and temperature
- 2 PWQO for minimum DO concentration set at conservative value based on highest temperature and warm water biota
- DO criteria: 0°C-5°C ≥ 2mg/L, 5°C-10°C ≥ 4mg/L, 10°C-20°C ≥ 5mg/L, 20°C-25°C ≥ 4mg/L
- 3 Alkalinity should not be decreased by more than 25% of the natural concentration
- 4 Table A and Table B standards apply only to Phenol
- 5 Aluminum standard for PWQO is pH dependent
- 6 Beryllium criteria: <75 mg/L Hardness = 11 ug/L, >75 mg/L Hardness = 1100 ug/L

- 7 Cadmium criteria: 0-100 mg/L Hardness = 0.1 ug/L, >100 mg/L Hardness = 0.5 ug/L
- 8 Chromium reported as total, published standards are for chromium VI (1.0 µg/L) and chromium III (8.9 µg/L)
- 9 Copper criteria: 0-20 mg/L Hardness = 1 ug/L, >20 mg/L Hardness = 5 ug/L
- 10 Lead criteria: <30 mg/L Hardness = 1 ug/L, 30 to 80 mg/L Hardness = 3 ug/L, >80 mg/L Hardness = 5 ug/L
- Metals are reported as "total" with the exception of Aluminum and Mercury (reported as dissolved)
- Shading indicates parameters exceeding guideline criteria
 - denotes concentration exceeds the Provincial Water Quality Objectives
 - denotes concentration exceeds the Canadian Water Quality Guidelines
 - denotes concentration exceeds the Aquatic Protection Values
- black, bold and underlined denotes RL greater than criteria
- denotes background surface water station

Data Input: RP
Data Check: MW

Table 6
Leachate Indicator Parameter Rationale

Leachate Indicator	Units	Groundwater					Surface Water			
		ODWS	RUL	Background Concentration ^A	Leachate Concentration ^B	Difference (L/B)	Standard (see notes)	Background Concentration ^C	Leachate Concentration ^D	Difference (L/B)
Alkalinity	mg/L	30-500	349	193	899	5	(P) see note ¹	40.5	94.0	2
Ammonia	mg/L			0.06	6.8	123	0.02 (P) ²	0.06	0.03	0
Chloride	mg/L	250	127	5.80	26.4	5	128 (C)	0.50	4.00	8
Conductivity	uS/cm		162	413	1660	4		86	231	3
Iron	mg/L	0.3	0.18	0.05	8.7	175		0.51	0.49	1
Nitrate	mg/L	10	2.6	0.075	0.20	3		0.050	0.20	4
pH	-	6.5-8.5		7.6	7.3	1	6.5-8.5 (P)	7.6	7.7	1
Total Suspended Solids	mg/L			1270	3960	3		19	18	1
Total Dissolved Solids	mg/L	500	360	214	946	4		55.5	127	2
Sulphate	mg/L	500	262	38.4	39.0	1	100 (A)	2.00	16.0	8
BOD	mg/L			1.0	12	12		1.0	1.0	1
COD	mg/L			48.0	143	3		25.0	21.0	1
Boron	mg/L	5	1	0.03	0.9	35	0.2 (P) ³	0.02	0.05	2

^A The background GW concentration is the median concentration at 89-1 between 1990 and 2017 (some years do not have data)

^B The GW leachate concentration is the median concentration at 08-1 between 2008 and 2017

^C The background SW concentration was determined using data from SW7 between 2013 and 2017

^D The SW leachate concentration was determined using data from SW3 (station receiving GW discharge, according to site conceptual model) between 1993 and 2011

L/B Leachate concentration/Background concentration

(P) Provincial Water Quality Objective

(C) CCME, Table B

(A) Aquatic Protection Value, Table A

¹ Alkalinity should not decrease by more than 25% of the background condition

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

³ 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

Inp. CM

Chk. AP

Table 7
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	
									26-Apr-18	15-Nov-18
Alkalinity	32	41	73	8	13	83	see note (1)	24 - 83	55	45
Chloride	0.50	0.50	1.0	6	0.26	1.5	128 (2)	1.5	1.2	1.1
Nitrate	0.050	0.050	0.50	8	0.17	0.59	-	0.59	0.025	0.025
Iron	0.309	0.513	3.27	8	1.09	3.99	0.30	3.99	0.341	0.476
Boron	0.018	0.021	0.034	8	0.007	0.043	0.20	0.20	0.027	0.026

Data Input: CM

Data Check: MW

- 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 24 mg/L)
 - 2 This is the CWQG (Table B) standard for chloride
 - PWQO Provincial Water Quality Objectives
- 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 2013-2017)
- Red and bold** value exceeds the compliance concentration for given parameter

AMENDED ENVIRONMENTAL COMPLIANCE APPROVALNUMBER 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

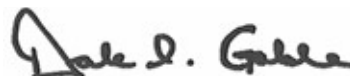
AND

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**

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



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 - Monitoring 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 sampling: 08-1, MW101, MW102, MW103, MW104
 VOCs¹: 08-1 and MW101
total 5
 Lab criteria: ODWS

Surface water sampling: SW1, SW2, SW3, SW6, SW7
total 5
 Lab criteria: PWQO

Monitoring Program	Groundwater		Surface Water	
	Spring and Fall		Spring and Fall	
Parameters	Alkalinity	Barium	Alkalinity	Mercury
	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	Zinc
	VOCs at MW101 and 08-1: ¹		Aluminum-dissolved	Antimony
	Acetone	Dichloropropene, trans-1,3-	Selenium	Beryllium
	Benzene	Dichloropropene, Total-1,3	Silicon	Molybdenum
	Bromodichloromethane	Ethylbenzene	Thallium	Tin
	Bromoform	Hexane	Tungsten	Titanium
	Bromomethane	Methyl Butyl Ketone	Uranium	
	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-				
Field	pH	N-NH3 unionized (Calc)	pH	N-NH3 unionized
	Temperature	Turbidity	Temperature	(Calc)
	Dissolved Oxygen	ORP	Dissolved Oxygen	Turbidity
	Conductivity		Conductivity	ORP

¹ VOC analysis will occur every 5 years starting in 2019

In: CM
 Chk: MW

Appendix E
MECP Correspondence

MEMORANDUM

August 16, 2018

TO: Nathalie Matthews
Senior Environmental Officer
Kingston District Office
Eastern Region

FROM: Shawn Trimper
Hydrogeologist
Technical Support Section
Eastern Region

RE: 2017 Annual Report
Leeds (closed) Waste Disposal Site
Lot 11, Concession 3, Geographic Township of Leeds
Township of Leeds and the Thousand Islands
Environmental Compliance Approval (ECA) No. A442002

The Ministry of the Environment, Conservation and Parks (MECP) Kingston District Office (KDO) provided the report titled "Leeds Waste Disposal Site, 2017 Annual Monitoring Report" dated March 2018 and completed by Malroz Engineering Inc. (Malroz). I have reviewed the aforementioned report and offer the following comments for your consideration.

Environmental Compliance Approval (ECA)

The Leeds Waste Disposal Site (WDS) is owned and operated by The Corporation of the Township of Leeds and the Thousand Islands (the township) and is licensed under ECA No. A442002. The Leeds WDS is located on Lot 11, Concession 3, in the Geographic Township of Leeds. The site was closed in 1991 and a low permeability final cover was applied shortly thereafter. The site was licensed to receive domestic waste and brush. The site was originally licensed for the operation of a 0.8 hectare fill area within a 1.7 hectare total site area. At the time of closure, the site was considered to be in an over fill situation and the ECA was subsequently amended to recognize the actual waste fill area of 1.5 hectares. The site is a naturally attenuating site (unlined) and landfilling was conducted using the "area fill" method.

Physical Setting

The site is located approximately 13 kilometres west of Lansdowne and approximately 5.5 kilometres (km) north of Highway 401. The site is located in a rural area at the east end of Pelow Road. An unnamed watercourse is located in proximity to the eastern property boundary and flows toward the southwest, and drains to Sucker Brook Creek, which ultimately discharges to the Gananoque River which is located approximately 2km south of the site. The nearest residential properties are located to the west and northwest of the site along the north and south sides of Pelow Road. The nearest residential dwelling is located approximately 210 metres northwest of the site.

Geology

Geology at the site consists of a thin and discontinuous overburden unit overlying Precambrian bedrock. Overburden thickness has been reported to range from 0 to 7 metres and bedrock outcrops are common in the area. Bedrock is reported to be composed of mafic intrusive rocks. Overburden materials have been described as fine sand with varying amounts of gravel and clay/fines. Organic deposits are also present in wetland areas located northeast, east, and southeast of the site.

Hydrogeology

The overburden unit is thin and discontinuous in nature, and groundwater flow within the unit is expected to be highly controlled by the local topography. Based on surficial and bedrock topography, the primary direction of groundwater flow in the overburden unit is toward the east and southeast and is expected to discharge to the unnamed tributary. Localized topographic lows located to the north and northwest of the site are expected to result in localised groundwater/leachate flow to these areas.

A bedrock monitoring well was previously located northeast of the site but has since been decommissioned. This monitoring well contained artesian conditions; indicating that the bedrock and overburden are poorly connected and that downward gradients (upward flow conditions) are present. No bedrock monitoring wells currently exist at the site, and are not currently interpreted to be required.

Groundwater Monitoring Program (2017)

Malroz conducted groundwater monitoring in August and December of 2017. Only one monitoring well (89-1) could be located and was sampled during the August sampling event. Only two monitoring wells (89-1 and 08-1) were sampled as part of the December monitoring event.

The groundwater monitoring program conducted in 2017 did not comply with the approved groundwater monitoring program.

Background Groundwater Quality

Background groundwater quality in the overburden unit was historically assessed based on groundwater quality at monitoring well 89-4, which was located hydraulically up-gradient and to the northeast of the waste mound. Background groundwater quality has generally been characterized by relatively low concentrations of most parameters with the exception of hardness, phosphorus, manganese, and iron which were commonly elevated.

It was previously discussed/agreed that monitoring well 89-1 (and its eventual replacement) is likely a suitable background monitoring well. Monitoring well 89-1 was sampled on two occasions during 2017; however, no formal background groundwater quality assessment is provided within the report.

Monitoring well 89-1 was abandoned and replaced (MW102) in February 2018.

Leachate

Malroz indicates that the following parameters were elevated in leachate (monitoring well 08-1) as compared to background groundwater quality (monitoring well 89-1): alkalinity, dissolved organic carbon (DOC), hardness, total phosphorus, total dissolved solids (TDS), total suspended solids (TSS), chloride, sulphate, barium, boron, calcium, iron, manganese, potassium, silicon, sodium, strontium, vanadium, and zinc.

Malroz identifies boron, chloride, conductivity, and DOC as a sub-set of leachate indicator parameters (LIPs). It is not clear why or how the subset of LIPs were determined.

Down-gradient Groundwater Quality

Limited groundwater monitoring was conducted in 2017, and as such, the extent of leachate impacts is poorly defined and remains undelineated toward the south.

Leachate impacts have historically been identified at monitoring wells located in the vicinity of the eastern (08-1) and southern (00-1) toe of the waste mound. Leachate impacts are also expected to extend beyond the north and west property boundaries due to localised depressions in these areas.

Additional monitoring wells (MW103 and MW104) were installed down-gradient (south) of the waste mound during February 2018, and groundwater quality data from these monitoring wells will improve the understanding of down-gradient groundwater quality.

Regulatory Evaluation

Condition 3.1(a) of the ECA requires the site to be operated in compliance with Guideline B-7. Malroz indicates that inadequate information existed in 2017 to provide a formal Guideline B-7 assessment; however, they acknowledge that the site has historically been interpreted to be in non-compliance with Guideline B-7.

Additional monitoring wells were installed/replaced during February 2018 that will allow a formal Guideline B-7 assessment to be conducted in 2018.

Trigger Mechanisms and Contingency Plans

Formal trigger mechanisms and contingency action plans are not provided in the current report; however, the site is recognized to be in perpetual non-compliance with Guideline B-7, and an action plan has been approved and is in the process of being implemented to address these issues.

The approved action plan (2016) includes the following actions:

- Updating the monitoring well network with removal/replacement/addition of monitoring wells (completed February 2018).
- Delineation of leachate impacts in the overburden unit (ongoing data collection / not completed).

- Acquisition of lands or groundwater rights as required to comply with Guideline B-7. (ongoing data collection / not completed)
- Acquisition of a 30 metre buffer in all areas (not yet completed).
- Formally updating the groundwater and surface water monitoring programs (not formally completed as required by condition 3.2 of the ECA).
- Developing formal groundwater and surface water triggers and contingency plans (not completed).

Conditions 3.4(a) and 3.4(b) require that within two (2) months from the issuance of the amended ECA, formal triggers and contingency plans be developed and provided. To my knowledge formal trigger mechanisms and contingency action plans have not be developed and provided, and as such, I conclude that the site is in non-compliance with conditions 3.4(a) and 3.4(b) of the ECA.

Groundwater-Surface Water Interactions

Leachate impacted groundwater is expected to discharge to the unnamed tributary located east and southeast of the waste mound. Multiple Provincial Water Quality Objective (PWQO) exceedances have historically been reported in groundwater samples collected at monitoring well 08-1 located at the toe of the landfill adjacent to the tributary. Iron staining has also been reported in this area. The results indicate that leachate impacted groundwater has the potential to impact surface water.

Two additional monitoring wells (MW103 and MW104) were installed in February 2018 to the south of the waste mound in the vicinity of the unnamed tributary/wetland. These monitoring wells will provide additional information with respect to groundwater quality in this area and will assist in determining if groundwater discharge in this area has the potential to impair surface water quality groundwater quality.

I previously recommended that future monitoring reports compare groundwater quality data results from monitoring wells located adjacent to surface water to PWQOs. While Malroz has provided the comparison but no discussion, and indicate that they disagree with this practice. The recommended comparison is a standard practice in the assessment of potential impacts to surface water at waste disposal sites as outlined in the Technical Guidance Document "Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water (MOE, November 2010). The purpose of the comparison is to determine what parameters within the groundwater plume represent a potential risk to surface water should it discharge to surface water. Future monitoring reports should provide a discussion of the results.

Malroz recommends that a staff gauge be installed at SW1 to allow for an improved understanding of groundwater-surface water interactions in this area. I have no objection to the installation of a staff gauge in this area.

A MECP Surface Water Scientist should continue to be consulted with respect to surface water management associated with the site.

Water Supply Wells

Residential homes are located west and northwest of the site on the north and south side of Pelow Road. Private supply wells are expected to be the primary source of water supply in the area, and are expected to be completed almost exclusively in the bedrock unit. The thin overburden is not expected to be a viable aquifer for domestic water supply. No groundwater supply wells are located down-gradient of the site within 500m.

I conclude that the site does not currently pose a risk to water supply wells and water supply well monitoring is not required at this time.

Landfill Gas

Formal landfill gas monitoring is not currently conducted at the site; however, landfill gas screening within monitoring wells was conducted in 2017. Landfill gas was not detected in any monitoring wells during 2017. A landfill gas assessment was provided in the closure report (WESA, 1991) and determined that the offsite risk posed by landfill gas is negligible.

Recommended Groundwater Monitoring Program (2018)

Malroz recommends that groundwater monitoring continue to be conducted twice per year (spring and fall). The monitoring well network has been updated to reflect those monitoring wells installed and decommissioned in 2018. The following monitoring wells are to be included in the monitoring program: 08-1; MW101; MW102; MW103; and, MW104. The list of parameters to be analysed are listed in section 3.1 of the report and include general chemical parameters, nutrients, organic parameters, metals, and volatile organic compounds (VOCs).

I am generally supportive of the groundwater monitoring program proposed by Malroz; however, if all newly installed monitoring wells are non-detect for VOCs in 2018, I would support a reduction in VOC monitoring to once every five (5) years at selected monitoring wells (i.e. MW101 and 08-1).

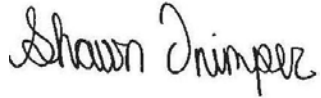
Condition 3.2 of the ECA requires, within two (2) months of the issuance of the ECA, that a report be prepared and provided that formally presents updated groundwater and surface water monitoring programs. To my knowledge, no such report has been received, and the site is in non-compliance with this condition.

Conclusions and Recommendations

- The Leeds WDS closed in 1991 and is a natural attenuation site.
- Compliance with Guideline B-7 is required by condition 3.1(a) of the ECA.
- A Guideline B-7 assessment was not provided in the report; however, it was acknowledged that the site is in non-compliance with Guideline B-7.

- An action plan was approved in 2016 to address Guideline B-7 non-compliance at the site. Four new/replacement monitoring wells were installed in February 2018 as agreed upon within the action plan. The timing for the completion of additional required actions is unclear; however, it is understood that they are underway.
- Conditions 3.4(a) and 3.4(b) require that within two (2) months from the issuance of the amended ECA, formal triggers and contingency plans be developed and provided. To my knowledge formal trigger mechanisms and contingency action plans have not been developed and provided, and the site is in non-compliance with conditions 3.4(a) and 3.4(b) of the ECA.
- Limited groundwater monitoring was conducted at the site in 2017 and does not comply with the approved groundwater monitoring program at the site.
- Condition 3.2 of the d ECA requires, within two (2) months of the issuance of the ECA, that a report be prepared and provided that formally presents updated groundwater and surface water monitoring programs. To my knowledge, no such report has been received, and the site is in non-compliance with this condition.
- I am generally supportive of the groundwater monitoring program proposed by Malroz; however, if all newly installed monitoring wells are non-detect for VOCs in 2018, I would support a reduction in VOC monitoring to once every two (2) years at selected monitoring wells (i.e. MW101 and 08-1).
- Leachate impacted groundwater is expected to discharge to the unnamed tributary located east and southeast of the waste mound. A MECP Surface Water Scientist should continue to be consulted with respect to surface water management associated with this site.
- The current report contains only the 2017 monitoring data. Future monitoring reports should include all current and historical monitoring data. This request was made in my previous review; however, it has not been addressed.
- The geological and hydrogeological descriptions provided in the current report consist of quoted interpretations and descriptions provided in previous reports. The referenced material is professional interpretation of site observations, site conditions, and readily available information. Future monitoring reports should provide unique interpretations for these sections prepared by the authors of the report.
- Future monitoring reports should include a formal discussion of background groundwater quality.
- Future monitoring reports should provide a statement of compliance with respect to relevant conditions of the ECA.

- The current report was not accompanied by a completed monitoring and screening checklist. A completed and signed checklist should be submitted with all future reports.



Shawn Trimper, P.Eng.
ST

ec: Peter Taylor
Greg Faaren
Roberto Sacilotto

c: Dana Cruickshank
File GW LG LT 01 03 C3 (Leeds (closed) WDS; ECA No. A442002)
SAT/ID# 7156-AXGRJ3

Camille Malcolm

From: Matthews, Nathalie (MECP) <Nathalie.Matthews@ontario.ca>
Sent: Friday, November 02, 2018 2:03 PM
To: 'Adam Goheen'; Albert Paschkowiak
Cc: Munasinghe, Ranjani (MECP); Trimper, Shawn (MECP); Cruikshank, Dana (MECP)
Subject: Proposed GW and SW Monitoring Programs - Leeds WDS - 2017 AMR
Attachments: 1040-109_Final Monitoring Plan for Leeds WDS.pdf

Adam and Albert,

The proposed environmental monitoring program (attached to this email), was reviewed by our groundwater unit and the following comments are offered with respect to the groundwater monitoring portion only:

- The proposed monitoring well locations are appropriate.
- The proposed sampling frequency is acceptable. However, the provided chart indicates that VOCs will be monitored at all locations during all events. Shawn previously agreed that VOC monitoring may be reduced to a frequency of every 5 years at selected monitoring locations (08-1 and MW101).
- The proposed parameter list is acceptable; however, I note that the list of VOCs to be analysed has not been provided. VOC analysis should be conducted for a comprehensive list of parameters, consistent with those analysed during 2017.
- GW elevation monitoring should also be included in the table and should be conducted twice per year in the Spring and Fall.

Also, to note....the approved monitoring programs will apply to all future years, unless amended. Therefore, the table should not indicate the year.

It is recommended that the groundwater monitoring program be revised to reflect the comments noted above and be resubmitted to our Approvals Unit, with a copy to my attention.

With respect to whether methane monitoring is required, this is beyond the scope of Eastern Region's review/expertise. Therefore, the need to monitor methane is deferred to Malroz and/or EAB.

Comments on the surface water monitoring program will be provided once the ministry's Surface Water Evaluator has completed his review.

If you have any questions, please call or email.

Nathalie Matthews, Provincial Officer 📞 613.548.6917 or 800.267.0974, ext. 2674
Ministry of the Environment, Conservation and Parks - Kingston District Office
1259 Gardiners Road, Unit 3, Kingston, ON K7P 3J6 (Mailing Address: PO Box 22032, Kingston, ON K7M 8S5)
Spills Action Centre: 800.268.6060 | Pollution Hotline (anonymous): 866.MOE.TIPS | www.ontario.ca/ministry-environment

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**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
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Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 800 267-0974



MEMORANDUM

November 5, 2018

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

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

RE: 2017 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 2018 prepared by Malroz for surface water concerns only.

Project Overview

For 2017 Malroz reports the following:

- Leeds WDS was closed in December 1991.
- Direction of shallow groundwater flow is to the adjacent brook/creek and wetland area.
- Surface water flows southerly in an intermittent tributary along the east side of the landfill to Sucker Brook which flows into the Gananoque River.
- Leachate is characterized by elevated concentrations of hardness, alkalinity, TKN, iron, manganese TP, TDS, TSS, chloride, sulphate, barium, boron, calcium, potassium silicon, strontium, vanadium, zinc and DOC compared to background well concentrations.
- SW1, SW2, SW3 and SW5 were monitored in the tributary to Sucker Creek. SW7 and SW6 are located in Sucker and SW7 is assessed to be representative of background conditions.
- The surface water stations are sampled twice a year (Spring and Fall). There was no flow at SW3 and SW7 in August 2017 and no flow at SW1 and SW3 in December 2017.

- Surface water enters the site along the east tributary and is controlled by a culvert that regulates flow from an upstream marsh. A beaver dam upstream of SW6 impedes flow to Sucker Creek and has resulted in flooding the area around SW5 and to within one meter of the toe of the landfill (seasonal).
- SW1 had exceedances of either PWQO, CWQG or Table A guidelines for phenols, aluminum, cobalt, copper, iron, lead and Dissolved Oxygen (DO) in August.
- SW2 had exceedances of either PWQO, CWQG or Table A guidelines or Total phosphorus (TP), aluminum, cobalt, copper, iron, lead and zinc in August and for TP, aluminum and iron in December.
- SW5 had exceedances of either PWQO, CWQG or Table A guidelines for total phosphorus, aluminum and iron in August and for total phosphorus, aluminum and iron in December.
- SW6 had exceedances of either PWQO, CWQG or Table A guidelines for total phosphorus, aluminum, cobalt, copper, and lead in August and for TP, aluminum and iron in December.
- SW7 had exceedances of either PWQO, CWQG or Table A guidelines for total phosphorus, aluminum and iron in December.
- Development of trigger mechanisms are dependent upon 2018 monitoring results.
- Concludes that there is some leachate impact to surface water but that attenuation is occurring within the current monitoring network.
- Recommends the following
 - Continue surface water monitoring on an twice per year basis. Schedule following rain events.
 - Install staff gauge at SW1.
 - Trigger mechanism for impacts at SW6 developed and forwarded for approval.

Reviewer's Comments

This site was last reviewed for surface water in 2015 on the 2013-2014 report. At that time several plans were in the works. These included the installation of a beaver baffle to ensure pond levels do not interact with the landfill which is a concern that appears to on-going. A contingency plan was to be developed in 2015 and submitted to MECP for approval. 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. As the reviewer was not asked to review the 2015 or 2016 annual reports, it is unknown if any of these measures have been completed.

The 2017 annual report does not include any historical data to compare to. Because there was no flow at SW1 and SW7 in August and at SW1 in December of 2017 it is difficult to interpret the data from this site. In addition, the site is supposed to be sampled in the spring and fall but in 2017 was sampled in the summer and winter. This again makes inter-year comparisons difficult because there is a significant difference

in concentrations between August and December in 2017. The standard deviation for many of the parameters is very high. In order to enhance interpretation of the data and extra sampling period should be added to the monitoring program.

The reviewer compared 2017 data to previous historical data up to 2014 that the reviewer had from his previous review. Table 1 summarizes the differences between historical and 2017 data. Where 2017 data concentrations were greater than historical by 25% percent that parameter would be in the negative row. If 2017 concentrations were less than historical by more than 25% they would be in the positive row and if there was less than 25% difference they would be in the no change row.

Table 1: Percentage of Parameters Showing Differences between Historical Concentrations and 2017 Concentrations.

	SW1	SW2	SW5	SW6	SW7
Negative	47	29	26	26	0
Positive	35	38	21	29	65
No Change	18	32	53	44	35

SW1 and SW5 showed a higher percentage of parameters having higher concentrations in 2017 than historical. SW7 showed improvement in water quality in 2017 but there was only one sample from December and December data in general was better than that in August.

Table 2 shows the station with the highest concentration (shaded cell) for each parameter for the tributary and for those in Sucker Creek.

Table 2: 2017 Station with Highest Concentrations

Parameter	SW2	SW1	SW5	SW7	SW6	Parameter	SW2	SW1	SW5	SW7	SW6
	Ave	Aug	Ave	Dec	Ave		Ave	Aug	Ave	Dec	Ave
Conductivity uS/cm	93.5	570	286.5	64	140	Chromium	0.001	0.001	0.001	0.001	0.001
Hardness	46.75	301	122.5	18	61.5	Cobalt	0.00185	0.011	0.0011	0.0005	0.0008
pH	6.975	7.5	7.8	7.9	7.55	Copper	0.0019	0.0065	0.0076	0.0005	0.00215
TSS	35	106	32.5	2	7.5	Iron	6.265	56.3	1.913	0.531	0.6395
TDS	71.5	344	177	44	95	Lead	0.0477	0.081	0.0592	0.0001	0.0238
Alkalinity	47.5	310	109	32	69	Magnesium	3.425	23.7	12.05	1.59	4.82
N - Ammonia	0.03	0.28	0.035	0.06	0.035	Manganese	0.2605	3.68	0.5205	0.048	0.7495
Chloride	1	6	2	1	1	Nickel	0.001	0.004	0.0015	0.001	0.001
N - Nitrate	0.2	0.3	0.3	0.1	0.1	Potassium	0.321	5.27	1.3535	0.691	0.713
N - Nitrite	0.05	0.05	0.05	0.05	0.05	Sodium	1.51	9.8	5.08	0.925	1.965
N - Total Kjeldahl	0.65	0.9	1.1	0.4	2.1	Vanadium	0.00145	0.0024	0.00175	0.0005	0.00065
Phosphorus (total)	0.1	0.23	0.315	0.02	0.96	Zinc	0.0125	0.025	0.0565	0.005	0.0115
Sulphate	2	5	8	2	2	BOD	4.5	40	3	2	3.5
Aluminum	0.2175	0.455	0.2475	0.102	0.1375	COD	20	214	20	19	15.5
Barium	0.035	0.242	0.139	0.001	0.0365	Phenols	0.001	0.005	0.001	0.001	0.001
Boron	0.00675	0.148	0.0585	0.02	0.027	DOC	10.45	67.8	11.95	7.9	10.2

When looking at the tributary stations, SW2 upstream had no parameters that had the highest concentration in 2017. SW1 adjacent to the landfill had significantly higher concentrations than SW2 for most parameters and SW5 which is downstream also

had a number of parameters that had the highest concentrations found in 2017. It is clear that the landfill is impacting on water quality in the tributary.

When comparing the upstream (SW7) and downstream station (SW6) on Sucker Creek, SW6 always had the highest concentrations. When comparing SW7 to SW6 for December only, SW6 has significantly elevated concentrations of conductivity, hardness, TDS, Alkalinity, TP, sulphate, barium, magnesium and vanadium, most of whom are leachate indicator parameters.

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 appears to be impacting water quality in Sucker Creek. The main chemicals of concern in the tributary that may be impacting on aquatic life are iron, aluminum and copper. Other metals are also at elevated levels. More robust data is required to confirm the above analysis as data is limited.

Recommendations

1. An update is required on the status of several plans that were in the works during my last review
2. Water quality impacts are difficult to interpret because the water quality is seasonally quite variable and limited in frequency. Therefore an additional monitoring session should be added so that stations are sampled spring, summer and fall after a significant rain event when water is likely present.
3. Future reports should have the current data as well as historical data available in electronic format.
4. 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.

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

Dana Cruikshank

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: 15 Nov 2018

Time: 13h30

Inspected by: CMM + MWV

Weather Conditions: cloudy, -6°C

Inspection Item	condition	notes
Condition of the waste cap (Erosion, repairs needed?)	Good.	
Are there seep present.	No.	
Condition of perimeter fence and gate.	Good.	
Is the site secure.	No	Perimeter fence is not enclosed @ northern boundary of waste mound
Were vermin, vectors, dust or litter present. N N N Y		furniture has been dumped outside entrance gate. also, some wire (metal) is piled just beyond entrance gate.

General Comments Sheen observed in the stream to the East of the waste mound (upstream from SW1).

Camille Malcolm.
Signature

Appendix G
Laboratory Certificates

C.O.C.: G71682

REPORT No. B18-11013 (i)

Rev. 1

Report To:

Malroz Engineering Inc.
308 Wellington Street, 2nd Floor
Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18
DATE REPORTED: 11-Jun-18
SAMPLE MATRIX: Groundwater

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

Client I.D.	18-W007	18-W008	18-W010	
Sample I.D.	B18-11013-1	B18-11013-2	B18-11013-3	
Date Collected	26-Apr-18	26-Apr-18	26-Apr-18	

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	01-May-18/O	888	875	232	
pH @25°C	pH Units		SM 4500H	01-May-18/O	7.84	7.41	8.26	
Conductivity @25°C	µmho/cm	1	SM 2510B	01-May-18/O	1690	1600	458	
Chloride	mg/L	0.5	SM4110C	29-Apr-18/O	14.1	16.4	2.4	
Nitrite (N)	mg/L	0.05	SM4110C	29-Apr-18/O	< 0.05	0.05	< 0.05	
Nitrate (N)	mg/L	0.05	SM4110C	29-Apr-18/O	< 0.05	0.08	< 0.05	
Sulphate	mg/L	1	SM4110C	29-Apr-18/O	149	83	19	
BOD(5 day)	mg/L	2	SM 5210B	27-Apr-18/K	3	11	3	
Total Suspended Solids	mg/L	3	SM2540D	27-Apr-18/K	1030	1250	5130	
Phosphorus-Total	mg/L	0.01	E3199A.1	30-Apr-18/K	1.12	1.13	9.58	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	30-Apr-18/K	0.9	12.2	4.7	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	01-May-18/K	0.08	9.78	0.07	
Total Dissolved Solids	mg/L	3	SM 2540D	01-May-18/O	926	875	251	
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	02-May-18/O	19.1	19.8	8.2	
Phenolics	mg/L	0.001	MOEE 3179	05-May-18/O	< 0.001	< 0.001	< 0.001	
COD	mg/L	5	SM 5220D	02-May-18/O	49	79	48	
Hardness (as CaCO3)	mg/L	1	SM 3120	02-May-18/O	950	900	261	
Aluminum	µg/L	10	SM 3120	02-May-18/O	110	100	50	
Arsenic	µg/L	0.1	EPA 200.8	02-May-18/O	0.9	1.0	0.4	
Barium	µg/L	1	SM 3120	02-May-18/O	57	291	29	
Boron	µg/L	5	SM 3120	02-May-18/O	662	835	17	
Cadmium	µg/L	0.02	EPA 200.8	02-May-18/O	0.079	0.062	0.018	
Calcium	µg/L	20	SM 3120	02-May-18/O	233000	234000	70400	
Chromium	µg/L	1	EPA 200.8	02-May-18/O	5	10	2	
Cobalt	µg/L	0.1	EPA 200.8	02-May-18/O	0.9	1.8	0.4	
Copper	µg/L	0.1	EPA 200.8	02-May-18/O	2.4	0.6	0.4	
Iron	µg/L	5	SM 3120	02-May-18/O	24	22100	32	

Revised to provide results for metals in ug/L



R.L. = Reporting Limit

Test methods are 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

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

C.O.C.: G71682

REPORT No. B18-11013 (i)

Rev. 1

Report To:

Malroz Engineering Inc.
 308 Wellington Street, 2nd Floor
 Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18

JOB/PROJECT NO.: Leeds

DATE REPORTED: 11-Jun-18

P.O. NUMBER: 1040

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W007	18-W008	18-W010	
Sample I.D.	B18-11013-1	B18-11013-2	B18-11013-3	
Date Collected	26-Apr-18	26-Apr-18	26-Apr-18	

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Lead	µg/L	0.02	EPA 200.8	02-May-18/O	< 0.02	< 0.02	< 0.02	
Magnesium	µg/L	20	SM 3120	02-May-18/O	89300	76700	20800	
Manganese	µg/L	1	SM 3120	02-May-18/O	1290	1550	41	
Mercury	µg/L	0.02	SM 3112 B	03-May-18/O	< 0.02	< 0.02	< 0.02	
Potassium	µg/L	100	SM 3120	02-May-18/O	2200	42800	600	
Silver	µg/L	0.02	EPA 200.8	02-May-18/O	< 0.02	< 0.02	< 0.02	
Sodium	µg/L	200	SM 3120	02-May-18/O	81800	32800	14900	
Uranium	µg/L	0.05	EPA 200.8	02-May-18/O	4.62	0.26	0.73	
Vanadium	µg/L	5	SM 3120	02-May-18/O	< 5	6	< 5	
Zinc	µg/L	5	SM 3120	02-May-18/O	< 5	77	< 5	

Revised to provide results for metals in ug/L



R.L. = Reporting Limit

Test methods are 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.: G71682

REPORT No. B18-11013 (ii)

Rev. 2

Report To:

Malroz Engineering Inc.
 308 Wellington Street, 2nd Floor
 Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18
 DATE REPORTED: 29-Jan-19
 SAMPLE MATRIX: Groundwater

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

Client I.D.	18-W007	18-W008	18-W010	
Sample I.D.	B18-11013-1	B18-11013-2	B18-11013-3	
Date Collected	26-Apr-18	26-Apr-18	26-Apr-18	

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Acetone	µg/L	2	EPA 8260	01-May-18/O	< 2	< 2	< 2	
Benzene	µg/L	0.5	EPA 8260	01-May-18/O	< 0.5	< 0.5	< 0.5	
Bromobenzene	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Bromodichloromethane	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Bromoform	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Bromomethane	µg/L	0.3	EPA 8260	01-May-18/O	< 0.3	< 0.3	< 0.3	
Carbon Tetrachloride	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Chloroethane	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Chloroform	µg/L	0.3	EPA 8260	01-May-18/O	< 0.3	< 0.3	< 0.3	
Chloromethane	µg/L	0.3	EPA 8260	01-May-18/O	< 0.3	< 0.3	< 0.3	
Chlorotoluene,2-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Chlorotoluene,4-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Dibromo-3-Chloropropane, 1,2-	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Dibromochloromethane	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dibromomethane	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Dichlorobenzene,1,2-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichlorobenzene,1,3-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichlorobenzene,1,4-	µg/L	0.2	EPA 8260	01-May-18/O	0.3	< 0.2	< 0.2	
Dichlorodifluoromethane	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Dichloroethane,1,1-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichloroethane,1,2-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichloroethene, 1,1-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichloroethene, cis-1,2-	µg/L	0.1	EPA 8260	01-May-18/O	0.4	< 0.1	< 0.1	
Dichloroethene, trans-1,2-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	



R.L. = Reporting Limit

Test methods are 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

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

C.O.C.: G71682

REPORT No. B18-11013 (ii)

Rev. 2

Report To:

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

Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18

JOB/PROJECT NO.: Leeds

DATE REPORTED: 29-Jan-19

P.O. NUMBER: 1040

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.			
					18-W007	18-W008	18-W010	
					Sample I.D.			
					Date Collected			
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	01-May-18/O	< 0.3	< 0.3	< 0.3	
Dichloropropane,1,2-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichloropropane,1,3-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Dichloropropane,2,2-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Dichloropropene, cis-1,3-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichloropropene, trans-1,3-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Dichloropropene, 1,1-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Ethylbenzene	µg/L	0.5	EPA 8260	01-May-18/O	< 0.5	< 0.5	< 0.5	
Hexachlorobutadiene	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Hexane	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Isopropylbenzene	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	
Isopropyltoluene,4-	µg/L	0.4	EPA 8260	01-May-18/O	< 0.4	< 0.4	< 0.4	
Methyl Butyl Ketone	µg/L	10	EPA 8260	01-May-18/O	< 10	< 10	< 10	
Methyl Ethyl Ketone	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Methyl Isobutyl Ketone	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Methyl-t-butyl Ether	µg/L	1	EPA 8260	01-May-18/O	< 1	< 1	< 1	
Monochlorobenzene (Chlorobenzene)	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	0.4	< 0.2	
Naphthalene	µg/L	0.7	EPA 8260	01-May-18/O	< 0.7	< 0.7	< 0.7	
n-Butylbenzene	µg/L	0.7	EPA 8260	01-May-18/O	< 0.7	< 0.7	< 0.7	
n-Propylbenzene	µg/L	0.4	EPA 8260	01-May-18/O	< 0.4	< 0.4	< 0.4	
sec-Butylbenzene	µg/L	0.5	EPA 8260	01-May-18/O	< 0.5	< 0.5	< 0.5	
Styrene	µg/L	0.5	EPA 8260	01-May-18/O	< 0.5	< 0.5	< 0.5	
tert-Butylbenzene	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Tetrachloroethane,1,1,1,2-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1	
Tetrachloroethane,1,1,2,2-	µg/L	0.4	EPA 8260	01-May-18/O	< 0.4	< 0.4	< 0.4	
Tetrachloroethylene	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2	



R.L. = Reporting Limit

Test methods are 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.: G71682

REPORT No. B18-11013 (ii)

Rev. 2

Report To:

Malroz Engineering Inc.
 308 Wellington Street, 2nd Floor
 Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18
 DATE REPORTED: 29-Jan-19
 SAMPLE MATRIX: Groundwater

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

Client I.D.	18-W007	18-W008	18-W010
Sample I.D.	B18-11013-1	B18-11013-2	B18-11013-3
Date Collected	26-Apr-18	26-Apr-18	26-Apr-18

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Toluene	µg/L	0.5	EPA 8260	01-May-18/O	< 0.5	< 0.5	< 0.5
Trichlorobenzene,1,2,3-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2
Trichlorobenzene,1,2,4-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2
Trichloroethane,1,1,1-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1
Trichloroethane,1,1,2-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1
Trichloroethylene	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1
Trichlorofluoromethane	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1
Trichloropropane,1,2,3-	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2
Trimethylbenzene,1,2,4-	µg/L	2	EPA 8260	01-May-18/O	< 2	< 2	< 2
Trimethylbenzene,1,3,5-	µg/L	0.6	EPA 8260	01-May-18/O	< 0.6	< 0.6	< 0.6
Vinyl Chloride	µg/L	0.2	EPA 8260	01-May-18/O	< 0.2	< 0.2	< 0.2
Xylene, m,p-	µg/L	0.4	EPA 8260	01-May-18/O	< 0.4	< 0.4	< 0.4
Xylene, o-	µg/L	0.1	EPA 8260	01-May-18/O	< 0.1	< 0.1	< 0.1
Xylene, m,p,o-	µg/L	0.4	EPA 8260	01-May-18/O	< 0.4	< 0.4	< 0.4

1 Revised to include m,p,o - Xylene



Michelle Dubien
 Lab Manager

R.L. = Reporting Limit

Test methods are 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.: G78300

REPORT No. B18-11088

Rev. 1

Report To:

Malroz Engineering Inc.
 308 Wellington Street, 2nd Floor
 Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 27-Apr-18
 DATE REPORTED: 11-Jun-18
 SAMPLE MATRIX: Groundwater

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

Client I.D.	18-W005		
Sample I.D.	B18-11088-1		
Date Collected	27-Apr-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	02-May-18/O	253		
pH @25°C	pH Units		SM 4500H	02-May-18/O	8.19		
Conductivity @25°C	µmho/cm	1	SM 2510B	02-May-18/O	595		
Chloride	mg/L	0.5	SM4110C	30-Apr-18/O	6.8		
Nitrite (N)	mg/L	0.05	SM4110C	30-Apr-18/O	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	30-Apr-18/O	0.07		
Sulphate	mg/L	1	SM4110C	30-Apr-18/O	52		
Phosphorus-Total	mg/L	0.01	E3199A.1	01-May-18/K	18.3		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	01-May-18/K	15.3		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	02-May-18/K	0.14		
Total Dissolved Solids	mg/L	3	SM 2540D	04-May-18/O	309		
Phenolics	mg/L	0.001	MOEE 3179	08-May-18/O	< 0.001		
COD	mg/L	5	SM 5220D	04-May-18/O	577		
Hardness (as CaCO3)	mg/L	1	SM 3120	04-May-18/O	266		
Aluminum	µg/L	10	SM 3120	04-May-18/O	40		
Arsenic	µg/L	0.1	EPA 200.8	10-May-18/O	0.2		
Barium	µg/L	1	SM 3120	04-May-18/O	33		
Boron	µg/L	5	SM 3120	04-May-18/O	39		
Cadmium	µg/L	0.02	EPA 200.8	10-May-18/O	0.017		
Calcium	µg/L	20	SM 3120	04-May-18/O	58200		
Chromium	µg/L	1	EPA 200.8	10-May-18/O	< 1		
Cobalt	µg/L	0.1	EPA 200.8	10-May-18/O	0.2		
Copper	µg/L	0.1	EPA 200.8	10-May-18/O	1.6		
Iron	µg/L	5	SM 3120	04-May-18/O	< 5		
Lead	µg/L	0.02	EPA 200.8	10-May-18/O	0.06		
Magnesium	µg/L	20	SM 3120	04-May-18/O	29400		
Manganese	µg/L	1	SM 3120	04-May-18/O	34		

Revised to provide results for metals in ug/L



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.: G78300

REPORT No. B18-11088

Rev. 1

Report To:

Malroz Engineering Inc.
 308 Wellington Street, 2nd Floor
 Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 27-Apr-18

JOB/PROJECT NO.: Leeds

DATE REPORTED: 11-Jun-18

P.O. NUMBER: 1040

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W005			
Sample I.D.	B18-11088-1			
Date Collected	27-Apr-18			

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Mercury	µg/L	0.02	SM 3112 B	04-May-18/O	< 0.02			
Potassium	µg/L	100	SM 3120	04-May-18/O	1100			
Silver	µg/L	0.1	EPA 200.8	10-May-18/O	< 0.1			
Sodium	µg/L	200	SM 3120	04-May-18/O	17100			
Uranium	µg/L	0.05	EPA 200.8	10-May-18/O	2.27			
Vanadium	µg/L	5	SM 3120	04-May-18/O	13			
Zinc	µg/L	5	SM 3120	04-May-18/O	< 5			

Revised to provide results for metals in ug/L



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

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

C.O.C.: G71683

REPORT No. B18-11014

Report To:

Malroz Engineering Inc.
 308 Wellington Street, 2nd Floor
 Kingston ON K7K 7A8 Canada
Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18
 DATE REPORTED: 10-May-18
 SAMPLE MATRIX: Surface Water

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

Client I.D.	18-W009	18-W001	18-W006	18-W003
Sample I.D.	B18-11014-1	B18-11014-2	B18-11014-3	B18-11014-4
Date Collected	26-Apr-18	26-Apr-18	26-Apr-18	26-Apr-18

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	01-May-18/O	75	32	99	114
pH @25°C	pH Units		SM 4500H	01-May-18/O	7.57	7.37	8.01	7.93
Conductivity @25°C	µmho/cm	1	SM 2510B	01-May-18/O	163	67	223	258
Chloride	mg/L	0.5	SM4110C	29-Apr-18/O	1.3	0.9	1.9	2.4
Nitrite (N)	mg/L	0.05	SM4110C	29-Apr-18/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	29-Apr-18/O	0.09	< 0.05	0.14	< 0.05
Sulphate	mg/L	1	SM4110C	29-Apr-18/O	5	< 1	9	15
BOD(5 day)	mg/L	2	SM 5210B	27-Apr-18/K	< 2	5	3	3
Total Suspended Solids	mg/L	3	SM2540D	01-May-18/K	11	20	9	7
o-Phosphate (P)	mg/L	0.01	PE4500-S	27-Apr-18/K	0.01	0.02	0.01	0.01
Phosphorus-Total	mg/L	0.01	E3199A.1	30-Apr-18/K	0.06	0.10	0.04	0.04
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	30-Apr-18/K	0.6	0.6	0.4	0.4
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	01-May-18/K	0.20	0.01	0.09	< 0.01
Ammonia (N)-unionized	mg/L	0.01	CALC	01-May-18/K	< 0.01	< 0.01	< 0.01	< 0.01
Total Dissolved Solids	mg/L	3	SM 2540D	01-May-18/O	83	34	114	132
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	02-May-18/O	6.2	5.8	6.4	7.9
Phenolics	mg/L	0.001	MOEE 3179	05-May-18/O	< 0.001	< 0.001	< 0.001	< 0.001
COD	mg/L	5	SM 5220D	02-May-18/O	18	21	21	25
Hardness (as CaCO3)	mg/L	1	SM 3120	01-May-18/O	78	50	121	126
Aluminum	µg/L	10	SM 3120	09-May-18/O	80	120	60	30
Arsenic	µg/L	0.1	EPA 200.8	01-May-18/O	0.4	0.7	0.9	0.8
Barium	µg/L	1	SM 3120	01-May-18/O	27	31	42	33
Boron	µg/L	5	SM 3120	01-May-18/O	36	< 5	63	61
Cadmium	µg/L	0.02	EPA 200.8	01-May-18/O	0.020	0.072	0.019	< 0.015
Calcium	µg/L	20	SM 3120	01-May-18/O	20600	13300	31400	31300
Chromium	µg/L	1	EPA 200.8	01-May-18/O	< 1	1	< 1	< 1
Cobalt	µg/L	0.1	EPA 200.8	01-May-18/O	0.2	0.4	0.2	< 0.1



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.: G71683

REPORT No. B18-11014

Report To:

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

Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18

JOB/PROJECT NO.: Leeds

DATE REPORTED: 10-May-18

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	18-W009	18-W001	18-W006	18-W003
Sample I.D.	B18-11014-1	B18-11014-2	B18-11014-3	B18-11014-4
Date Collected	26-Apr-18	26-Apr-18	26-Apr-18	26-Apr-18

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Copper	µg/L	0.1	EPA 200.8	01-May-18/O	< 0.1	6.8	< 0.1	< 0.1
Iron	µg/L	5	SM 3120	01-May-18/O	554	661	428	159
Lead	µg/L	0.02	EPA 200.8	01-May-18/O	0.14	1.41	0.19	0.05
Magnesium	µg/L	20	SM 3120	01-May-18/O	6520	4130	10300	11600
Manganese	µg/L	1	SM 3120	01-May-18/O	81	42	59	11
Mercury	µg/L	0.02	SM 3112 B	02-May-18/O	< 0.02	< 0.02	< 0.02	< 0.02
Nickel	µg/L	0.2	EPA 200.8	01-May-18/O	1.4	2.4	1.9	1.5
Potassium	µg/L	100	SM 3120	01-May-18/O	1700	700	2800	2500
Silver	µg/L	0.02	EPA 200.8	01-May-18/O	< 0.02	< 0.02	< 0.02	< 0.02
Sodium	µg/L	200	SM 3120	01-May-18/O	2800	2900	5100	5100
Strontium	µg/L	1	SM 3120	01-May-18/O	128	90	209	179
Vanadium	µg/L	5	SM 3120	01-May-18/O	< 5	< 5	< 5	< 5
Zinc	µg/L	5	SM 3120	01-May-18/O	10	36	22	< 5



Michelle Dubien
 Lab Manager

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 SAMPLE MATRIX: Surface Water

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

Client I.D.	18-W004	18-W002		
Sample I.D.	B18-11014-5	B18-11014-6		
Date Collected	26-Apr-18	26-Apr-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	01-May-18/O	55	21		
pH @25°C	pH Units		SM 4500H	01-May-18/O	7.90	7.57		
Conductivity @25°C	µmho/cm	1	SM 2510B	01-May-18/O	127	49		
Chloride	mg/L	0.5	SM4110C	29-Apr-18/O	1.2	0.6		
Nitrite (N)	mg/L	0.05	SM4110C	29-Apr-18/O	< 0.05	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	29-Apr-18/O	< 0.05	< 0.05		
Sulphate	mg/L	1	SM4110C	29-Apr-18/O	6	1		
BOD(5 day)	mg/L	2	SM 5210B	27-Apr-18/K	3	3		
Total Suspended Solids	mg/L	3	SM2540D	01-May-18/K	8	8		
o-Phosphate (P)	mg/L	0.01	PE4500-S	27-Apr-18/K	< 0.01	0.01		
Phosphorus-Total	mg/L	0.01	E3199A.1	30-Apr-18/K	0.03	0.04		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	30-Apr-18/K	0.4	0.4		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	01-May-18/K	0.01	0.04		
Ammonia (N)-unionized	mg/L	0.01	CALC	01-May-18/K	< 0.01	< 0.01		
Total Dissolved Solids	mg/L	3	SM 2540D	01-May-18/O	64	25		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	02-May-18/O	7.1	4.7		
Phenolics	mg/L	0.001	MOEE 3179	05-May-18/O	< 0.001	< 0.001		
COD	mg/L	5	SM 5220D	02-May-18/O	20	18		
Hardness (as CaCO3)	mg/L	1	SM 3120	01-May-18/O	74	21		
Aluminum	µg/L	10	SM 3120	09-May-18/O	30	50		
Arsenic	µg/L	0.1	EPA 200.8	01-May-18/O	0.4	0.7		
Barium	µg/L	1	SM 3120	01-May-18/O	26	8		
Boron	µg/L	5	SM 3120	01-May-18/O	27	12		
Cadmium	µg/L	0.02	EPA 200.8	01-May-18/O	< 0.015	< 0.015		
Calcium	µg/L	20	SM 3120	01-May-18/O	19600	6130		
Chromium	µg/L	1	EPA 200.8	01-May-18/O	< 1	< 1		
Cobalt	µg/L	0.1	EPA 200.8	01-May-18/O	0.1	0.1		



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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.: G71683

REPORT No. B18-11014

Report To:

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

Attention: Ben Clock

Caduceon Environmental Laboratories

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

DATE RECEIVED: 26-Apr-18

JOB/PROJECT NO.: Leeds

DATE REPORTED: 10-May-18

P.O. NUMBER: 1040

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	18-W004	18-W002		
Sample I.D.	B18-11014-5	B18-11014-6		
Date Collected	26-Apr-18	26-Apr-18		

Parameter	Units	R.L.	Reference Method		Date/Site Analyzed			
			Reference Method	Date/Site Analyzed				
Copper	µg/L	0.1	EPA 200.8	01-May-18/O	< 0.1	< 0.1		
Iron	µg/L	5	SM 3120	01-May-18/O	341	525		
Lead	µg/L	0.02	EPA 200.8	01-May-18/O	0.11	0.19		
Magnesium	µg/L	20	SM 3120	01-May-18/O	6110	1440		
Manganese	µg/L	1	SM 3120	01-May-18/O	47	34		
Mercury	µg/L	0.02	SM 3112 B	02-May-18/O	< 0.02	< 0.02		
Nickel	µg/L	0.2	EPA 200.8	01-May-18/O	0.8	0.5		
Potassium	µg/L	100	SM 3120	01-May-18/O	1200	500		
Silver	µg/L	0.02	EPA 200.8	01-May-18/O	< 0.02	< 0.02		
Sodium	µg/L	200	SM 3120	01-May-18/O	3700	900		
Strontium	µg/L	1	SM 3120	01-May-18/O	116	28		
Vanadium	µg/L	5	SM 3120	01-May-18/O	< 5	< 5		
Zinc	µg/L	5	SM 3120	01-May-18/O	24	8		



Michelle Dubien
 Lab Manager

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C.O.C.: G82028

REPORT No. B18-35385 (i)

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: 15-Nov-18
 DATE REPORTED: 27-Nov-18
 SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1040-LEEDS
 P.O. NUMBER:
 WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.	18-W016	18-W017	18-W018	18-W019
					Sample I.D.	18-W016	18-W017	18-W018	18-W019
Date Collected					15-Nov-18	15-Nov-18	15-Nov-18	15-Nov-18	15-Nov-18
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	19-Nov-18/O	135	314	599	656	
pH @25°C	pH Units		SM 4500H	19-Nov-18/O	7.96	8.08	7.68	7.87	
Conductivity @25°C	µmho/cm	1	SM 2510B	19-Nov-18/O	343	748	1470	1360	
Chloride	mg/L	0.5	SM4110C	20-Nov-18/O	3.0		14.0	9.7	
Nitrite (N)	mg/L	0.05	SM4110C	20-Nov-18/O	< 0.05		0.06	< 0.05	
Nitrate (N)	mg/L	0.05	SM4110C	20-Nov-18/O	0.08		1.74	0.06	
Sulphate	mg/L	1	SM4110C	20-Nov-18/O	38		217	140	
BOD(5 day)	mg/L	3	SM 5210B	16-Nov-18/K			9	4	
Total Suspended Solids	mg/L	3	SM2540D	20-Nov-18/K	51000		2600	260	
Phosphorus-Total	mg/L	0.01	E3199A.1	19-Nov-18/K	26.6		1.36	0.15	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	19-Nov-18/K	27.8		3.1	0.7	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	21-Nov-18/K	0.09		1.38	0.04	
Total Dissolved Solids	mg/L	3	SM 2540D	20-Nov-18/O	176	391	801	738	
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	19-Nov-18/O	7.6		14.1	17.3	
Phenolics	mg/L	0.002	MOEE 3179	20-Nov-18/K	0.002		< 0.002		
COD	mg/L	5	SM 5220D	20-Nov-18/O	463		80	33	
Hardness (as CaCO3)	mg/L	1	SM 3120	21-Nov-18/O	193		795	822	
Aluminum	µg/L	10	SM 3120	21-Nov-18/O	30		100	100	
Arsenic	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.1		0.6	0.5	
Barium	µg/L	1	SM 3120	21-Nov-18/O	27		258	60	
Boron	µg/L	5	SM 3120	21-Nov-18/O	39		1280	656	
Cadmium	µg/L	0.015	EPA 200.8	20-Nov-18/O	< 0.015		1.08	0.059	
Calcium	µg/L	20	SM 3120	21-Nov-18/O	43200		206000	204000	
Chromium	µg/L	1	EPA 200.8	20-Nov-18/O	< 1		< 1	< 1	
Cobalt	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.2		1.5	0.4	
Copper	µg/L	0.1	EPA 200.8	20-Nov-18/O	1.1		2.3	3.2	
Iron	µg/L	5	SM 3120	21-Nov-18/O	< 5		2500	14	



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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.: G82028

REPORT No. B18-35385 (i)

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: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.			
					18-W016	18-W017	18-W018	18-W019
Lead	µg/L	0.02	EPA 200.8	20-Nov-18/O	0.06		0.03	0.04
Magnesium	µg/L	20	SM 3120	21-Nov-18/O	20700		68200	75800
Manganese	µg/L	1	SM 3120	21-Nov-18/O	8		1330	290
Mercury	µg/L	0.02	SM 3112 B	22-Nov-18/O	< 0.02		< 0.02	
Potassium	µg/L	100	SM 3120	21-Nov-18/O	400		37100	2300
Silver	µg/L	0.1	EPA 200.8	20-Nov-18/O	< 0.1		< 0.1	< 0.1
Sodium	µg/L	200	SM 3120	21-Nov-18/O	14400		36400	89400
Uranium	µg/L	0.05	EPA 200.8	20-Nov-18/O	0.86		0.41	4.37
Vanadium	µg/L	5	SM 3120	21-Nov-18/O	< 5		< 5	< 5
Zinc	µg/L	5	SM 3120	21-Nov-18/O	< 5		560	< 5

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



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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JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W020		
Sample I.D.	B18-35385-5		
Date Collected	15-Nov-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	19-Nov-18/O	261		
pH @25°C	pH Units		SM 4500H	19-Nov-18/O	7.88		
Conductivity @25°C	µmho/cm	1	SM 2510B	19-Nov-18/O	524		
Chloride	mg/L	0.5	SM4110C	20-Nov-18/O	3.2		
Nitrite (N)	mg/L	0.05	SM4110C	20-Nov-18/O	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	20-Nov-18/O	0.09		
Sulphate	mg/L	1	SM4110C	20-Nov-18/O	21		
BOD(5 day)	mg/L	3	SM 5210B	16-Nov-18/K			
Total Suspended Solids	mg/L	3	SM2540D	20-Nov-18/K	1000		
Phosphorus-Total	mg/L	0.01	E3199A.1	19-Nov-18/K	1.81		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	19-Nov-18/K	0.5		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	21-Nov-18/K	0.07		
Total Dissolved Solids	mg/L	3	SM 2540D	20-Nov-18/O	271		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	19-Nov-18/O	6.7		
Phenolics	mg/L	0.002	MOEE 3179	20-Nov-18/K	< 0.002		
COD	mg/L	5	SM 5220D	20-Nov-18/O	50		
Hardness (as CaCO3)	mg/L	1	SM 3120	21-Nov-18/O	277		
Aluminum	µg/L	10	SM 3120	21-Nov-18/O	50		
Arsenic	µg/L	0.1	EPA 200.8	20-Nov-18/O	< 0.1		
Barium	µg/L	1	SM 3120	21-Nov-18/O	37		
Boron	µg/L	5	SM 3120	21-Nov-18/O	27		
Cadmium	µg/L	0.015	EPA 200.8	20-Nov-18/O	< 0.015		
Calcium	µg/L	20	SM 3120	21-Nov-18/O	75800		
Chromium	µg/L	1	EPA 200.8	20-Nov-18/O	< 1		
Cobalt	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.1		
Copper	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.8		
Iron	µg/L	5	SM 3120	21-Nov-18/O	< 5		



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Michelle Dubien
Lab Manager

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JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W020			
Sample I.D.	B18-35385-5			
Date Collected	15-Nov-18			

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Lead	µg/L	0.02	EPA 200.8	20-Nov-18/O	0.07			
Magnesium	µg/L	20	SM 3120	21-Nov-18/O	21300			
Manganese	µg/L	1	SM 3120	21-Nov-18/O	13			
Mercury	µg/L	0.02	SM 3112 B	22-Nov-18/O				
Potassium	µg/L	100	SM 3120	21-Nov-18/O	700			
Silver	µg/L	0.1	EPA 200.8	20-Nov-18/O	< 0.1			
Sodium	µg/L	200	SM 3120	21-Nov-18/O	15000			
Uranium	µg/L	0.05	EPA 200.8	20-Nov-18/O	0.83			
Vanadium	µg/L	5	SM 3120	21-Nov-18/O	< 5			
Zinc	µg/L	5	SM 3120	21-Nov-18/O	5			

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



Michelle Dubien
 Lab Manager

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C.O.C.: G82028

REPORT No. B18-35385 (ii)

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 Fax: 613-544-2770

DATE RECEIVED: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W016	18-W017	18-W018	18-W019
Sample I.D.	B18-35385-1	B18-35385-2	B18-35385-3	B18-35385-4
Date Collected	15-Nov-18	15-Nov-18	15-Nov-18	15-Nov-18

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Acetone	µg/L	30	EPA 8260	20-Nov-18/R	< 30	< 30	< 30	< 30
Benzene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Bromobenzene	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1	< 0.1	< 0.1	< 0.1
Bromochloromethane	µg/L	0.2	EPA 8260	20-Nov-18/R	< 0.2	< 0.2	< 0.2	< 0.2
Bromodichloromethane	µg/L	2	EPA 8260	20-Nov-18/R	< 2	< 2	< 2	< 2
Bromoform	µg/L	5	EPA 8260	20-Nov-18/R	< 5	< 5	< 5	< 5
Bromomethane	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride	µg/L	0.2	EPA 8260	20-Nov-18/R	< 0.2	< 0.2	< 0.2	< 0.2
Chloroethane	µg/L	0.08	EPA 8260	20-Nov-18/R	< 0.08	< 0.08	< 0.08	< 0.08
Chloroform	µg/L	1	EPA 8260	20-Nov-18/R	< 1	< 1	< 1	< 1
Chloromethane	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06	< 0.06	< 0.06	< 0.06
Chlorotoluene,2-	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06	< 0.06	< 0.06	< 0.06
Chlorotoluene,4-	µg/L	0.08	EPA 8260	20-Nov-18/R	< 0.08	< 0.08	< 0.08	< 0.08
Dibromo-3-Chloropropane, 1,2-	µg/L	0.07	EPA 8260	20-Nov-18/R	< 0.07	< 0.07	< 0.07	< 0.07
Dibromochloromethane	µg/L	2	EPA 8260	20-Nov-18/R	< 2	< 2	< 2	< 2
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	20-Nov-18/R	< 0.2	< 0.2	< 0.2	< 0.2
Dibromomethane	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06	< 0.06	< 0.06	< 0.06
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane	µg/L	2	EPA 8260	20-Nov-18/R	< 2	< 2	< 2	< 2
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5



R.L. = Reporting Limit

Test methods are 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.: G82028

REPORT No. B18-35385 (ii)

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: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.			
					18-W016	18-W017	18-W018	18-W019
					Sample I.D.			
					Date Collected			
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	20-Nov-18/R	< 0.3	< 0.3	< 0.3	< 0.3
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropane,1,3-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1	< 0.1	< 0.1	< 0.1
Dichloropropane,2,2-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1	< 0.1	< 0.1	< 0.1
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Dichloropropene,1,1-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1	< 0.1	< 0.1	< 0.1
Dioxane, 1,4-	µg/L	20	EPA 8260	20-Nov-18/R	< 20	< 20	< 20	< 20
Ethylbenzene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Hexachlorobutadiene	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06	< 0.06	< 0.06	< 0.06
Hexane	µg/L	5	EPA 8260	20-Nov-18/R	< 5	< 5	< 5	< 5
Isopropylbenzene	µg/L	0.04	EPA 8260	20-Nov-18/R	< 0.04	< 0.04	< 0.04	< 0.04
Isopropyltoluene,4-	µg/L	0.05	EPA 8260	20-Nov-18/R	< 0.05	< 0.05	< 0.05	< 0.05
Methyl Butyl Ketone	µg/L	10	EPA 8260	20-Nov-18/R	< 10	< 10	< 10	< 10
Methyl Ethyl Ketone	µg/L	20	EPA 8260	20-Nov-18/R	< 20	< 20	< 20	< 20
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	20-Nov-18/R	< 20	< 20	< 20	< 20
Methyl-t-butyl Ether	µg/L	2	EPA 8260	20-Nov-18/R	< 2	< 2	< 2	< 2
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	µg/L	0.04	EPA 8260	20-Nov-18/R	< 0.04	< 0.04	< 0.04	< 0.04
n-Butylbenzene	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1	< 0.1	< 0.1	< 0.1
n-Propylbenzene	µg/L	0.03	EPA 8260	20-Nov-18/R	< 0.03	< 0.03	< 0.03	< 0.03
sec-Butylbenzene	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06	< 0.06	< 0.06	< 0.06
Styrene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
tert-Butylbenzene	µg/L	0.03	EPA 8260	20-Nov-18/R	< 0.03	< 0.03	< 0.03	< 0.03



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.: G82028

REPORT No. B18-35385 (ii)

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: 15-Nov-18
 DATE REPORTED: 27-Nov-18
 SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1040-LEEDS
 P.O. NUMBER:
 WATERWORKS NO.

Client I.D.	18-W016	18-W017	18-W018	18-W019
Sample I.D.	B18-35385-1	B18-35385-2	B18-35385-3	B18-35385-4
Date Collected	15-Nov-18	15-Nov-18	15-Nov-18	15-Nov-18

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
					18-W016	18-W017	18-W018	18-W019
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethylene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorobenzene,1,2,3-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1	< 0.1	< 0.1	< 0.1
Trichlorobenzene,1,2,4-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethylene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane	µg/L	5	EPA 8260	20-Nov-18/R	< 5	< 5	< 5	< 5
Trichloropropane,1,2,3-	µg/L	0.07	EPA 8260	20-Nov-18/R	< 0.07	< 0.07	< 0.07	< 0.07
Trimethylbenzene,1,2,4-	µg/L	0.03	EPA 8260	20-Nov-18/R	< 0.03	< 0.03	< 0.03	< 0.03
Trimethylbenzene,1,3,5-	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06	< 0.06	< 0.06	< 0.06
Vinyl Chloride	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5
Xylene, m,p-	µg/L	1.0	EPA 8260	20-Nov-18/R	< 1.0	< 1.0	< 1.0	< 1.0
Xylene, m,p,o-	µg/L	1.1	EPA 8260	20-Nov-18/R	< 1.1	< 1.1	< 1.1	< 1.1
Xylene, o-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5	< 0.5	< 0.5	< 0.5



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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REPORT No. B18-35385 (ii)

Report To:

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

Attention: Camille Malcolm

Caduceon Environmental Laboratories

285 Dalton Ave
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 Tel: 613-544-2001
 Fax: 613-544-2770

DATE RECEIVED: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W020		
Sample I.D.	B18-35385-5		
Date Collected	15-Nov-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Acetone	µg/L	30	EPA 8260	20-Nov-18/R	< 30		
Benzene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Bromobenzene	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1		
Bromochloromethane	µg/L	0.2	EPA 8260	20-Nov-18/R	< 0.2		
Bromodichloromethane	µg/L	2	EPA 8260	20-Nov-18/R	< 2		
Bromoform	µg/L	5	EPA 8260	20-Nov-18/R	< 5		
Bromomethane	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Carbon Tetrachloride	µg/L	0.2	EPA 8260	20-Nov-18/R	< 0.2		
Chloroethane	µg/L	0.08	EPA 8260	20-Nov-18/R	< 0.08		
Chloroform	µg/L	1	EPA 8260	20-Nov-18/R	< 1		
Chloromethane	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06		
Chlorotoluene,2-	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06		
Chlorotoluene,4-	µg/L	0.08	EPA 8260	20-Nov-18/R	< 0.08		
Dibromo-3-Chloropropane, 1,2-	µg/L	0.07	EPA 8260	20-Nov-18/R	< 0.07		
Dibromochloromethane	µg/L	2	EPA 8260	20-Nov-18/R	< 2		
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	20-Nov-18/R	< 0.2		
Dibromomethane	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06		
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichlorodifluoromethane	µg/L	2	EPA 8260	20-Nov-18/R	< 2		
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		



R.L. = Reporting Limit

Test methods are 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.: G82028

REPORT No. B18-35385 (ii)

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

Attention: Camille Malcolm

Caduceon Environmental Laboratories

285 Dalton Ave
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 Tel: 613-544-2001
 Fax: 613-544-2770

DATE RECEIVED: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W020		
Sample I.D.	B18-35385-5		
Date Collected	15-Nov-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Dichloromethane (Methylene Chloride)	µg/L	0.3	EPA 8260	20-Nov-18/R	< 0.3		
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloropropane,1,3-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1		
Dichloropropane,2,2-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1		
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Dichloropropene,1,1-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1		
Dioxane, 1,4-	µg/L	20	EPA 8260	20-Nov-18/R	< 20		
Ethylbenzene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Hexachlorobutadiene	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06		
Hexane	µg/L	5	EPA 8260	20-Nov-18/R	< 5		
Isopropylbenzene	µg/L	0.04	EPA 8260	20-Nov-18/R	< 0.04		
Isopropyltoluene,4-	µg/L	0.05	EPA 8260	20-Nov-18/R	< 0.05		
Methyl Butyl Ketone	µg/L	10	EPA 8260	20-Nov-18/R	< 10		
Methyl Ethyl Ketone	µg/L	20	EPA 8260	20-Nov-18/R	< 20		
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	20-Nov-18/R	< 20		
Methyl-t-butyl Ether	µg/L	2	EPA 8260	20-Nov-18/R	< 2		
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Naphthalene	µg/L	0.04	EPA 8260	20-Nov-18/R	< 0.04		
n-Butylbenzene	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1		
n-Propylbenzene	µg/L	0.03	EPA 8260	20-Nov-18/R	< 0.03		
sec-Butylbenzene	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06		
Styrene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
tert-Butylbenzene	µg/L	0.03	EPA 8260	20-Nov-18/R	< 0.03		



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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DATE RECEIVED: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 27-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Client I.D.	18-W020		
Sample I.D.	B18-35385-5		
Date Collected	15-Nov-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Tetrachloroethylene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Toluene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Trichlorobenzene,1,2,3-	µg/L	0.1	EPA 8260	20-Nov-18/R	< 0.1		
Trichlorobenzene,1,2,4-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Trichloroethylene	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Trichlorofluoromethane	µg/L	5	EPA 8260	20-Nov-18/R	< 5		
Trichloropropane,1,2,3-	µg/L	0.07	EPA 8260	20-Nov-18/R	< 0.07		
Trimethylbenzene,1,2,4-	µg/L	0.03	EPA 8260	20-Nov-18/R	< 0.03		
Trimethylbenzene,1,3,5-	µg/L	0.06	EPA 8260	20-Nov-18/R	< 0.06		
Vinyl Chloride	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		
Xylene, m,p-	µg/L	1.0	EPA 8260	20-Nov-18/R	< 1.0		
Xylene, m,p,o-	µg/L	1.1	EPA 8260	20-Nov-18/R	< 1.1		
Xylene, o-	µg/L	0.5	EPA 8260	20-Nov-18/R	< 0.5		



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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C.O.C.: G82031

REPORT No. B18-35377

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: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 28-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.	18-W011	18-W012	18-W013	18-W014
					Sample I.D.	15-Nov-18	15-Nov-18	15-Nov-18	15-Nov-18
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	19-Nov-18/O	B18-35377-1	24	32	45	36
pH @25°C	pH Units		SM 4500H	19-Nov-18/O	B18-35377-2	7.03	7.61	7.47	7.22
Conductivity @25°C	µmho/cm	1	SM 2510B	19-Nov-18/O	B18-35377-3	72	68	121	98
Chloride	mg/L	0.5	SM4110C	20-Nov-18/O	B18-35377-4	0.8	< 0.5	1.1	0.9
Nitrite (N)	mg/L	0.05	SM4110C	20-Nov-18/O		< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	20-Nov-18/O		< 0.05	< 0.05	< 0.05	< 0.05
Sulphate	mg/L	1	SM4110C	20-Nov-18/O		7	< 1	9	9
BOD(5 day)	mg/L	3	SM 5210B	16-Nov-18/K		6	5	4	5
Total Suspended Solids	mg/L	3	SM2540D	20-Nov-18/K		< 3	< 3	< 3	60
o-Phosphate (P)	mg/L	0.01	PE4500-S	21-Nov-18/K		0.03	< 0.01	0.04	0.12
Phosphorus-Total	mg/L	0.01	E3199A.1	19-Nov-18/K		0.05	0.02	0.04	0.17
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	19-Nov-18/K		0.5	0.5	0.6	0.9
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	21-Nov-18/K		0.03	0.04	0.03	0.05
Ammonia (N)-unionized	mg/L	0.01	CALC	21-Nov-18/K		< 0.01	< 0.01	< 0.01	< 0.01
Total Dissolved Solids	mg/L	3	SM 2540D	20-Nov-18/O		36	34	61	50
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	19-Nov-18/O		9.7	7.6	9.0	7.3
Phenolics	mg/L	0.002	MOEE 3179	20-Nov-18/K		< 0.002	0.003	< 0.002	< 0.002
COD	mg/L	5	SM 5220D	20-Nov-18/O		24	25	20	31
Hardness (as CaCO3)	mg/L	1	SM 3120	21-Nov-18/O		30	33	53	45
Aluminum	µg/L	10	SM 3120	21-Nov-18/O		40	< 10	20	30
Antimony	µg/L	0.1	EPA 200.8	20-Nov-18/O		0.3	0.3	0.2	< 0.1
Arsenic	µg/L	0.1	EPA 200.8	20-Nov-18/O		0.2	0.2	0.2	0.3
Barium	µg/L	1	SM 3120	21-Nov-18/O		19	11	15	35
Beryllium	µg/L	2	SM 3120	21-Nov-18/O		< 2	< 2	< 2	< 2
Boron	µg/L	5	SM 3120	21-Nov-18/O		< 5	17	26	8
Cadmium	µg/L	0.015	EPA 200.8	20-Nov-18/O		0.023	< 0.015	< 0.015	0.057
Calcium	µg/L	20	SM 3120	21-Nov-18/O		8750	10700	14900	13100



R.L. = Reporting Limit

Test methods are 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

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

C.O.C.: G82031

REPORT No. B18-35377

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: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 28-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	18-W011	18-W012	18-W013	18-W014
Sample I.D.	B18-35377-1	B18-35377-2	B18-35377-3	B18-35377-4
Date Collected	15-Nov-18	15-Nov-18	15-Nov-18	15-Nov-18

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed				
Chromium	µg/L	1	EPA 200.8	20-Nov-18/O	< 1	< 1	< 1	1
Cobalt	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.4	0.1	0.1	0.7
Copper	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.9	0.4	0.6	7.5
Iron	µg/L	5	SM 3120	21-Nov-18/O	1040	466	476	3250
Lead	µg/L	0.02	EPA 200.8	20-Nov-18/O	0.19	0.13	0.14	0.85
Magnesium	µg/L	20	SM 3120	21-Nov-18/O	2840	2110	4350	4150
Manganese	µg/L	1	SM 3120	21-Nov-18/O	34	27	8	97
Mercury	µg/L	0.02	SM 3112 B	22-Nov-18/O	< 0.02	< 0.02	< 0.02	< 0.02
Molybdenum	µg/L	10	SM 3120	21-Nov-18/O	< 10	< 10	< 10	< 10
Nickel	µg/L	0.2	EPA 200.8	20-Nov-18/O	0.6	0.3	0.5	1.6
Potassium	µg/L	100	SM 3120	21-Nov-18/O	800	500	1100	1000
Selenium	µg/L	1	EPA 200.8	20-Nov-18/O	< 1	< 1	< 1	< 1
Silver	µg/L	0.1	EPA 200.8	20-Nov-18/O	< 0.1	< 0.1	< 0.1	< 0.1
Silicon	µg/L	10	SM 3120	21-Nov-18/O	4150	1370	2420	4990
Sodium	µg/L	200	SM 3120	21-Nov-18/O	2000	1000	2300	2400
Strontium	µg/L	1	SM 3120	21-Nov-18/O	44	47	72	69
Thallium	µg/L	0.05	EPA 200.8	20-Nov-18/O	< 0.05	< 0.05	< 0.05	< 0.05
Tin	µg/L	50	SM 3120	21-Nov-18/O	< 50	< 50	< 50	< 50
Titanium	µg/L	5	SM 3120	21-Nov-18/O	18	5	11	47
Tungsten	µg/L	10	SM 3120	21-Nov-18/O	< 10	< 10	< 10	< 10
Uranium	µg/L	0.05	EPA 200.8	20-Nov-18/O	< 0.05	< 0.05	< 0.05	0.59
Vanadium	µg/L	5	SM 3120	21-Nov-18/O	< 5	< 5	< 5	< 5
Zinc	µg/L	5	SM 3120	21-Nov-18/O	10	9	10	16



R.L. = Reporting Limit

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Michelle Dubien
 Lab Manager

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

DATE RECEIVED: 15-Nov-18

JOB/PROJECT NO.: 1040-LEEDS

DATE REPORTED: 28-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	18-W015		
Sample I.D.	B18-35377-5		
Date Collected	15-Nov-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	19-Nov-18/O	62		
pH @25°C	pH Units		SM 4500H	19-Nov-18/O	7.45		
Conductivity @25°C	µmho/cm	1	SM 2510B	19-Nov-18/O	161		
Chloride	mg/L	0.5	SM4110C	20-Nov-18/O	1.5		
Nitrite (N)	mg/L	0.05	SM4110C	20-Nov-18/O	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	20-Nov-18/O	< 0.05		
Sulphate	mg/L	1	SM4110C	20-Nov-18/O	12		
BOD(5 day)	mg/L	3	SM 5210B	16-Nov-18/K	4		
Total Suspended Solids	mg/L	3	SM2540D	20-Nov-18/K	18		
o-Phosphate (P)	mg/L	0.01	PE4500-S	21-Nov-18/K	0.05		
Phosphorus-Total	mg/L	0.01	E3199A.1	19-Nov-18/K	0.25		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	19-Nov-18/K	0.8		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	21-Nov-18/K	0.05		
Ammonia (N)-unionized	mg/L	0.01	CALC	21-Nov-18/K	< 0.01		
Total Dissolved Solids	mg/L	3	SM 2540D	20-Nov-18/O	82		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	19-Nov-18/O	7.3		
Phenolics	mg/L	0.002	MOEE 3179	20-Nov-18/K	< 0.002		
COD	mg/L	5	SM 5220D	20-Nov-18/O	22		
Hardness (as CaCO3)	mg/L	1	SM 3120	21-Nov-18/O	76		
Aluminum	µg/L	10	SM 3120	21-Nov-18/O	30		
Antimony	µg/L	0.1	EPA 200.8	20-Nov-18/O	< 0.1		
Arsenic	µg/L	0.1	EPA 200.8	20-Nov-18/O	0.2		
Barium	µg/L	1	SM 3120	21-Nov-18/O	50		
Beryllium	µg/L	2	SM 3120	21-Nov-18/O	< 2		
Boron	µg/L	5	SM 3120	21-Nov-18/O	26		
Cadmium	µg/L	0.015	EPA 200.8	20-Nov-18/O	0.082		
Calcium	µg/L	20	SM 3120	21-Nov-18/O	20800		



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Michelle Dubien
 Lab Manager

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DATE REPORTED: 28-Nov-18

P.O. NUMBER:

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Client I.D.	18-W015		
Sample I.D.	B18-35377-5		
Date Collected	15-Nov-18		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Chromium	µg/L	1	EPA 200.8	20-Nov-18/O	2		
Cobalt	µg/L	0.1	EPA 200.8	20-Nov-18/O	1.0		
Copper	µg/L	0.1	EPA 200.8	20-Nov-18/O	8.7		
Iron	µg/L	5	SM 3120	21-Nov-18/O	1990		
Lead	µg/L	0.02	EPA 200.8	20-Nov-18/O	1.28		
Magnesium	µg/L	20	SM 3120	21-Nov-18/O	6750		
Manganese	µg/L	1	SM 3120	21-Nov-18/O	443		
Mercury	µg/L	0.02	SM 3112 B	22-Nov-18/O	< 0.02		
Molybdenum	µg/L	10	SM 3120	21-Nov-18/O	< 10		
Nickel	µg/L	0.2	EPA 200.8	20-Nov-18/O	2.0		
Potassium	µg/L	100	SM 3120	21-Nov-18/O	1400		
Selenium	µg/L	1	EPA 200.8	20-Nov-18/O	< 1		
Silver	µg/L	0.1	EPA 200.8	20-Nov-18/O	< 0.1		
Silicon	µg/L	10	SM 3120	21-Nov-18/O	5340		
Sodium	µg/L	200	SM 3120	21-Nov-18/O	3500		
Strontium	µg/L	1	SM 3120	21-Nov-18/O	112		
Thallium	µg/L	0.05	EPA 200.8	20-Nov-18/O	< 0.05		
Tin	µg/L	50	SM 3120	21-Nov-18/O	< 50		
Titanium	µg/L	5	SM 3120	21-Nov-18/O	77		
Tungsten	µg/L	10	SM 3120	21-Nov-18/O	20		
Uranium	µg/L	0.05	EPA 200.8	20-Nov-18/O	0.67		
Vanadium	µg/L	5	SM 3120	21-Nov-18/O	< 5		
Zinc	µg/L	5	SM 3120	21-Nov-18/O	24		



Michelle Dubien
 Lab Manager

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Appendix H
Historical Chemistry

Appendix I
Site Photographs



Surface Water Location: SW1
26-Apr-2018



Surface Water Location: SW2
26-Apr-2018



Surface Water Location: SW3
15-Nov-2018



Surface Water Location: SW6
15-Nov-2018



Surface Water Location: SW7
15-Nov-2018



Well ID: 08-1
26-Apr-2018



Well ID: MW101
26-Apr-2018



Well ID: MW102
26-Apr-2018



Well ID: MW103
15-Nov-2018



Well ID: MW104
26-Apr-2018

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

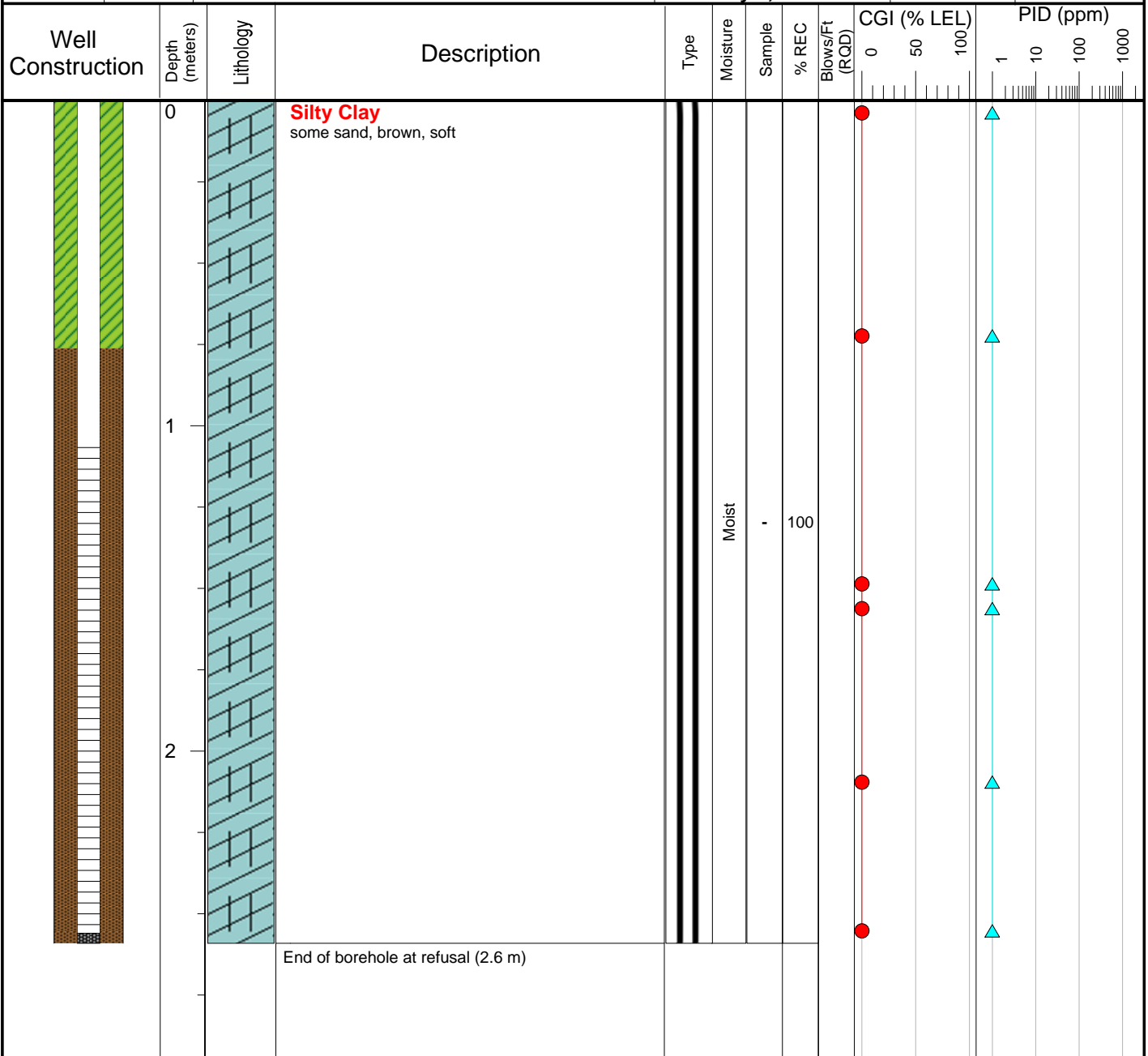
INPUT BY:
ZL

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		Silty Clay 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



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:
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		Silty Clay grey, mottling, soft		Moist	-	100									
	1		increased gravel content at 1.2 m													Wet
	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		Silty Clay 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
Historic Trends

