2018/2019 Biennial Report, Reid Road (Closed) Waste Disposal Site

Provisional Certificate of Approval No.: A341207

April 27, 2020

Prepared for:
The Corporation of the Municipality of Trent Lakes

 Reference No.: 8640-004

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Executive Summary

The Reid Road Waste Disposal Site (Site) is licensed under the Ministry of the Environment and Climate Change Provisional Certificate of Approval No. A341207. The site is at 298 Reid Street, 2.0 km southeast of Kinmount. The Site ceased landfilling operations in the mid-1990s and is now closed. Final closure activities were completed in 2004.

No groundwater monitoring wells are installed on-site; however, local topography indicates that impacted groundwater discharges to surface on-site. As sufficient sample volumes have been present at the surface water monitoring stations, groundwater monitoring has not been necessary.

Surface water is monitored at one upstream and one downstream location along an unnamed tributary which flows through the site. No site related impacts were at the downstream monitoring station. Furthermore, water quality remained stable and there was no need to implement the Site's contingency plan.

Cover material was in good condition from the areas observed and there were no signs of erosion or seeps identified at the site during the 2018 and 2019 site inspections.

The Municipality maintained the site in compliance with the Site Provisional Certificate of Approval in 2018 and 2019. Recommendations have been made for the site, which include the discontinuation of the monitoring program.

Respectfully submitted,

Cambium Inc.

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Table of Contents

List of Embedded Tables

List of Appended Figures

List of Appended Tables

List of Appendices

1.0 Introduction

Cambium Inc. (Cambium) was retained by the Corporation of the Municipality of Trent Lakes (Municipality) to complete the 2018/2019 biennial monitoring report for the Reid Road waste disposal site (Site). The Site operates in accordance with Ministry of the Environment, Conservation and Parks (Ministry) Provisional Certificate of Approval (PC of A) No. A341207, most recently amended on May 3, 2005 (Appendix A).

1.1 Site Location

The Site is on Lot 1, Concession 16, geographic Galway Township, Municipality of Trent Lakes, County of Peterborough. The Site is at 298 Reid Street, 2.0 km southeast of Kinmount (Figure 1). The Universal Transverse Mercator (UTM) coordinates for the Site entrance are Zone 17T, 687349 m east, 4960744 m north.

1.2 Scope of Work

The scope of the 2018/2019 work program was based on the results of the 2016/2017 monitoring programs (Cambium, 2018), the requirements of the PC of A, and included the following:

- Site inspection
- Surface water monitoring in the spring and autumn
- Evaluation of surface water quality against the Provincial Water Quality Objectives (PWQO)
- Preparation of this biennial monitoring report

1.3 Site Description

The 2.8 ha site is owned by the Municipality and was operated as a natural attenuation 2.0 ha landfill for the disposal of domestic and commercial waste until landfilling ceased in the mid-1990s. Final closure activities were completed in 2004. A Local Topography Plan is attached as Figure 2.

2.0 Methodology

The 2018/2019 program was completed to comply with the PC of A and Ministry guidelines and regulations. As such, the monitoring program was completed consistent with the *Guidance Manual for Landfill Sites Receiving Municipal Waste* (MOEE, 1993) and *Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water, Technical Guidance Document* (MOE, 2010).

Field tasks were completed following Cambium's Standard Operating Procedures developed from recognized standard procedures such as those listed above and the Ministry document *Guidance on Sampling and Analytical Methods for use at Contaminated Sites in Ontario* (MOEE, 1996). A health and safety program was developed for site-specific conditions and all Cambium personnel working on the project were familiarized and required to follow the identified protocol.

Surface water samples were collected at the locations and frequencies shown in Table 1. All collected surface water samples were stored in coolers with freezer packs and maintained less than 10°C after collection and during transport to Caduceon Environmental Laboratories in Kingston, Ontario (Caduceon). Caduceon is accredited by the Canadian Associations for Laboratory Accreditation Inc. for specific environmental tests listed in the scope of accreditation.

2.1 Surface Water Monitoring Program

Cambium staff were onsite on May 29 and November 12, 2018, and April 16 and November 14, 2019 to conduct surface water sampling from the following:

- SW1
- SW2

Both SW1 and SW2 were frozen during the autumn 2019 sampling event and sample could not be collected. The following tasks were completed as part of the monitoring program:

- Surface water samples were collected by immersing the sample container into the water body.

- Where sample bottles were prefilled with preservatives, a clean bottle was used to collect and decant the water directly into the sample bottle.
- Field measurements were recorded for pH, conductivity, temperature, dissolved oxygen (DO), and oxygen reduction potential (ORP).
- Where possible, depth, width, and flow velocity measurements were recorded at each surface water location.

Surface water samples were submitted for analysis of the parameters listed in Table 1. The results of the surface water sampling program are discussed in Section 4.2 and summarized in Table 2.

Surface water sample locations are on Figure 2. Surface water field sheets are in Appendix B, the laboratory Certificates of Analysis as provided by Caduceon are in Appendix C, and photographs of the surface water sampling stations are in Appendix D.

Blind duplicate surface water samples were collected as part of the QA/QC program from locations listed below. As this represents 10 percent of the samples taken, this program is considered sufficient. In addition to these samples, the laboratory completes internal QA/QC. The results of the QA/QC program are presented in Section 4.1.

- May 2018: SW1
- November 2018: SW2
- April 2019: SW2

2.2 Landfill Gas Monitoring Program

Landfill gas (LFG) is not actively managed at the Site. The large, open site area and isolated location from the public supports passive landfill gas management, which allows generated landfill gas to naturally disperse through the waste and naturally-permeable cover to the atmosphere.

2.3 Site Inspection and Operations Overview

Site operations were observed during the visits conducted by Cambium staff in May and November 2018, and April and November 2019. During these visits final cover integrity and condition of fencing and access gates were inspected on accessed areas of the Site, and observations noted in the field file. The site inspections results are discussed in Section 5.0.

3.0 Geological and Hydrogeological Context

3.1 Topography and Drainage

The Site is in the Gull tertiary watershed. The land surrounding the landfill is mostly forested and unevaluated wetlands. An unnamed watercourse flows from an unevaluated wetland from the northeast to southwest, across the western portion of the Site, travelling under Reid Road and joining an unnamed tributary draining from Kinmount Lake. The tributary eventually drains into the Burnt River. There are no provincially significant or evaluated wetlands within 500 m of the Site. Refer to Figure 2.

The Site is in a topographic lowland and drainage is characterized as stagnant, with intermittent flows of low volume during periods of increased precipitation.

The following two surface water monitoring locations are in the approved monitoring program:

- SW1 is the background monitoring location at the northern property boundary on an unnamed tributary.
- SW2 is downstream of the waste mound and SW1, upstream of a culvert along the same unnamed tributary as SW1, and monitors the water quality leaving the Site.

Flow measurements were obtained from the surface water locations and UTM coordinates for the surface water monitoring locations are in Embedded Table 1.

Embedded Table 1 Surface Water Sampling Observations

Surface Water Station	UTM	May 2018	November 2018	April 2019	November 2019
SW1 Discharge (m^3/s)	687284 4961003	< 0.007	< 0.02	0.038	Frozen
SW2 Discharge (m^3/s)	687271 4960771	No Observable Flow	No Observable Flow	No Measurable Flow	Frozen

Notes:

1. Zone 17

The 2018/2019 precipitation data for Haliburton County (Government of Canada, 2019) were compared to the average precipitation data for 1981 to 2010 (Government of Canada, 2015)

and indicated the total annual precipitation was consistent with historical normal; however, individual month varied. Notably, April and August 2018 and April and October 2019 received nearly double the normal. Conversely March 2018 and November 2019 received only about half and 2/3 the normal, respectively. Embedded Table 2 summarizes the amount of precipitation during and in three days prior to the sampling events as well as historical normals. Refer to Appendix B for climate data.

Embedded Table 2 Historical and 2018/2019 Precipitation Data

Sampling Date	Average Monthly Precipitation (1981 – 2010)	2018 Precipitation (mm)	2019 Precipitation (mm)	Precipitation During and Prior to Sampling (mm)
May 29, 2018	93.3	79.4	-	2.6
Nov 12, 2018	116.4	107.0	-	10.2
April 16, 2019	75.6	-	142.0	13.2
November 14, 2019	116.4	-	75.4	6.2

3.2 Groundwater Assessment

Local topography within the Site and the immediate areas suggests that the surface water sampling locations (SW1 and SW2) along the unnamed tributary, to the west of the existing limit of waste, are supplied by shallow groundwater base flow. Based on sufficient surface water volumes along this unnamed tributary, groundwater monitoring has not been deemed necessary.

4.0 Results and Discussion

Water quality results are used to assess the existence, extent, and intensity of impacts to the surface water environment related to waste disposal site activities. Water quality data are compared against background water quality and historical data for the Site to permit an analysis of any significant changes or trends in the water quality over time. This section presents the results of the 2018 and 2019 monitoring program at the Site.

4.1 Quality Assurance/Quality Control

Analysis results for blind duplicate samples obtained from SW1 in May 2018, and SW2 in November 2018 and April 2019, were evaluated. Parameter concentrations were considered to be significantly different if the relative percent difference (RPD) between the duplicate and the parent samples was greater than 30% when both analytical results were greater than five times the reported detection limit (RDL).

The duplicate analyses indicated that, in general the parent and duplicate samples showed good correlation. The parameter concentrations that did not meet the data quality objective (30%) for RPD are in Embedded Table 3.

Embedded Table 3 Surface Water QA/QC Evaluation

Sampling Station (Date)	Parameter and Concentration (mg/L)	RPD (%)
SW2 (November 2018)	Total Suspended Solids (TSS)	120
	Total Kjeldahl Nitrogen (TKN)	46
	Cadmium	67
	Iron	48
	Manganese	50
	Total Phosphorus	46

The RPD is calculated only when both the parent and duplicate samples concentrations are five times greater than the RDLs. Parent/duplicate samples with only one measurable concentration were assessed qualitatively. If the measurable concentration was close to the detection limit, the sample results were considered valid and the measurable concentration was accepted. No significant variations were identified.

Given that the surface water at location SW2 was described as being ponded and brown it was inferred the discrepancies were related to the quality of the sample and the difficulty getting a true duplicate, particularly given the variation in noted for TSS. Parameter concentrations at SW2 in November 2018 were typically greater than normal, as was the case in both the original and duplicate samples. This was considered when interpreting results.

Overall, the water quality data was considered suitable for its intended use, which was to identify changes in water quality and analyzed parameters present at concentrations that do not meet compliance criteria; however, caution was used with completed the assessment of the November 2018 data.

4.2 Surface Water Quality

The 2003 to 2010 surface water quality data is included digitally as part of this report package (WSP, 2016) and water quality data from 2011 to 2019 are summarized in Table 2. The surface water data was compared to historical results and background water quality data. Compliance was assessed using the PWQO (MOEE, 1994).

4.2.1 Background Surface Water Quality

SW1 has been considered to represent background or non-landfill impacted conditions based on its upstream and up-gradient location from the waste mound.

The water quality of SW1 has been characterized by low concentrations of most parameters with the occasional exceedances of the PWQO for aluminum, cadmium, iron, zinc, total phosphorus, and DO (low), as well as low pH. Historically, seasonal fluctuations have occurred at this monitoring station, as was the case in 2018 and 2019. The following parameters did not meet the PWQO:

- 2018: aluminum, cadmium, total phosphorus, DO (low), pH (low; field)
- 2019: pH (low, lab), total phosphorus

SW1 continued to represent background water quality for the Site. Elevated parameter concentrations were attributed to natural variations.

4.2.2 Downstream Water Quality

SW2 is 195 m downstream of SW1 and monitors the water quality leaving the Site. The water quality at SW2 has typically had similar concentrations to SW1 as was the case in 2018 and 2019. The following parameters did not meet the PWQO:

- 2018: aluminum, cadmium, copper, iron, total phosphorus, and DO (low)
- 2019: none

Overall, the water quality at SW2 remained stable with no notable trends. PWQO exceedances at SW2 were also reflected in the background water quality at SW1, with the exception of copper. No impacts from the landfill were evident at SW2 and there is no need to implement the Site's contingency plan.

Condition 18 of the PC of A states that the Ministry District Manager must be notified within two weeks of receiving the laboratory results if any exceedances of the PWQO are observed at any monitoring location. As noted above there were no landfill related impacts at the downstream surface water SW2 monitoring station; therefore, Ministry notification was not deemed necessary in 2018 or 2019.

The Ministry agreed that the Site was having no impacts on the downstream surface water environment (Cambium, 2018). Although this was based on the water quality results from 2008 through 2011, the water quality at the Site has generally remained the same since that time.

4.3 Adequacy of Monitoring Program

In an effort to have a refined and concise monitoring program at the Site, the existing monitoring program is reviewed annually to determine if it sufficiently monitors impacts at the Site. Following an assessment of the monitoring program for 2017 and 2018, it was recommended that the monitoring and reporting program cease for the Reid Road waste disposal site (Cambium, 2018). This remained the case following the 2018 and 2019 assessment.

As outlined in Section 7 of the *Monitoring and Reporting for Waste Disposal Sites, Groundwater and Surface Water Technical Guidance Document* (MOE, 2010), discontinuation of a monitoring program is an acceptable recommendation if the site is closed and meets all of the following criteria:

1. decreasing leachate source strength;
2. a database with greater than 5 years of post-closure monitoring data;
3. there is no active leachate collection at the site;
4. meets one of the following conditions:
    a) There is no surface water receiver within the leachate attenuation zone and/or there is no reasonable pathway for leachate to enter surface water through subsurface flow, or storm water runoff; or
    b) There is a surface water receiver and there are no on-going exceedances of applicable PWQOs or background concentrations (whichever are higher), or Table B (see Section 4.6) in the receiver (i.e., any exceedances are anomalous and/or from an isolated incident);
5. no expected potential for impact to groundwater receptors.

Following the 2017 through 2019 assessments, the following was determined to apply to the Reid Road site:

1. the leachate impact at the Site is minimal, if any
2. there is a database of 15 years post-closure data (since capping)
3. there is no active leachate collection at the Site
4. the surface water receiver does not have any on-going exceedances of the applicable assessment (PWQO) concentrations attributed to impact (i.e., all PWQO exceedances are also in the background water quality)
5. there are no expected potential impacts to groundwater receptors from the Site

Given the time since closure (mid-1990s), the small volume of waste, and the continued un-impacted surrounding environment, there is no need to continue the monitoring and reporting for this Site. It is recommended that the Site be inspected twice annually. The inspections should occur during or immediately following the spring melt and once during a period of low flow (i.e., late summer or autumn). Documentation of these inspections should be kept on file at the Municipal office.

Should any leachate seeps or evidence in the adjacent surface water tributary indicate environmental impacts are potentially occurring, the District Manger should be notified within two weeks and a contingency plan should be developed in consultation with the Ministry.

As required by Condition 19 of the PC of A, written approval is required by the District Manager, prior to implementing the recommended reductions.

5.0 Site Inspection

The Reid Road Waste Disposal Site is licensed under PC of A No. A341207 and landfilling was ceased in the mid-1990s. This section presents a summary of Site inspections performed in 2018 and 2019 and addresses requirements below, detailed in Condition 20 of the PC of A.

- Summary of Site inspections, actions taken as a result of the Site inspections, records of complaints and description of efforts to resolve complaints, refer to Section 5.1 and 5.2.
- Summary of all works or activities carried out at the Site during the reporting period, including remedial works and maintenance activities, refer to Section 5.3.
- A statement of compliance with this Certificate, refer to Section 5.4.

5.1 Site Inspections

Inspections completed by Cambium staff during the spring and autumn of 2018 and 2019 met the requirements of biannual site inspections required by Condition 15 of the PC of A. During site visits the waste mound was well vegetated with no signs of erosion from the areas accessed and no seeps were observed. Furthermore, the fencing and gates to access the Site were observed to be in good condition. There are no on-site structures.

5.2 Complaints

The Municipality reported no complaints involving the Site in 2018 or 2019.

5.3 Site Maintenance

The Municipality reported that no remedial works or maintenance activities were completed at the Site in 2018 or 2019.

5.4 Compliance with Ministry Approval

The Municipality managed the Site in compliance with the PC of A.

6.0 Conclusions and Recommendations

Based on the 2018/2019 monitoring program, Cambium makes the following conclusions regarding the Reid Road Waste Disposal Site:

- Local topography suggests that any impacted groundwater will discharge to the on-site watercourse.
- Surface water quality results indicated that there are no Site related impacts occurring at the downstream monitoring stations. Any exceedances of the PWQO criteria in the downstream water quality were also reflected at the background water quality.
- The water quality remained stable with no notable trends. Based on this assessment, there was no need to implement the Site's contingency plan.
- The final cover was noted to be in good condition from the areas visited by Cambium field staff in 2018 and 2019 and no signs of erosions or seeps were identified.

Based on the results of the 2018/2019 monitoring program, Cambium recommends the following:

- The monitoring and reporting program should be discontinued for the Site and should be replaced by semi-annual Site inspections. The inspections should occur during or immediately following the spring melt and once during a period of low flow (i.e., late summer or autumn). Documentation of these inspections should be kept on file at the Municipal office.

  As required by Condition 19 of the PC of A, written approval is required by the District Manager, prior to implementing the recommended reductions.

References

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Glossary of Terms

Active Face/Area
The portion of the landfill facility where waste is currently being deposited, spread and/or, compacted prior to the placement of cover material.

Adverse Environmental Impact
Any direct or indirect undesirable effect on the environment resulting from an emission or discharge that is caused or likely to be caused by human activity.

Annual Report
Report documenting the results of water quality, environmental quality, and operations monitoring for the year, or for a period as prescribed in the Certificate of Approval.

Approved Design and Operations Plan
The design of a landfill site and its facilities which have been submitted along with the application documents for which formal Ministry approval has been issued through the Certificate of Approval.

Approved Site or Facility
A landfill site/facility for which there is an existing and current Certificate of Approval.

Aquifer
A geologic unit (soil or rock) that contains sufficient saturated permeable material to yield measurable quantities of water to wells and springs.

Attenuation
Natural process through which the concentrations of landfill generated contaminants are reduced to safe levels.

Borehole
A hole drilled for soil sampling purposes.

Buffer Area
An area of land situated within the peripheral area surrounding an active filling area, but limited in extent to the property boundary, assigned to provide space for remedial measures, contaminant control measures, and for the reduction or elimination of adverse environmental impact caused by migrating contaminants.

Certificate of Approval
The license or permit issued by the Ministry for the operation of a landfill site. Issued to the owner of the site with conditions of compliance stated therein.

Contaminant
A compound, element, or physical parameter, usually resulting from human activity, or found at elevated concentrations that have or may have a harmful effect on public health or the environment.

Contaminant Migration Path
Route by which a contaminant will move from the site into adjacent properties or the natural environment. Usually a route that offers the least resistance to movement.

Contamination Attenuation Zone
The zone beneath the surface, located beyond the landfill site boundary, where contaminants will be naturally attenuated to predetermined levels. Also, see Reasonable Use Policy.

Contingency Plan
A documented plan detailing a co-ordinated course of action to be followed to control and remediate occurrences such as a fire, explosion, or release of contaminants in an uncontrolled manner that could threaten the environment and public health.

Cover Material
Material approved by the Ministry that is used to cover compacted solid waste. Usually, a soil with suitable characteristics for specific end-use.

Site Development Plan and Operations Report
Development and Operations Plan or Report is a document detailing the planned sequence of activities through the landfill site's active life, the control systems, site facilities and monitoring systems that are necessary. This document is required for obtaining a Certificate of Approval.

Design Capacity
The maximum amount of waste that is planned to be disposed of at a landfill site.

Detection Limit
Concentration under which a parameter cannot be quantitatively measured.

EAA or EA Act
Environmental Assessment Act, Revised Statutes of Ontario, 1990. One of the primary acts of legislation intended to protect, conserve, and wisely manage Ontario's environment through regulating planning and development.

Environmental Compliance Approval
The license or permit issued by the Ministry for the operation of a landfill site. Issued to the owner of the site with conditions of compliance stated therein.

EPA
Environmental Protection Act, Revised Status of Ontario, 1990. EPA is another of the primary pieces of Provincial legislation governing the protection of the natural environment of the Province.

Evapotranspiration
The evaporation of all water from soil, snow, ice, vegetation and other surfaces, including the water absorbed by plants, that is released to the atmosphere as vapour.

Fill Area
The area of a landfill site designed and designated for the disposal of waste.

Final Cover
Soil material or soil in combination with synthetic membranes, overlain by vegetation in a planned landscape, placed over a waste cell that has reached the end of its active life.

Groundwater
Subsurface water that occurs beneath the water table in soils and rocks that are fully saturated.

Hydraulic Conductivity
The rate of flow of water through a cross-section under a specific hydraulic gradient. It is a property of the geologic formation and the fluid, in hydrogeologic applications where the fluid is water (Units of m/day or cm/s).

Hydraulic Gradient
The head drop per unit distance in the direction of flow, the driving force for groundwater flow.

Hydrogeology
The study of subsurface waters and related geologic aspects of surface waters.

Impermeable Fill
Soil material that is placed as filling material that is sufficiently cohesive and fine grained to impede and restrict the flow of water through it.

In situ Testing
Testing done on-site, in the field, of material or naturally occurring substances in their original state.

Landfill Gas
Combustible gas (primarily methane and carbon dioxide) generated by the decomposition of organic waste materials.

Landfill Site
A parcel of land where solid waste is disposed of in or on land for the purposes of waste management.

Leachate
Water or other liquid that has been contaminated by dissolved or suspended particles due to contact with solid waste.

Leachate Breakout
Location where leachate comes to the ground surfaces; a seep or spring.

Limit of Filling
The outermost limit at which waste has been disposed of, or approved or proposed for disposal at a landfill.

Ministry
Ontario Ministry of the Environment, Conservation and Parks.

Monitoring
Regular or spontaneous procedures used to methodically inspect and collect data on the performance of a landfill site relating to environmental quality (i.e., air, leachate, gas, ground or surface water, unsaturated soils, etc.).

Monitoring Well
The constructed unit of casing (riser and screen) installed in a borehole.

Multi-Level Monitoring Well
More than one monitoring well installed at a given test well location.

Native Soil
Soil material occurring naturally in the ground at a location.

Natural Attenuation
Where contaminants are reduced to acceptable concentration levels by natural mechanisms (dilution, absorption onto the soil matrix, etc.), biological action, and chemical interaction.

Occupational Health and Safety Act
The primary act of legislation enacted by Ontario Ministry of Labour to regulate and control the safety in the workplace; also Occupational Health and Safety Act, Revised Statutes of Ontario, 1990.

Odour Control
Minimizing or eliminating the nuisance and undesirable impact of objectionable or unpleasant odours arising from waste disposal operations.

Open Burning
Burning any matter whereby the resultant combustion products are emitted directly to the atmosphere without passing through an adequate stack, duct, or chimney.

Operations Plan
A document detailing the waste disposal operations in a planned, and if necessary, a staged manner, that ensure compliance with regulatory provisions concerning the operations of a landfill site.

Operator (Site Operator)/Attendant
The individual or organization who, through ownership or under contract, manages and operates a landfill site for the purpose of waste disposal.

Owner
A person, persons, organization, or municipal authority who own a landfill facility or part of a landfill facility, and in whose name the Certificate of Approval for the site is issued.

Percolation
The movement of infiltrating water through soil.

Permeability
Often used interchangeable with hydraulic conductivity, but not strictly correct. Permeability is a property of the porous media only. Dependent upon media properties that affect flow, diameter, sphericity, roundness, and packing of the grains.

Piezometer
A well that intersects a confined aquifer.

Provisional Certificate of Approval (Provisional C of A)
Same as Certificate of Approval.

Reasonable Use Policy
A policy developed by the Ministry to stipulate limits to the level of groundwater quality impairment that may be permitted to occur at site property boundaries, to allow the reasonable use of adjacent properties or land without adversely affecting public health and the environment.

Recharge Zone
An area where precipitation or surface run-off infiltrates into the ground and then, through natural percolation enters an aquifer.

Recycling
Sorting, collecting or processing waste materials that can be used as a substitute for the raw materials in a process or activity for the production of (the same or other) goods. For example, the "Blue Box" system, in-plant scrap handling, or raw material recovery systems. Recycling is also the marketing of products made from recycled or recycled materials.

Reduction (of waste or component of 3Rs program)
Those actions, practices, or processes that result in the production or generation of less waste.

Remedial Action
Corrective action taken to clean-up or remedy a spill, an uncontrolled discharge of a contaminant, or a breach in a facility or its operations, in order to minimize the consequent threat to public health and the environment.

Representative Sample
A small portion of soil, water, etc. which can be subjected to testing and analysis, that is expected to yield results that will reliably represent the identical characteristics of the source of the material or of a larger body of material.

Reuse (component of 3Rs program)
The use of an item again in its original form, for a similar purpose as originally intended, or to fulfil a different function.

Run-off
The part of precipitation (rainwater, snowmelt) that flows overland and does not infiltrate the surface material (soil or rock).

Saturated Zone
The zone of a subsurface soil where all voids are filled with water.

Sedimentation
The deposition of fine grained soil in an undesirable location, caused by the scouring, erosion and transportation of earth materials by surface run-off.

Sensitive Land Use
A land use where humans or the natural environment may experience an adverse environmental impact.

Settlement
The subsidence of the top surface and underlying waste of a landfill or waste cell as a result of densification under its own weight.

Site Capacity
The maximum amount of waste that is planned to be disposed (design capacity) or that has been disposed of at a landfill site.

Site Closure
The planned and approved cessation or termination of landfilling activities at a landfill site upon reaching its site capacity.

Site Life
The period from its inception through active period of waste disposal, to the time when a landfill site reaches its' site capacity, when it ceases to receive any further waste, including and up to closure.

Solid Waste
Any waste matter that cannot be characterized by its physical properties as a liquid waste product.

Solid Waste Disposal Site or Facility
A site or facility such as a landfill site where solid waste is disposed of.

Source Separation
The separation of various wastes at their point of generation for the purposes of recycling or further processing.

Standpipe
A monitoring well that intersects the water table aquifer.

Storm water
Run-off that occurs as a direct result of a storm event or thaw.

Storm water Detention
Control of storm water by the construction of impoundments of structures for the purpose of regulating storm water flows during high intensity rainfall events that would otherwise transport excessive amounts of sediment, cause soil erosion or cause flooding.

Stratigraphy
The geologic sub-structuring, usually layered with different distribution, deposition and age.

Surface Run-off (Drainage)
See Run-off.

Surface Water
Water that occurs at the earth's surface (ponds, streams, rivers, lakes, oceans).

Sub-Soil
Soil horizons below the topsoil.

Test hole
A hole drilled for soil sampling purposes.

Topsoil
The uppermost layer of the soil containing appreciable organic materials in mineral soils. Adequate fertility to support plant growth.

Unsaturated Zone
The zone (also vadose zone) in a porous sub-soil, where the voids are not completely water-filled, but contain some air-filled voids. Limited above by the land surface and below by the water table.

Vector
A disease carrier and transmitter; usually an insect or rodent.

VOC
Volatile organic compounds are those compounds that will readily volatilize (convert from liquid to gas phase) at conditions normally found in the environment.

Waste
Ashes, garbage, refuse, domestic waste, industrial waste, or municipal refuse and other used products as are designated or interpreted by the provisions of the Environmental Protection Act.

Waste Disposal Site (Facility)
Any land or land covered by water upon, into, in or through which, or building or structure in which, waste is deposited or processed and any machinery or equipment or operation required for the treatment or disposal of waste.

Waste Management System
All facilities, equipment and operations for the complete management of waste, including the collection, handling, transportation, storage, processing and disposal thereof, and may include one or more waste disposal sites.

Water Table
The water level attained in a monitoring well, which screens the surficial unconfined aquifer.

Water Balance
Amounts of water to various components in a system so that water entering the system equals the amount of water contained within and discharged out of a system.

Water Level
The level of water in a well.

Well Casing
The pipe that is used to construct a well.

Well Screen
A filtering device used to keep sediment from entering a well.

Wetlands
Areas where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrolytic vegetation, and which have soils indicative of wet conditions.

Abbreviations

RFP	Request For Proposal	**µS**	microSiemens
MECP	Ontario Ministry of the Environment, Conservation and Parks	**ODWQS**	Ontario Drinking Water Quality Standards
MNRF	Ontario Ministry of Natural Resources and Forestry	**ECA**	Environmental Compliance Approval
PC of A	Provisional Certificate of Approval	**PWQO**	Provincial Water Quality Objectives
EPA	Environmental Protection Act	**TOC**	Total Organic Carbon
EAA	Environmental Assessment Act	**VOC**	Volatile Organic Compound
MW	monitoring well	**BTU**	British Thermal Unit
masl	metres above sea level	**°C**	temperature in degrees Celsius
kg	kilogram	**N/A**	not available
mm	millimetres	**%**	percent
m	metres	**cfm**	cubic feet per minute
km	kilometres	**ppmdv**	part per million by dry volume
ha	hectare	**ppmv**	part per million by volume
m^3	cubic metres	**ppm**	part per million
m^2	square metres	**min**	minimum
mg/l	milligrams per litre	**max**	maximum

Units of Measurement and Conversions

Length

1 metre (m)	=	3.28 feet
1 millimetre (mm)	=	0.039 inches
1 kilometre (km)	=	0.621 miles

Area

1 hectare (ha)	=	2.47 acres
1 square metre (m^2)	=	10.76 square feet

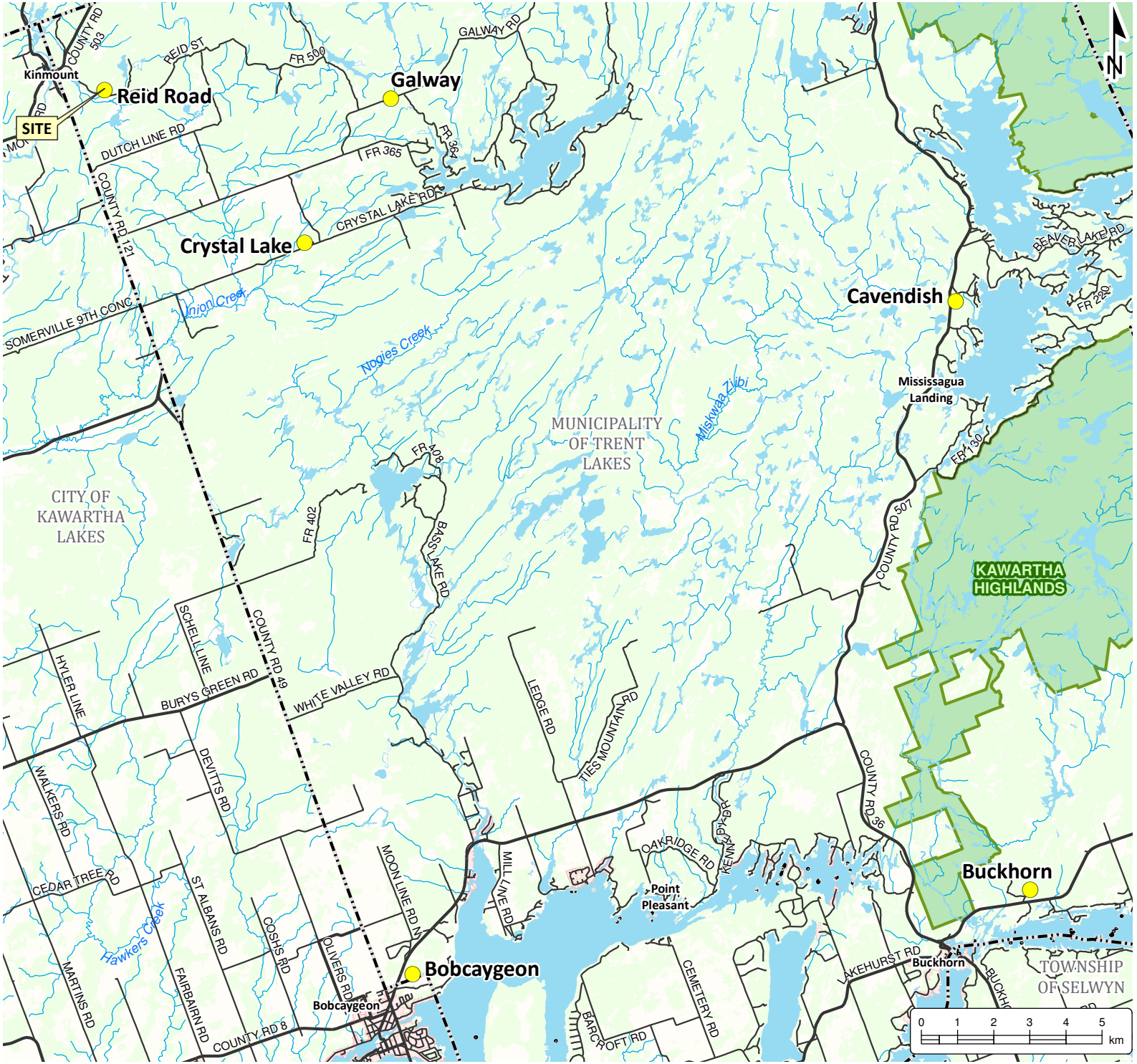
Volume

1 cubic metre(m^3)	=	35.29 cubic feet
1 litre(L)	=	0.220 gallons

Mass

1 metric ton (tonne)	=	1.10 Imperial tons
1 kilogram (kg)	=	2.20 lbs
pound (lb)	=	453.6 g
gram (g)	=	---
milligrams (mg)	=	1 x 10^{-3} g
microgram (µg)	=	1 x 10^{-6} g
nanogram (ng)	=	1 x 10^{-9} g
kilogram (kg)	=	1000 g
picogram (pg)	=	1 x 10^{12} g
metric tonne (t)	=	1000 kg

Appended Figures



REID ROAD WASTE DISPOSAL SITE

Municipality of Trent Lakes
County of Peterborough

LEGEND

- Trent Lakes Waste Disposal Sites
- Major Road
- Minor Road
- Watercourse
- Water Area
- Provincial Park
- Built-Up Area
- Wooded Area
- Municipal Boundary

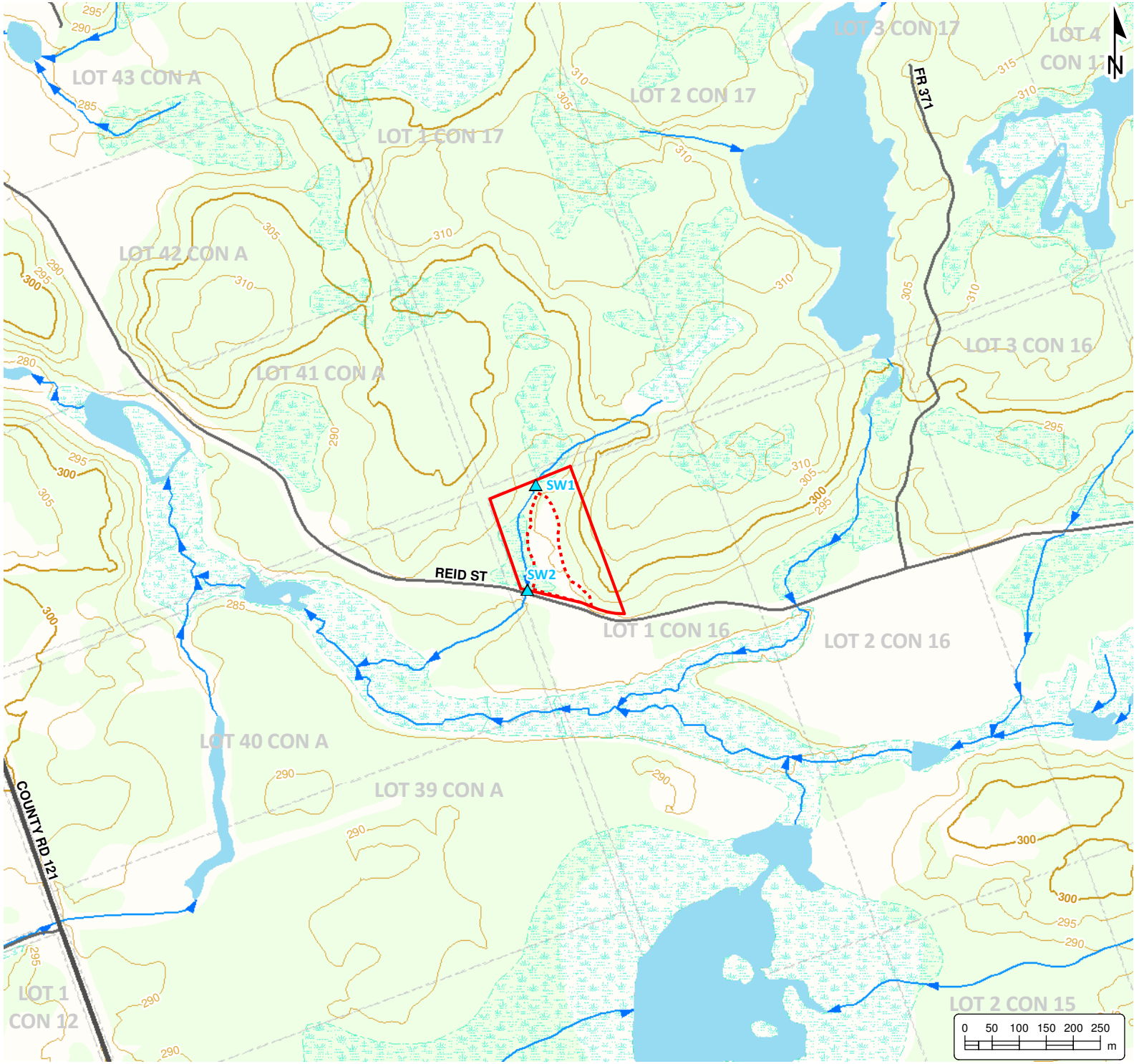
Notes:
- Base mapping features are © Queen's Printer of Ontario, 2017 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

CAMBIUM
P.O. Box 325, 52 Hunter Street East
Peterborough, Ontario, K9H 1G5
Tel: (705) 742.7900 Fax: (705) 742.7907
www.cambium-inc.com

REGIONAL LOCATION PLAN

Project No.:	8604-004	Date:	April 2020
		Rev.:	
Scale:	1:150,000	Projection:	NAD 1983 UTM Zone 17N
Created by:	TLC	Checked by:	SNR
Figure:	1		

O:\GIS\project_MX\8600 to 8699\8640-004 MTL - Reid Landfill AMP 2019\2019-10-16 FIG 1 - Regional Location Plan.mxd



REID ROAD WASTE DISPOSAL SITE

Municipality of Trent Lakes
County of Peterborough

LEGEND

- Surface Water Location
- Major Road
- Minor Road
- Watercourse, Permanent
- Contour 5m Interval (Major)
- Contour 5m Interval (Minor)
- Property Boundary (2.8 ha.)
- Existing Limit of Waste (2.0 ha.)
- Lot / Concession
- Wetland Area
- Water Area
- Wooded Area

Notes:
- Base mapping features are © Queen's Printer of Ontario, 2017 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
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LOCAL TOPOGRAPHY PLAN

Project No.:	8640-004	Date:	April 2020
		Rev.:	
Scale:	1:10,000	Projection:	NAD 1983 UTM Zone 17N
Created by:	TLC	Checked by:	SNR
Figure:	2		

O:\GIS\project_MXDs\8600 to 8699\8640-004 MTL - Reid Landfill AMP 2019\2019-10-16 FIG 2 - Local Topography Plan.mxd

Appended Tables

Table 1
Reid Road Closed Landfill Monitoring Program

Location	Task	Frequency	Parameters
SURFACE WATER			
SW1, SW2 1 QA/QC Duplicate	• Surface water sampling • Flow estimates • Field measurements (pH, temperature, conductivity, dissolved oxygen and ORP)	Twice Annually (Spring and Autumn)	Alkalinity, Ammonia, dissolved aluminum, Arsenic, Barium, Boron, Cadmium, Chloride, Chromium, Conductivity, Copper, Iron, Lead, Manganese, dissolved mercury, Nitrate, Nitrite, TKN, pH, Total Phosphorous, TSS, TDS, Sulphate, Zinc, BOD, COD, DOC, Phenols, Hardness

Table 2: Summary of Surface Water Quality

Parameter[1]	PWQO [2]	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1	SW1
		12-May-11	03-May-12	23-Oct-12	28-May-13	12-Nov-13	26-May-14	27-Oct-14	#######	28-Oct-15	27-Apr-16	28-Oct-16	06-Jun-17	02-Oct-17	29-May-18	12-Nov-18	16-Apr-19
Alkalinity (as $CaCO_3$)	decrease >25%	10	9	5	8	6	8	12	11	18	8	12	13	18	12	7	< 5
Conductivity (µs/cm)	NV	31	39	46	34	26	25	37	34	71	25	48	27	72	30	24	20
pH (Units)	6.5 - 8.5	6.8	6.61	6.62	**5.95**	6.71	6.65	6.54	7.02	6.7	6.87	7.18	6.71	6.72	6.78	6.67	**6.35**
Solids - Total Dissolved (TDS)	NV	18	44	48	116	<20	42	42	26	62	38	58	15	39	15	12	10
Solids - Total Suspended (TSS)	NV	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	7	5	< 3	84	< 3
Dissolved Organic Carbon (DOC)	NV	5.9	5.2	6.6	5.7	5.8	4.8	8	4	12	5	5	8	7	9	8	4
Oxygen Demand - Biological (BOD)	NV	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 2	< 2	< 2	4	< 3
Oxygen Demand - Chemical (COD)	NV	17	17	22	33	16	21	20	<5	32	<5	13	23	14	26	12	19
Phenolics- Total	0.005	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	< 0.001	< 0.001	0.003	< 0.002
Chloride	NV	<1	0.43	0.87	0.3	0.47	0.32	0.6	0.9	1.5	1.68	0.6	< 0.5	2.2	< 0.5	1.1	0.5
Sulphate	NV	<1	5.38	11.9	3.84	3.85	2.4	2.3	3.7	12.3	8.03	7.7	2.0	12.0	< 1	3.0	3.0
Ammonia, Unionized (as N)[3]	0.02	-	<0.001	<0.001	<0.001	-	-	0.00009	0.00011	-	-	0.00016	<0.005	<0.005	<0.005	<0.005	< 0.005
Nitrogen - Ammonia (NH_3) & Ammonium (NH_4)	NV	<0.05	<0.02	<0.02	<0.02	-	-	0.05	<0.02	<0.02	-	<0.02	< 0.01	0.1	0.03	0.03	0.02
Nitrogen - Nitrite (NO_2)	NV	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrogen - Nitrate (NO_3)	NV	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	0.09	< 0.05	< 0.005	< 0.005	< 0.05	< 0.05
Nitrogen - Total Kjeldhal (TKN)	NV	0.50	0.31	0.32	0.18	0.40	0.36	0.22	0.19	0.38	0.20	0.29	0.30	0.30	0.40	0.30	0.20
Mercury- Dissolved	0.0002	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.005	-	<0.0001	<0.0001	-	-	-	-	-
Mercury- Total	0.0002	-	-	-	-	-	-	-	-	-	-	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Hardness (as $CaCO_3$)	NV	12	13	18	13	<10	11	15	13	29	9.5	17	23	28	14	11	4
Aluminum	0.075	-	**0.079**	0.075	**0.1**	**0.093**	**0.077**	**0.089**	0.06	**0.09**	0.063	0.05	**0.16**	**0.08**	**0.14**	**0.08**	0.06
Arsenic	0.1	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.0002	0.0002	0.0002	< 0.0001	< 0.0001
Barium	NV	0.069	<0.010	0.071	0.066	0.047	0.068	0.089	0.063	0.115	0.049	0.097	0.082	0.172	0.099	0.056	0.036
Boron	0.2	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.008	0.006	< 0.005	< 0.005	< 0.005
Cadmium[4]	0.00001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	**0.00002**	**0.00006**	**0.00004**	< 0.000015	< 0.000015
Chromium	0.0089	<0.005	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper[4]	0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.002	0.0004	0.0004	0.0006	0.0003	0.0003
Iron	0.3	0.10	0.07	0.01	0.06	0.03	0.06	0.10	0.07	**0.57**	0.028	0.03	0.17	**0.33**	0.20	0.08	0.09
Lead[4]	0.001	<0.0005	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00029	0.00023	0.00034	0.00005	0.00004
Manganese	NV	0.038	0.041	0.005	0.012	0.007	0.200	0.028	0.024	0.205	0.007	0.003	0.050	0.325	0.067	0.004	0.012
Phosphorous - Total	0.02	0.015	**0.037**	<0.02	<0.02	<0.02	**0.04**	**0.04**	<0.02	**0.022**	<0.02	0.01	**0.03**	**0.03**	**0.04**	< 0.01	**0.23**
Zinc	0.03	<0.005	0.006	0.005	0.008	<0.005	<0.005	<0.005	<0.001	0.0070	<0.005	<0.005	**0.038**	0.005	0.010	< 0.005	0.012
Dissolved Oxygen (DO)[5]	5	-	-	-	-	-	7.34	10.16	7.84	8.57	-	7.89	8.77	8.79	**3.74**	**3.74**	9.65
Temperature (°C)[5]	NV	-	-	-	-	-	17.5	7.6	1.0	6.6	6.8	6.1	13.1	8.0	17.4	17.4	2.2
pH (units)[5]	6.5-8.5	-	-	-	-	-	7.85	**5.80**	8.20	7.80	**8.74**	8.01	6.53	6.82	**6.32**	**6.32**	7.66
Conductivity (µS/cm)[5]	NV	-	-	-	-	-	15	29	20	80	35	298	30	80	30	30	20
Oxidation Reduction Potential (mV)[5]	NV	-	-	-	-	-	-	-	-	-	-	-	20	129	51	51	137

Notes:

1. All results are expressed in mg/L unless otherwise stated.
2. PWQO means Provincial Water Quality Objectives.
3. Calculated from Total Ammonia and Field Results (2017 - present)
4. Based on average hardness.
5. Results from field analysis.

Bold text and shading indicate values exceeding PWQO.

NV indicates No Value.

"-" parameter not analyzed.

Table 2: Summary of Surface Water Quality

Parameter[1]	PWQO [2]	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2	SW2
		13-May-11	04-May-12	23-Oct-12	28-May-13	12-Nov-13	26-May-14	27-Oct-14	#######	28-Oct-15	27-Apr-16	28-Oct-16	06-Jun-17	29-May-18	12-Nov-18	16-Apr-19
Alkalinity (as $CaCO_3$)	decrease >25%	17	15	6	18	10	18	17	11	11	15	17	24	24	11	7
Conductivity (µs/cm)	NV	52	51	51	59	37	45	50	36	82	48	59	20	54	33	26
pH (Units)	6.5 - 8.5	6.97	6.71	**5.65**	**6.21**	7.01	6.72	6.60	7.24	6.61	7.18	7.16	7.17	7.09	6.66	6.86
Solids - Total Dissolved (TDS)	NV	32	48	60	84	32	40	38	28	74	40	50	11	27	17	13
Solids - Total Suspended (TSS)	NV	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	< 3	5	20	< 3
Dissolved Organic Carbon (DOC)	NV	5.4	5.2	6.6	5.7	5.7	4.4	7.6	3.4	10.8	4.7	8.8	7.5	7.2	7.3	4.3
Oxygen Demand - Biological (BOD)	NV	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	< 2	< 2	6	< 3
Oxygen Demand - Chemical (COD)	NV	19.0	6.0	18.0	123.0	12.0	19.0	18	7	31	5	16	21	27	18	16
Phenolics- Total	0.005	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	< 0.001	< 0.002	< 0.002
Chloride	NV	<1	0.5	0.9	0.5	0.5	0.4	0.7	0.8	1.7	0.55	1.0	< 0.5	< 0.5	1.4	0.6
Sulphate	NV	3.0	6.3	13.1	5.8	4.4	4.0	2.9	3.9	21.6	7.65	9.8	2.0	2.0	3.0	3.0
Ammonia, Unionized (as N)[3]	0.02	-	<0.001	<0.001	<0.001	-	-	0.000038	-	-	-	0.02	<0.005	<0.005	<0.005	< 0.005
Nitrogen - Ammonia (NH_3) & Ammonium (NH_4)	NV	<0.05	<0.02	<0.02	<0.02	-	-	<0.02	<0.02	<0.02	-	<0.02	< 0.01	0.06	0.04	0.03
Nitrogen - Nitrite (NO_2)	NV	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrogen - Nitrate (NO_3)	NV	<0.1	0.05	<0.05	0.07	<0.05	<0.05	<0.05	0.11	<0.05	0.09	<0.05	< 0.05	0.07	< 0.05	< 0.05
Nitrogen - Total Kjeldhal (TKN)	NV	3.30	0.68	0.31	1.47	0.38	0.39	0.24	0.19	0.38	0.19	0.33	0.70	4.90	0.50	0.20
Mercury- Dissolved	0.0002	-	<0.0001	<0.005	<0.0001	-	-	-	<0.005	-	<0.0001	<0.0001	-	-	-	-
Mercury- Total	0.0002	-	-	-	-	-	-	-	-	-	-	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002
Hardness (as $CaCO_3$)	NV	22	21	20	24	15	21	21	15	32	19	23	21	26	16	5
Aluminum	0.075	-	0.062	0.061	**0.085**	<0.003	<0.003	<0.003	0.054	0.072	0.050	0.074	0.070	**0.090**	**0.160**	0.060
Arsenic	0.1	-	<0.003	<0.003	<0.003	0.049	0.081	0.070	<0.003	<0.003	<0.003	<0.003	0.0002	0.0006	0.0002	< 0.0001
Barium	NV	0.081	<0.010	0.072	0.083	<0.010	<0.010	<0.010	0.057	0.111	0.062	<0.003	0.076	0.112	0.102	0.038
Boron	0.2	<0.01	<0.010	0.011	0.010	<0.0001	<0.0001	<0.0001	<0.010	<0.010	<0.010	<0.010	0.007	< 0.005	< 0.005	< 0.005
Cadmium[4]	0.00001	<0.0001	<0.0001	<0.0001	<0.0001	<0.003	<0.003	<0.003	<0.0001	<0.0001	<0.0001	<0.0001	**0.000014**	**0.000034**	**0.000201**	< 0.000015
Chromium	0.0089	<0.005	<0.003	<0.003	<0.003	-	-	-	<0.003	<0.003	<0.003	<0.003	< 0.001	< 0.001	< 0.001	< 0.001
Copper[4]	0.001	<0.001	<0.002	<0.002	<0.002	**0.0470**	**0.0740**	**0.0840**	<0.001	<0.002	<0.002	<0.002	0.0004	0.0005	**0.0051**	0.0003
Iron	0.3	0.10	<0.010	0.01	0.08	<0.002	<0.002	<0.002	0.11	0.13	0.031	0.09	0.03	0.19	**0.70**	0.08
Lead[4]	0.001	<0.0005	<0.001	<0.001	<0.001	-	-	-	<0.002	<0.002	<0.002	<0.001	0.00005	0.00017	0.00069	0.00003
Manganese	NV	0.072	0.008	0.008	0.039	<0.005	<0.005	0.005	0.027	0.054	0.003	0.084	0.012	0.115	1.390	0.022
Phosphorous - Total	0.02	0.02	**0.03**	<0.02	**0.06**	<0.02	<0.02	<0.02	<0.02	**0.03**	<0.02	**0.03**	**0.05**	**0.47**	**0.05**	< 0.01
Zinc	0.03	<0.005	<0.005	<0.005	0.006	<0.0001	<0.0001	<0.0001	<0.001	0.007	<0.005	0.006	0.008	0.012	0.029	0.007
Dissolved Oxygen (DO)[5]	5	-	-	-	-	-	-	**3.70**	10.26	7.23	-	7.96	6.97	**4.58**	**4.58**	10.47
Temperature (°C)[5]	NV	-	-	-	-	-	16.1	7.6	0.3	6.7	6.0	6.1	12.6	16.8	16.8	1.5
pH (units)[5]	6.5-8.5	-	-	-	-	-	7.46	**5.24**	8.00	7.71	**8.53**	**8.95**	6.79	6.84	6.84	8.05
Conductivity (µS/cm)[5]	NV	-	-	-	-	-	36	40	20	100	50	379	100	60	60	30
Oxidation Reduction Potential (mV)[5]	NV	-	-	-	-	-	-	-	-	-	-	-	22	57	57	137

Notes:

1. All results are expressed in mg/L unless otherwise stated.
2. PWQO means Provincial Water Quality Objectives.
3. Calculated from Total Ammonia and Field Results (2017 - present)
4. Based on average hardness.
5. Results from field analysis.

Bold text and shading indicate values exceeding PWQO.

NV indicates No Value.

"-" parameter not analyzed.

Appendix A
Provisional Certificate of Approval

Ontario

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

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A341207
Notice No. 2

The Corporation of the Township of Galway-Cavendish-Harvey
PO Box 820
Bobcaygeon, Ontario
K0M 1A0

Site Location: Reid Road Landfill
Lot 1, Concession 16
Galway-Cavendish-Harvey Township, County of Peterborough
K0L 1J0

You are hereby notified that I have amended Provisional Certificate of Approval No. A341207 issued on October 28, 2003 and amended on November 1, 2004 for a waste disposal site , being known as the Reid Road Landfill Site, as follows:

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

6. Letter and supporting documentation dated April 15, 2005 addresses to Mr. Dale Gable, Ministry of the Environment from Mr. Michael Cant, TSH providing an additional response to the October 5, 2005 letter. The supporting documentation was the following:

i. Drawing No. 1: Proposed Final Contours - Reid Road Landfill (Scale 1:1000) prepared by TSH and dated April, 2005

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

1. Item 6 is added to incorporate the submission material to satisfy Condition 12 into the Certificate.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A341207 dated October 28, 2003

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

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

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

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

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

DATED AT TORONTO this 3rd day of May, 2005

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

DG/
c: District Manager, MOE Peterborough
Michael Cant, Totten Sims Hubicki Associates

Ontario

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

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A341207
Notice No. 1

The Corporation of the Township of Galway-Cavendish-Harvey
PO Box 820
Bobcaygeon, Ontario
K0M 1A0

Site Location: Reid Road Landfill
Lot 1, Concession 16
Galway-Cavendish-Harvey Township, County of Peterborough
K0L 1J0

You are hereby notified that I have amended Provisional Certificate of Approval No. A341207 issued on October 28, 2003 for a waste disposal site, being known as the Reid Road Landfill Site, as follows:

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

3. Letter dated August 26, 2004 and supporting documentation to Mr. James O'Mara, Director, Ministry of the Environment from Mr. Michael Cant, Totten Sims Hubicki Associated providing information to satisfy Condition 12 and 22 of the Certificate of Approval No. 341207.

4. Letter dated October 5, 2004 to Mr. Michael Cant, TSH from Mr. Dale I. Gable, Ministry of the Environment requesting additional information of the contingency plans and final cover update.

5. Letter dated October 19, 2004 to Mr. Dale I. Gable, Ministry of the Environment from Mr. Michael Cant, TSH providing additional information on the contingency plans and a timeline for collecting and submitting the information to satisfy Condition 12.

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

1. Items 3, 4 and 5 are added to include the submission and supporting documents and information provided to satisfy Condition 22 into the Certificate.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A341207 dated October 28, 2003

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

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

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

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

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

DATED AT TORONTO this 1st day of November, 2004

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

DG/
c: District Manager, MOE Peterborough
Michael Cant, Totten Sims Hubicki Associates

Ontario

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

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A341207

The Corporation of the Township of Galway-Cavendish and Harvey
PO Box 130
Buckhorn, Ontario
K0L 1J0

Site Location: Reid Road Landfill
North Half of Lot 1, Concession 16
Township of Galway-Cavendish and Harvey,
County of Peterborough
K0L 1J0

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:

Closure Plan for Reid Road Landfill Site.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

DEFINITION OF TERMS

1. In this Provisional Certificate of Approval:

a) "Certificate" means this Provisional Certificate of Approval as amended from time to time, including all Schedules attached to and forming part of this Certificate;

b) "Township" or "Owner" means the Corporation of the Township of Galway-Cavendish and Harvey;

c) "Director" means one or more persons who from time to time are appointed under Section 5 of the *Environmental Protection Act*;

d) "MOE" means the Ministry of Environment.

e) "Regional Director" means the Director, MOE, Eastern Region;

f) "District Manager" means the District Manager of the MOE, Peterborough District;

g) "Site" means the entire waste disposal site including the landfilling area, buffer lands and attenuation zones approved by this Certificate of Approval;

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

i) "OWRA" means the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40, as amended;

j) "Reg. 347" means Regulation 347 - R.R.O. 1990, General - Waste Management, as amended, made under the EPA;

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

l) "Reasonable Use Guideline" means the Ministry Guideline B-7 entitled "Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities", dated April 1994, as amended; and

m) "Property" means the Site.

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

TERMS AND CONDITIONS

GENERAL PROVISIONS

2. The Township shall allow MOE personnel, or MOE authorized representative(s), upon presentation of credentials to carry out any and all inspections authorized by the EPA, the OWRA or the *Pesticides Act*, as amended from time to time, of any place to which this Certificate relates and without restricting the generality of the foregoing to:

i) enter upon the premises or the location where the records required by the Conditions of this Certificate are kept;

ii) have access to and copy, at any reasonable time, any records required by the Conditions of this Certificate;

iii) inspect at reasonable times any facilities and equipment (including monitoring and control equipment), practices or operations required by the Conditions of this Certificate; and

iv) sample and monitor at reasonable times for the purposes of assessing compliance with the Conditions of this Certificate.

3. This waste disposal Site shall be closed, maintained, monitored, inspected and reported by the Township in accordance with the documents listed in the attached Schedule “A” and with the Conditions in this Certificate of Approval. Should there be any discrepancies between any of the Schedules and the Conditions in this Certificate, the Conditions shall take precedence. Should there be discrepancies between the documents listed in Schedule "A", the document bearing the most recent date shall take precedence.

4. This Certificate revokes all previously issued Provisional Certificates of Approval issued under Part V of the EPA for this Site. The approval given herein including the terms and conditions set out, replaces all previously issued approvals and related terms and conditions under Part V of the Act for this Site.

5. The requirements specified in this Certificate are minimum requirements and do not abrogate the need for the Township to take all reasonable steps to avoid violating the provisions of all other applicable legislation.

6. The requirements of this Certificate are severable. If any requirement of this Certificate, or the application of any requirement of this Certificate, to any circumstances, is held invalid, the application of such requirement to other circumstances and the remainder of this Certificate shall not be affected thereby.

NOTIFICATION

7. The Township shall notify the Director, in writing, of any of the following changes within thirty (30) days of the occurrence of the change:

a) change of Owner of the Site;
b) change of address or address of new Owner;
c) change of name of the Township or any change of business name or style.

The Notification shall include a copy of the most current "Initial Notice or Notice of Change" filed under the Corporations Information Act, R.S.O. 1990, as amended from time to time, or if that Act is not applicable, a copy of the most recent registration under the Business Names Act, R.S.O. 1990, as amended from time to time.

8. The Township shall ensure that all communication made pursuant to this Certificate will refer to this Certificate No. A 341207

PROHIBITION/REGISTRATION ON TITLE

9. a) Pursuant to Section 197 of the EPA, neither the Owner nor any person having an interest in the Property shall deal with the Property in any way without first giving a copy of this Certificate to each person acquiring an interest in the Property as a result of the dealing.

b) The Owner shall:

i) Within 120 days of the date of this Certificate, submit to the Director for the Director's signature two copies of a completed Certificate of Prohibition containing a registerable description of the Property, in accordance with Form 1 of O. Reg. 14/92.

ii) Within 10 calendar days of receiving the Certificates of Prohibition signed by the Director, register the Certificate of Prohibition in the appropriate Land Registry Office on title to the Property and submit to the Director immediately following registration the duplicate registered copy.(applicable definitions pasted in or entered by Reviewer)

SITE CLOSURE

10. The Site shall be closed as outlined in the document listed in Schedule "A", Item 1 *Reid Road Landfill Site-Closure Plan* dated June 2001, prepared by TSH.

11. No additional wastes shall be disposed of at the Site under this Certificate.

12. By August 31, 2004, the Township shall submit updated plans and drawings that clearly identify the 2.8 hectare landfill Site, 2.0 hectare approved landfilling area at a scale of 1:1000. The plans and drawings shall include the finished, final contours of the Site and shall be accompanied by a description of final cover material used, thickness of final cover application and topsoil application.

13. Site access shall continue to be restricted by means of a lockable gate. The restriction shall remain for as long as this Certificate is in force.

14. Notices of Site closure shall continue to be posted at the Site entrance noting, among others, the Site closure and directing wastes to an alternative landfill disposal location..

POST CLOSURE OPERATIONS

15. Site inspections shall be conducted by the Township twice per year, once in the Spring and another in Fall, to assess the integrity of the final cover and vegetation, condition of access roads, ditches, culverts, gates, fencing and other on Site works. If inspections reveal that remedial works are necessary, such remedial works shall be undertaken within a reasonable period of time, but prior to the next scheduled Site inspection. In the case of revegetation, remedial works shall be undertaken as soon as weather conditions permit.

SURFACE WATER MONITORING

16. Surface water monitoring shall continue as described in Section 3, Environmental Monitoring, contained in Item 1 of Schedule "A". Monitoring events shall occur on a semi-annual basis.

17. Surface water monitoring station SW-2 shall be relocated upstream of the Site such that possible influence of road salting activities on sample results is reduced.

18. Any exceedences of PWQO at any of the monitoring locations shall be reported in writing to the District Manager within two (2) weeks of receiving the monitoring results.

19. The District Manager may amend any part of the surface water monitoring program at any time. The Township may request, in writing to the District Manger, amendments to the monitoring program.

REPORTING

20. By April 30, 2004 and every two years thereafter, the Township shall submit a report to the District Manager detailing the activities and monitoring results of the previous two year period. At a minimum, the report shall contain the following:

i) results of all samples, and analysis and interpretation of results;

ii) assessment of adequacy of monitoring program and recommendations for changes to program;

iii) assessment of need for groundwater monitoring

iv) assessment of results with respect to PWQO and Reasonable Use Guidelines, if applicable;

v) assessment of future compliance and need to implement contingency plans;

vi) summary of Site inspections, actions taken as a result of the Site inspections, records of complaints and description of efforts to resolve complaints;

vii) summary of all works or activities carried out at the Site during the reporting period, including remedial works and maintenance activities; and

viii) a statement of compliance with this Certificate.

21. The requirements for reporting as outlined in Condition 20, including the frequency of reporting, may be modified, altered or revised at the discretion of the District Manager. Any changes to the reporting requested by the Township shall be made in writing to the District Manager.

CONTINGENCY PLANS

22. By August 31, 2004, the Owner shall submit to the Director, a report outlining the contingency plans should such needs be dictated by the Trigger Mechanisms as detailed in Section 4 of Item 1, Schedule "A". These contingency plans should be adequately detailed so as to enable an assessment to be made of it's financial and technical feasibility and to enable the Owner to assume responsibility for implementing the contingency plans. The contingency plans should address both surface and ground water.

SCHEDULE "A"

1. *Reid Road Landfill Site, Closure Plan* prepared by Totten Sims Hubicki dated June 2001.
2. Letter dated February 15, 2002 from TSH to Ernst Zaltsberg, MOE responding to questions/comments.

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

1. Condition 1 defines terms and words used in this Certificate
2. Conditions 2, 4, 5, 6, 7, 8 and 9 clarify the legal responsibilities and obligations imposed by this Certificate.
3. Condition 3 ensures that the Site is closed, monitored, inspected and maintained in accordance with the application submitted by the Township, and not in a manner which the Director had not been asked to consider.
4. Condition 10 refers to supporting documentation which will be used to guide the closure and post closure requirements.
5. Condition 11 reinforces that no wastes shall be landfilled at this Site.
6. Condition 12 stipulates a date for submission of drawings requested previously but not complied with.
7. Condition 13 and 14 require the Site to be secured against unauthorized entry through signs and locked gates.
8. Condition 15 specifies twice yearly Site inspections to assess closure, post closure performance.
9. Conditions 16 and 17 revise the surface water monitoring program.
10. Condition 18 requires that the Township notify the MOE within a 2 week period if monitoring shows exceedences.
11. Condition 19 allows the District Manager to alter or amend any part of the monitoring program.
12. Condition 20 sets out the requirements for the biannual reporting.

13. Condition 21 allows the District Manager to alter or amend the reporting period or other aspects of the reporting requirements.
14. Condition 22 requires a more definitive set of contingency measures and the costs associated with the implementation of contingency measures.

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A341207 issued on March 19, 1980

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

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

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

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

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

DATED AT TORONTO this 28th day of October, 2003

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

JH/
c: District Manager, MOE Peterborough
Mr. Michael Cant, Totten Sims Hubicki Associates (1997) Limited

Appendix B
Field Sheets and Precipitation Data

CAMBIUM

FIELD SHEET - SURFACE WATER SAMPLING

Sample Station	Depth (m)	Width (m)	Distance (m)	Time (s)	Velocity (m/s)	Discharge (m^3/s)	D.O. (mg/L)	Temp. (^oC)	pH (units)	Cond. (mS)	ORP (mV)	Observations				
												Clarity	Colour	Odour	Sheen	Other
SW1	0.12	0.61	-	-	<0.1	<0.007	3.74	17.4	6.32	30	51	Clear	None	None	None	QA/QC
SW2	0.19	Ponded- No Observable Flow					4.58	16.8	6.84	60	57	Clear	None	None	None	

LOCATION: Reid Road Closed WDS

DATE: 29-May-18

WEATHER (SAMPLE DAY): 19°C Sun 25°C

PROJECT NUMBER: 7205-004

SAMPLED BY: M. Pion + M. Latter

WEATHER (PREVIOUS DAY): 24°C Sun

LOCATION: Reid WDS DATE: 2018-11-12 WEATHER (SAMPLE DAY): -2°C, Overcast 0°C

PROJECT NUMBER: 7205-004 SAMPLED BY: M. Pion + S. Elford WEATHER (PREVIOUS DAY): -7°C, Sun and Snow

FIELD SHEET – SURFACE WATER DEVELOPMENT & SAMPLING

Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m^3/s)	Temp (°C)	pH (units)	Cond. (mS)	DO (mg/L)	ORP (mV)	Observations				
										Clarity	Colour	Odour	Sheen	Other
SW1	0.20	1.00	< 0.1	<0.02	1.7	7.94	20	9.25	122	Clear	None	None	None	
SW2	0.12	Ponded - No Observable Flow			1.7	7.91	30	10.14	122	Clear	Brown	None	None	QA/QC,Area flooded

LOCATION: Reid WDS

DATE: April 16, 2019

WEATHER (SAMPLE DAY): -1°C Sun 10°C

PROJECT NUMBER: 8640-004

SAMPLED BY: M. Francis and M. Pion

WEATHER (PREVIOUS DAY): 0°C Overcast + Rain <1mm 5°C

FIELD SHEET – SURFACE WATER SAMPLING

Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m^3/s)	Temp (°C)	pH (units)	Cond. (mS)	DO (mg/L)	ORP (mV)	Observations				
										Clarity	Colour	Odour	Sheen	Other
SW1	0.19	2.00	0.10	0.038	2.2	7.66	20	9.65	137	Clear	None	None	None	
SW2	0.16	-	< 0.10	-	1.5	8.05	30	10.47	137	Clear	Yellow	None	None	QA/QC, Area flooded

LOCATION: Reid WDS DATE: November 14, 2019 WEATHER (SAMPLE DAY): -7°C Overcast + Snow

PROJECT NUMBER: 8640-004 SAMPLED BY: MP, TJ WEATHER (PREVIOUS DAY): -20°C Sun

FIELD SHEET – SURFACE WATER SAMPLING

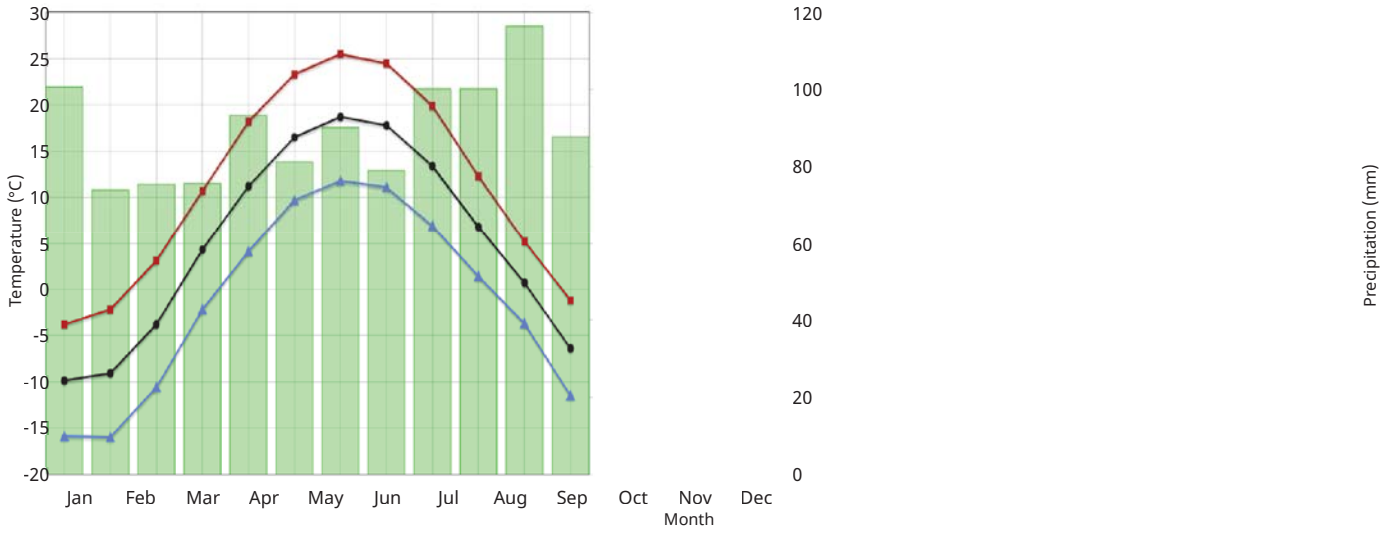
Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m^3/s)	Temp (°C)	pH (units)	Cond. (mS)	DO (mg/L)	ORP (mV)	Observations				
										Clarity	Colour	Odour	Sheen	Other
SW1	-	-	-	-	-	-	-	-	-	-	-	-	-	Frozen
SW2	-	-	-	-	-	-	-	-	-	-	-	-	-	Frozen

Government of Canada / Gouvernement du Canada

Canadian Climate Normals 1981-2010 Station Data

▼ Temperature and Precipitation Graph

Temperature and Precipitation Graph for 1981 to 2010 Canadian Climate Normals
HALIBURTON 3



	Daily Maximum Temperature (°C)
	Daily Average Temperature (°C)
	Daily Minimum Temperature (°C)
	Precipitation (mm)

▼ Normals Data

The minimum number of years used to calculate these Normals is indicated by a code for each element. A "+" beside an extreme date indicates that this date is the first occurrence of the extreme value. Values and dates in bold indicate all-time extremes for the location.

Data used in the calculation of these Normals may be subject to further quality assurance checks. This may result in minor changes to some values presented here.

HALIBURTON 3
ONTARIO
Current Station Operator: CCN

Latitude:	45°01'56.094" N	**Longitude:**	78°31'52.014" W	**Elevation:**	330.00 m
Climate ID:	6163171	**WMO ID:**		**TC ID:**	

▼ Temperature

Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-9.9	-9.1	-3.8	4.3	11.2	16.5	18.7	17.8	13.4	6.8	0.7	-6.4	5.0	D
Standard Deviation	3.7	2.8	2.2	1.5	1.9	1.3	1.4	1.2	1.7	1.3	1.9	3.6	1.5	D

Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Maximum (°C)	-3.8	-2.2	3.1	10.7	18.2	23.3	25.5	24.5	19.9	12.3	5.2	-1.2	11.3	D
Daily Minimum (°C)	-15.9	-16.0	-10.6	-2.2	4.1	9.7	11.8	11.1	6.9	1.4	-3.7	-11.5	-1.2	D
Extreme Maximum (°C)	11.5	13.0	22.5	29.5	32.0	33.0	**38.0**	34.5	32.5	28.5	19.0	14.5		
Date (yyyy/dd)	1995/14	1994/19	1998/30	1990/28	2006/30	1994/17	**1988/08**	2001/09	2005/12	2005/04	1999/09	2001/05		
Extreme Minimum (°C)	**-43.5**	-39.0	-34.5	-18.0	-9.5	-2.5	2.0	-0.5	-6.0	-11.5	-25.5	-38.5		
Date (yyyy/dd)	**1994/16**	1996/03	2003/03	1992/13	1992/04	1998/06	1992/22	1989/25	1989/27	1992/20	1995/29	1993/27		

▼ Precipitation

Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	33.7	21.2	37.4	56.1	90.8	81.2	90.1	79.0	100.2	93.1	83.4	27.7	793.9	D
Snowfall (cm)	66.9	52.7	37.9	19.4	2.5	0.0	0.0	0.0	0.1	7.1	32.9	60.1	279.6	D
Precipitation (mm)	100.6	73.9	75.4	75.6	93.3	81.2	90.1	79.0	100.2	100.2	116.4	87.7	1073.5	D
Snow Depth at Month-end (cm)	32	42	16	0	0	0	0	0	0	1	8	22	10	D
Extreme Daily Rainfall (mm)	37.2	51.6	42.4	40.1	33.4	**69.2**	50.6	57.0	64.2	43.4	51.2	20.8		
Date (yyyy/dd)	1995/15	1997/21	1998/30	1998/16	2004/23	**2005/13**	2002/22	1997/16	1989/22	1999/13	1995/11	2000/16		
Extreme Daily Snowfall (cm)	20.6	34.6	20.2	24.6	14.8	0.0	0.0	0.0	1.2	21.0	**41.2**	37.2		
Date (yyyy/dd)	1995/03	2003/22	1989/17	1992/10	1994/26	1988/01	1988/01	1988/01	1989/23	1997/26	**1992/13**	2000/11		
Extreme Daily Precipitation (mm)	37.2	53.4	42.4	40.1	33.6	**69.2**	50.6	57.0	64.2	43.4	55.6	37.2		
Date (yyyy/dd)	1995/15	1997/21	1998/30	1998/16	2004/02	**2005/13**	2002/22	1997/16	1989/22	1999/13	1995/11	2000/11		
Extreme Snow Depth (cm)	58	72	**82**	68	5	0	0	0	0	23	41	62		
Date (yyyy/dd)	2001/31	2001/25	**1997/22**	1997/01	2002/14	1991/01	1991/31	1991/01	1991/30	1997/28	1995/28	2004/24		

▶ Days with Maximum Temperature

▶ Days with Minimum Temperature

▶ Days with Rainfall

▶ Days With Snowfall

▶ Days with Precipitation

▶ Degree Days

▶ Frost-Free

Legend

- A = WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for **either** temperature **or** precipitation)
- B = At least 25 years
- C = At least 20 years
- D = At least 15 years

▼ Station / Element Metadata

Statistics listed below are provided as a guide to determine the validity of Normals and Extremes calculations. For example, a station with 30 years of record between 1981 and 2010 with no missing years would be a more reliable normal than a station with 15 years of record and 2 missing years. Less than 100% possible observations indicates that out of the total number of observations used, some records were missing.

HALIBURTON 3

Province/Territory	ON	**Latitude (dd mm):**	45 02 N
Country	CAN	**Longitude (ddd mm):**	78 32 W
Time Zone	EST	**Latitude (decimal degrees):**	45.03 N
Climate ID:	6163171	**Longitude (decimal degrees):**	78.53 W
WMO ID:		**Elevation (m):**	330
TC ID:			

▼ Temperature

Temperature

	Begin Year	End Year	Total Number of Years	Missing Years	Total Count of Observations	% of Possible Observations
Daily Average (°C)	1987	2006	20	1	6998	99.1
Standard Deviation	1987	2006	20	1	6998	99.1
Daily Maximum (°C)	1987	2006	20	1	6999	99.1
Daily Minimum (°C)	1987	2006	20	1	6999	99.1
Extreme Maximum (°C)	1987	2006			7046	99.8
Extreme Minimum (°C)	1987	2006			7046	99.8

▼ Precipitation

Precipitation

	Begin Year	End Year	Total Number of Years	Missing Years	Total Count of Observations	% of Possible Observations
Rainfall (mm)	1987	2006	20	0	7032	99.6
Snowfall (cm)	1987	2006	20	0	7032	99.6
Precipitation (mm)	1987	2006	20	0	7032	99.6
Snow Depth at Month-end (cm)	1987	2006	20	2	208	97

Precipitation

	Begin Year	End Year	Total Number of Years	Missing Years	Total Count of Observations	% of Possible Observations
Extreme Daily Rainfall (mm)	1987	2006			7060	100
Extreme Daily Snowfall (cm)	1987	2006			7062	100
Extreme Daily Precipitation (mm)	1987	2006			7060	100
Extreme Snow Depth (cm)	1987	2006			6027	92.3

▶ Days with Maximum Temperature

▶ Days with Minimum Temperature

▶ Days with Rainfall

▶ Days With Snowfall

▶ Days with Precipitation

▶ Degree Days

▶ Frost-Free

Date modified:
2019-09-19

Government of Canada / Gouvernement du Canada

Daily Data Report for May 2018

HALIBURTON 3
ONTARIO
Current Station Operator: CCN

Latitude:	45°01'56.094" N	**Longitude:**	78°31'52.014" W	**Elevation:**	330.00 m
Climate ID:	6163171	**WMO ID:**		**TC ID:**	

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01 †	25.0	-3.5	10.8	7.2	0.0	0.0	0.0	0.0	0		
02 †	23.5	5.5	14.5	3.5	0.0	6.0	0.0	6.0	0		
03 †	15.0	7.5	11.3	6.7	0.0	4.0	0.0	4.0	0		
04 †	22.0	4.5	13.3	4.7	0.0	4.6	0.0	4.6	0		
05 †	22.0	6.5	14.3	3.7	0.0	0.0	0.0	0.0	0		
06 †	17.0	0.5	8.8	9.2	0.0	0.0	0.0	0.0	0		
07 †	16.5	-1.5	7.5	10.5	0.0	0.0	0.0	0.0	0		
08 †	22.5	-1.5	10.5	7.5	0.0	0.0	0.0	0.0	0		
09 †	25.5	2.5	14.0	4.0	0.0	13.6	0.0	13.6	0		
10 †	16.0	9.5	12.8	5.2	0.0	1.6	0.0	1.6	0		
11 †	12.5	-1.5	5.5	12.5	0.0	0.0	0.0	0.0	0		
12 †	18.5	-3.5	7.5	10.5	0.0	0.0	0.0	0.0	0		
13 †	22.0	0.0	11.0	7.0	0.0	0.0	0.0	0.0	0		
14 †	24.0	1.5	12.8	5.2	0.0	T	0.0	T	0		
15 †	20.0	13.5	16.8	1.2	0.0	T	0.0	T	0		
16 †	22.5	1.5	12.0	6.0	0.0	0.0	0.0	0.0	0		
17 †	20.5	5.5	13.0	5.0	0.0	0.0	0.0	0.0	0		
18 †	20.0	1.5	10.8	7.2	0.0	0.0	0.0	0.0	0		
19 †	14.0	7.5	10.8	7.2	0.0	14.2	0.0	14.2	0		
20 †	18.5	10.5	14.5	3.5	0.0	0.0	0.0	0.0	0		
21 †	24.5	0.5	12.5	5.5	0.0	T	0.0	T	0		
22 †	16.5	10.5	13.5	4.5	0.0	7.0	0.0	7.0	0		
23 †	24.0	8.5	16.3	1.7	0.0	0.0	0.0	0.0	0		
24 †	27.5	4.5	16.0	2.0	0.0	T	0.0	T	0		
25 †	27.5	8.5	18.0	0.0	0.0	T	0.0	T	0		
26 †	26.0	13.5	19.8	0.0	1.8	2.6	0.0	2.6	0		
27 †	26.5	14.5	20.5	0.0	2.5	0.0	0.0	0.0	0		
28 †	30.5	18.0	24.3	0.0	6.3	0.0	0.0	0.0	0		
29 †	27.0	13.5	20.3	0.0	2.3	0.0	0.0	0.0	0		
30 †	30.5	10.5	20.5	0.0	2.5	0.0	0.0	0.0	0		
31 †	27.5	19.0	23.3	0.0	5.3	25.8	0.0	25.8	0		
Sum				141.2	20.7	79.4	0.0	79.4			
Avg	22.1	6.1	14.1								
Xtrm	30.5	-3.5									

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
- C = Precipitation occurred, amount uncertain
- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
- N = Temperature missing but known to be > 0
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- T = Trace
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- [empty] = No data available
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Date modified:
2019-09-19

Government of Canada / Gouvernement du Canada

Daily Data Report for November 2018

HALIBURTON 3
ONTARIO
Current Station Operator: CCN

Latitude:	45°01'56.094" N	**Longitude:**	78°31'52.014" W	**Elevation:**	330.00 m
Climate ID:	6163171	**WMO ID:**		**TC ID:**	

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01 †	7.5	3.0	5.3	12.7	0.0	12.6	T	12.6	0		
02 †	4.5	1.5	3.0	15.0	0.0	4.4	T	4.4	0		
03 †	3.5	0.5	2.0	16.0	0.0	1.0	2.0	3.0	0		
04 †	6.5	-2.0	2.3	15.7	0.0	T	0.0	T	0		
05 †	9.0	2.0	5.5	12.5	0.0	5.0	0.0	5.0	0		
06 †	13.5	6.0	9.8	8.2	0.0	8.0	0.0	8.0	0		
07 †	7.5	3.5	5.5	12.5	0.0	3.2	0.0	3.2	0		
08 †	5.5	-0.5	2.5	15.5	0.0	4.4	T	4.4	0		
09 †	1.0	-2.5	-0.8	18.8	0.0	0.0	5.8	5.8	0		
10 †	-1.0	-4.0	-2.5	20.5	0.0	0.0	T	T	4		
11 †	0.0	-11.5	-5.8	23.8	0.0	0.0	1.6	1.6	4		
12 †	2.5	-2.5	0.0	18.0	0.0	0.0	2.8	2.8	4		
13 †	-0.5	-6.5	-3.5	21.5	0.0	0.0	1.6	1.6	4		
14 †	-9.5	-12.5	-11.0	29.0	0.0	0.0	0.0	0.0	5		
15 †	-3.5	-16.5	-10.0	28.0	0.0	0.0	12.0	12.0	5		
16 †	2.0	-6.0	-2.0	20.0	0.0	0.4	5.6	6.0	15		
17 †	1.0	-10.5	-4.8	22.8	0.0	0.0	T	T	18		
18 †	-1.0	-16.5	-8.8	26.8	0.0	0.0	T	T	17		
19 †	0.5	-4.5	-2.0	20.0	0.0	0.0	2.6	2.6	16		
20 †	-4.0	-9.5	-6.8	24.8	0.0	0.0	5.4	5.4	17		
21 †	-7.5	-17.0	-12.3	30.3	0.0	0.0	T	T	22		
22 †	-7.5	-25.0	-16.3	34.3	0.0	0.0	0.0	0.0	21		
23 †	-4.0	-25.5	-14.8	32.8	0.0	0.0	0.0	0.0	21		
24 †	3.5	-11.5	-4.0	22.0	0.0	3.0	0.0	3.0	20		
25 †	4.5	1.5	3.0	15.0	0.0	7.4	0.4	7.8	14		
26 †	2.0	0.0	1.0	17.0	0.0	6.6	5.4	12.0	7		
27 †	2.0	-2.0	0.0	18.0	0.0	T	5.8	5.8	10		
28 †	-1.0	-4.5	-2.8	20.8	0.0	0.0	T	T	13		
29 †	0.5	-2.5	-1.0	19.0	0.0	0.0	T	T	13		
30 †	1.5	-2.5	-0.5	18.5	0.0	0.0	T	T	12		
Sum				609.8	0.0	56.0	51.0	107.0			
Avg	1.3	-5.9	-2.3								
Xtrm	13.5	-25.5									

Summary, average and extreme values are based on the data above.

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Date modified:
2019-09-19

Government of Canada / Gouvernement du Canada

Daily Data Report for April 2019

HALIBURTON 3
ONTARIO
Current Station Operator: CCN

Latitude:	45°01'56.094" N	**Longitude:**	78°31'52.014" W	**Elevation:**	330.00 m
Climate ID:	6163171	**WMO ID:**		**TC ID:**	

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01 †	1.5	-15.0	-6.8	24.8	0.0	0.0	0.0	0.0	53		
02 †	5.0	-7.5	-1.3	19.3	0.0	0.0	0.0	0.0	52		
03 †	5.0	-1.0	2.0	16.0	0.0	0.0	0.0	0.0	48		
04 †	2.5	-7.5	-2.5	20.5	0.0	0.0	0.0	0.0	45		
05 †	3.5	-10.5	-3.5	21.5	0.0	0.2	0.4	0.6	43		
06 †	9.5	-0.5	4.5	13.5	0.0	0.0	0.0	0.0	39		
07 †	10.5	0.0	5.3	12.7	0.0	3.2	0.0	3.2	35		
08 †	4.5	3.5	4.0	14.0	0.0	6.4	0.0	6.4	31		
09 †	4.0	0.0	2.0	16.0	0.0	4.4	0.8	5.2	30		
10 †	3.5	-2.5	0.5	17.5	0.0	0.0	0.0	0.0	28		
11 †	4.5	-7.5	-1.5	19.5	0.0	I	0.0	I	27		
12 †	12.0	0.0	6.0	12.0	0.0	2.8	0.0	2.8	27		
13 †	10.0	-0.5	4.8	13.2	0.0	0.0	0.0	0.0	19		
14 †	1.5	-5.5	-2.0	20.0	0.0	8.4	4.8	13.2	15		
15 †	6.5	-0.5	3.0	15.0	0.0	0.0	I	I	17		
16 †	12.5	-6.5	3.0	15.0	0.0	0.0	0.0	0.0	14		
17 †	14.5	-6.5	4.0	14.0	0.0	13.4	0.0	13.4	5		
18 †	16.0	3.5	9.8	8.2	0.0	35.0	0.0	35.0	I		
19 †	5.0	3.0	4.0	14.0	0.0	13.2	I	13.2	I		
20 †	7.0	2.5	4.8	13.2	0.0	10.8	0.0	10.8	I		
21 †	13.0	3.5	8.3	9.7	0.0	0.0	0.0	0.0	0		
22 †	19.5	0.0	9.8	8.2	0.0	0.0	0.0	0.0	0		
23 †	15.5	5.5	10.5	7.5	0.0	7.0	0.0	7.0	0		
24 †	6.5	1.5	4.0	14.0	0.0	I	0.0	I	0		
25 †	17.5	-2.5	7.5	10.5	0.0	1.8	0.0	1.8	0		
26 †	12.5	6.5	9.5	8.5	0.0	23.8	4.6	28.4	0		
27 †	3.5	-1.5	1.0	17.0	0.0	0.0	1.0	1.0	3		
28 †	9.0	-1.5	3.8	14.2	0.0	0.0	0.0	0.0	I		
29 †	8.5	-6.5	1.0	17.0	0.0	0.0	0.0	0.0	0		
30 †	12.5	1.5	7.0	11.0	0.0	I	0.0	I	0		
Sum				437.5	0.0	130.4	11.6	142.0			
Avg	8.6	-1.8	3.4								
Xtrm	19.5	-15.0									

Summary, average and extreme values are based on the data above.

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- [empty] = No data available
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Date modified:
2019-09-19

Government of Canada / Gouvernement du Canada

Daily Data Report for November 2019

HALIBURTON 3
ONTARIO
Current Station Operator: CCN

Latitude:	45°01'56.094" N	**Longitude:**	78°31'52.014" W
Elevation:	330.00 m	**Climate ID:**	6163171
WMO ID:		**TC ID:**	

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
01 †	1.0	-1.5	-0.3	18.3	0.0	2.8	T	2.8	1		
02 †	3.0	-0.5	1.3	16.7	0.0	4.4	1.0	5.4	T		
03 †	3.5	-0.5	1.5	16.5	0.0	0.2	1.2	1.4	T		
04 †	7.0	-1.5	2.8	15.2	0.0	6.4	T	6.4	T		
05 †	7.5	0.0	3.8	14.2	0.0	0.6	4.4	5.0	0		
06 †	1.5	-3.0	-0.8	18.8	0.0	0.0	1.0	1.0	3		
07 †	0.5	-5.0	-2.3	20.3	0.0	0.0	T	T	2		
08 †	-0.5	-11.0	-5.8	23.8	0.0	0.0	T	T	2		
09 †	2.0	-9.5	-3.8	21.8	0.0	T	T	T	1		
10 †	2.5	-1.0	0.8	17.2	0.0	0.0	0.0	0.0	T		
11 †	-6.0	-8.5	-7.3	25.3	0.0	0.0	3.0	3.0	T		
12 †	-7.0	-14.0	-10.5	28.5	0.0	0.0	0.0	0.0	3		
13 †	-5.0	-21.5	-13.3	31.3	0.0	0.0	2.8	2.8	3		
14 †	-1.5	-9.5	-5.5	23.5	0.0	T	0.4	0.4	6		
15 †	1.0	-7.5	-3.3	21.3	0.0	T	T	T	6		
16 †	-3.0	-18.5	-10.8	28.8	0.0	0.0	0.0	0.0	5		
17 †	1.5	-16.5	-7.5	25.5	0.0	0.0	1.8	1.8	5		
18 †	1.5	-3.0	-0.8	18.8	0.0	0.0	11.4	11.4	7		
19 †	3.0	-3.0	0.0	18.0	0.0	0.0	0.0	0.0	18		
20 †	4.5	-1.5	1.5	16.5	0.0	0.0	0.0	0.0	13		
21 †	6.0	-6.5	-0.3	18.3	0.0	10.2	T	10.2	10		

DAY	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
22 †	1.0	-4.5	-1.8	19.8	0.0	0.0	1.0	1.0	6		
23 †	2.5	-7.5	-2.5	20.5	0.0	0.0	0.0	0.0	6		
24 †	1.0	-7.5	-3.3	21.3	0.0	0.0	T	T	6		
25 †	4.5	-4.5	0.0	18.0	0.0	0.0	0.0	0.0	6		
26 †	8.5	-2.0	3.3	14.7	0.0	3.4	0.0	3.4	5		
27 †	5.0	-4.0	0.5	17.5	0.0	19.4	T	19.4	T		
28 †	-1.5	-5.5	-3.5	21.5	0.0	0.0	T	T	T		
29 †	-2.5	-6.5	-4.5	22.5	0.0	0.0	0.0	0.0	T		
30 †	-3.0	-11.5	-7.3	25.3	0.0	0.0	0.0	0.0	T		
Sum				619.7	0.0	47.4	28.0	75.4			
Avg	1.3	-6.6	-2.7								
Xtrm	8.5	-21.5									

Summary, average and extreme values are based on the data above.

Legend

- A = Accumulated
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- E = Estimated
- F = Accumulated and estimated
- L = Precipitation may or may not have occurred
- M = Missing
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Date modified:
2019-10-22

Appendix C
Laboratory Certificates of Analysis

CADUCEON™ ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G78558 **REPORT No. B18-15054**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

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

DATE RECEIVED: 31-May-18
DATE REPORTED: 12-Jun-18
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Reid Road WDS
P.O. NUMBER: 7205-004
WATERWORKS NO.

			Client I.D.		SW1	SW2	QA/QC	
			Sample I.D.		B18-15054-1	B18-15054-2	B18-15054-3	
			Date Collected		29-May-18	29-May-18	29-May-18	
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	05-Jun-18/O	12	24	11	
Conductivity @25°C	µmho/cm	1	SM 2510B	05-Jun-18/O	30	54	30	
pH @25°C	pH Units		SM 4500H	05-Jun-18/O	6.78	7.09	6.82	
TDS (Calc. from Cond.)	mg/L	1	Calc.	07-Jun-18	15	27	15	
Total Suspended Solids	mg/L	3	SM2540D	31-May-18/K	< 3	5	< 3	
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	05-Jun-18/O	8.6	7.2	8.7	
BOD(5 day)	mg/L	2	SM 5210B	31-May-18/K	< 2	< 2	< 2	
COD	mg/L	5	SM 5220D	06-Jun-18/O	26	27	27	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	01-Jun-18/K	0.03	0.06	0.03	
Phenolics	mg/L	0.001	MOEE 3179	05-Jun-18/O	< 0.001	< 0.001	< 0.001	
Chloride	mg/L	0.5	SM4110C	01-Jun-18/O	< 0.5	< 0.5	< 0.5	
Sulphate	mg/L	1	SM4110C	01-Jun-18/O	< 1	2	< 1	
Nitrite (N)	mg/L	0.05	SM4110C	01-Jun-18/O	< 0.05	< 0.05	< 0.05	
Nitrate (N)	mg/L	0.05	SM4110C	01-Jun-18/O	< 0.05	0.07	0.07	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	04-Jun-18/K	0.4	4.9	0.4	
Mercury	mg/L	0.00002	SM 3112 B	07-Jun-18/O	< 0.00002	< 0.00002	< 0.00002	
Hardness (as CaCO3)	mg/L	1	SM 3120	11-Jun-18/O	14	26	14	
Aluminum	mg/L	0.01	SM 3120	11-Jun-18/O	0.14	0.09	0.14	
Arsenic	mg/L	0.0001	EPA 200.8	01-Jun-18/O	0.0002	0.0006	0.0007	
Barium	mg/L	0.001	SM 3120	11-Jun-18/O	0.099	0.112	0.103	
Boron	mg/L	0.005	SM 3120	11-Jun-18/O	< 0.005	< 0.005	< 0.005	
Cadmium	mg/L	).000015	EPA 200.8	01-Jun-18/O	0.000036	0.000034	0.000053	
Chromium	mg/L	0.001	EPA 200.8	01-Jun-18/O	< 0.001	< 0.001	< 0.001	
Copper	mg/L	0.0001	EPA 200.8	01-Jun-18/O	0.0006	0.0005	0.0006	
Iron	mg/L	0.005	SM 3120	11-Jun-18/O	0.202	0.187	0.205	
Lead	mg/L	0.00002	EPA 200.8	01-Jun-18/O	0.00034	0.00017	0.00034	
Manganese	mg/L	0.001	SM 3120	11-Jun-18/O	0.067	0.115	0.071	

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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G78558 **REPORT No. B18-15054**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

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

DATE RECEIVED: 31-May-18
DATE REPORTED: 12-Jun-18
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Reid Road WDS
P.O. NUMBER: 7205-004
WATERWORKS NO.

			Client I.D.		SW1	SW2	QA/QC	
			Sample I.D.		B18-15054-1	B18-15054-2	B18-15054-3	
			Date Collected		29-May-18	29-May-18	29-May-18	
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Phosphorus-Total	mg/L	0.01	E3199A.1	04-Jun-18/K	0.04	0.47	0.04	
Zinc	mg/L	0.005	SM 3120	11-Jun-18/O	0.010	0.012	< 0.005	

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CADUCEON ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G81658 **REPORT No. B18-35186**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

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

DATE RECEIVED: 14-Nov-18
DATE REPORTED: 22-Nov-18
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Reid Road WDS
P.O. NUMBER: 7205-004
WATERWORKS NO.

			Client I.D.		SW2	SW QA/QC	SW1	
			Sample I.D.		B18-35186-1	B18-35186-2	B18-35186-3	
			Date Collected		12-Nov-18	12-Nov-18	12-Nov-18	
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	15-Nov-18/O	11	10	7	
Conductivity @25°C	µmho/cm	1	SM 2510B	16-Nov-18/O	33	32	24	
pH @25°C	pH Units		SM 4500H	15-Nov-18/O	6.66	6.86	6.67	
TDS (Calc. from Cond.)	mg/L	1	Calc.	16-Nov-18	17	17	12	
Total Suspended Solids	mg/L	3	SM2540D	15-Nov-18/K	20	80	84	
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	15-Nov-18/O	7.3	8.2	7.9	
BOD(5 day)	mg/L	3	SM 5210B	15-Nov-18/K	6	6	4	
COD	mg/L	5	SM 5220D	16-Nov-18/O	18	24	12	
Phenolics	mg/L	0.002	MOEE 3179	16-Nov-18/K	< 0.002	< 0.002	0.003	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	16-Nov-18/K	0.04	0.03	0.03	
Chloride	mg/L	0.5	SM4110C	16-Nov-18/O	1.4	1.1	1.1	
Sulphate	mg/L	1	SM4110C	16-Nov-18/O	3	3	3	
Nitrite (N)	mg/L	0.05	SM4110C	16-Nov-18/O	< 0.05	< 0.05	< 0.05	
Nitrate (N)	mg/L	0.05	SM4110C	16-Nov-18/O	< 0.05	< 0.05	< 0.05	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	14-Nov-18/K	0.5	0.8	0.3	
Mercury	mg/L	0.00002	SM 3112 B	20-Nov-18/O	< 0.00002	< 0.00002	< 0.00002	
Hardness (as CaCO3)	mg/L	1	SM 3120	20-Nov-18/O	16	17	11	
Aluminum	mg/L	0.01	SM 3120	20-Nov-18/O	0.16	0.13	0.08	
Arsenic	mg/L	0.0001	EPA 200.8	16-Nov-18/O	0.0002	0.0002	< 0.0001	
Barium	mg/L	0.001	SM 3120	20-Nov-18/O	0.102	0.089	0.056	
Boron	mg/L	0.005	SM 3120	20-Nov-18/O	< 0.005	< 0.005	< 0.005	
Cadmium	mg/L	).000015	EPA 200.8	16-Nov-18/O	0.000201	0.000100	< 0.000015	
Chromium	mg/L	0.001	EPA 200.8	16-Nov-18/O	< 0.001	< 0.001	< 0.001	
Copper	mg/L	0.0001	EPA 200.8	16-Nov-18/O	0.0051	0.0049	0.0003	
Iron	mg/L	0.005	SM 3120	20-Nov-18/O	0.702	0.432	0.082	
Lead	mg/L	0.00002	EPA 200.8	16-Nov-18/O	0.00069	0.00044	0.00005	
Manganese	mg/L	0.001	SM 3120	20-Nov-18/O	1.39	0.834	0.004	

M. Dubien

Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G81658 **REPORT No. B18-35186**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

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

DATE RECEIVED: 14-Nov-18
DATE REPORTED: 22-Nov-18
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Reid Road WDS
P.O. NUMBER: 7205-004
WATERWORKS NO.

			Client I.D.		SW2	SW QA/QC	SW1	
			Sample I.D.		B18-35186-1	B18-35186-2	B18-35186-3	
			Date Collected		12-Nov-18	12-Nov-18	12-Nov-18	
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Phosphorus-Total	mg/L	0.01	E3199A.1	14-Nov-18/K	0.05	0.08	< 0.01	
Zinc	mg/L	0.005	SM 3120	20-Nov-18/O	0.029	0.033	< 0.005	

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Michelle Dubien
Lab Manager

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G77357 **REPORT No. B19-10223**

Report To:

Cambium Environmental
PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

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

DATE RECEIVED: 18-Apr-19
DATE REPORTED: 29-Apr-19
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Reid Road WDS
P.O. NUMBER: 8640-004
WATERWORKS NO.

			Client I.D.		SW2	SW QA/QC	SW1	
			Sample I.D.		B19-10223-1	B19-10223-2	B19-10223-3	
			Date Collected		16-Apr-19	16-Apr-19	16-Apr-19	
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	23-Apr-19/O	7	6	< 5	
Conductivity @25°C	µmho/cm	1	SM 2510B	23-Apr-19/O	26	25	20	
pH @25°C	pH Units		SM 4500H	23-Apr-19/O	6.86	6.54	6.35	
TDS (Calc. from Cond.)	mg/L	1	Calc.	24-Apr-19	13	13	10	
Total Suspended Solids	mg/L	3	SM2540D	24-Apr-19/K	< 3	< 3	< 3	
Dissolved Organic Carbon	mg/L	0.2	EPA 415.1	24-Apr-19/O	4.3	4.3	4.1	
BOD(5 day)	mg/L	3	SM 5210B	22-Apr-19/K	< 3	< 3	< 3	
COD	mg/L	5	SM 5220D	24-Apr-19/O	16	16	19	
Phenolics	mg/L	0.002	MOEE 3179	24-Apr-19/K	< 0.002	< 0.002	< 0.002	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	24-Apr-19/K	0.03	0.02	0.02	
Chloride	mg/L	0.5	SM4110C	25-Apr-19/O	0.6	0.5	0.5	
Sulphate	mg/L	1	SM4110C	25-Apr-19/O	3	3	3	
Nitrite (N)	mg/L	0.05	SM4110C	25-Apr-19/O	< 0.05	< 0.05	< 0.05	
Nitrate (N)	mg/L	0.05	SM4110C	25-Apr-19/O	< 0.05	< 0.05	< 0.05	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	23-Apr-19/K	0.2	0.2	0.2	
Mercury	mg/L	0.00002	SM 3112 B	24-Apr-19/O	< 0.00002	< 0.00002	< 0.00002	
Hardness (as CaCO3)	mg/L	1	SM 3120	24-Apr-19/O	5	5	4	
Aluminum	mg/L	0.01	SM 3120	24-Apr-19/O	0.06	0.06	0.06	
Arsenic	mg/L	0.0001	EPA 200.8	24-Apr-19/O	< 0.0001	< 0.0001	< 0.0001	
Barium	mg/L	0.001	SM 3120	24-Apr-19/O	0.038	0.039	0.036	
Boron	mg/L	0.005	SM 3120	24-Apr-19/O	< 0.005	< 0.005	< 0.005	
Cadmium	mg/L	).000015	EPA 200.8	24-Apr-19/O	< 0.000015	< 0.000015	< 0.000015	
Chromium	mg/L	0.001	EPA 200.8	24-Apr-19/O	< 0.001	< 0.001	< 0.001	
Copper	mg/L	0.0001	EPA 200.8	24-Apr-19/O	0.0003	0.0003	0.0003	
Iron	mg/L	0.005	SM 3120	24-Apr-19/O	0.081	0.084	0.089	
Lead	mg/L	0.00002	EPA 200.8	24-Apr-19/O	0.00003	0.00006	0.00004	
Manganese	mg/L	0.001	SM 3120	24-Apr-19/O	0.022	0.023	0.012	

Michelle Dubien
Lab Manager

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Report To:

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PO Box 325, 52 Hunter Street East
Peterborough ON K9H 1G5 Canada
Attention: Stephanie Reeder

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Tel: 613-544-2001
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DATE RECEIVED: 18-Apr-19
DATE REPORTED: 29-Apr-19
SAMPLE MATRIX: Surface Water

JOB/PROJECT NO.: Reid Road WDS
P.O. NUMBER: 8640-004
WATERWORKS NO.

			Client I.D.		SW2	SW QA/QC	SW1	
			Sample I.D.		B19-10223-1	B19-10223-2	B19-10223-3	
			Date Collected		16-Apr-19	16-Apr-19	16-Apr-19	
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Phosphorus-Total	mg/L	0.01	E3199A.1	23-Apr-19/K	< 0.01	0.23	0.23	
Zinc	mg/L	0.005	SM 3120	24-Apr-19/O	0.007	0.009	0.012	

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Michelle Dubien
Lab Manager

Appendix D
Photographs

Photograph 1: Surface water monitoring station SW1, May 2018

Photograph 2: Surface water monitoring station SW1, November 2018

Photograph 3: Surface water monitoring station SW1, April 2019

Photograph 4: Frozen - Surface water monitoring station SW1, November 2019

Photograph 5: Surface water monitoring station SW2, May 2018

Photograph 6: Surface water monitoring station SW2, November 2018

Photograph 7: Surface water monitoring station SW2, April 2019

Photograph 8: Frozen - Surface water monitoring station SW2, November 2019