2024 Annual Development, Operations, and Monitoring Report
Violet Waste Disposal Site

Prepared for The Corporation of Loyalist Township

April 2025
File: 286-256.00

MALROZ

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

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

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

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

Monitoring Report and Site Information	
Waste Disposal Site Name	Violet Waste Disposal Site
Location (e.g. street address, lot, concession)	Parts of Lots 13 and 14, Concession 4 and 5, Former Township of Ernestown
GPS Location (taken within the property boundary at front gate/ front entry)	355748E 4902190N NAD 83 Zone 18
Municipality	Loyalist Township
Client and/or Site Owner	The Corporation of Loyalist Township
Monitoring Period (Year)	2024
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	A370802 (Certificate of Approval)
Director's Order No.:	N/A
Provincial Officer's Order No.:	N/A
Other:	N/A

Report Submission Frequency	◉ **Annual** ○ **Other**	Specify: Submitted by April 30 of the year following the calendar year covered by the report.	
The site is: **(Operation Status)**	◉ **Open** ○ **Inactive** ○ **Closed**		
Does your Site have a Total Approved Capacity?	◉ **Yes** ○ **No**		
If yes, please specify Total Approved Capacity	958430	*Units*	Cubic Metres
Does your Site have a Maximum Approved Fill Rate?	○ **Yes** ◉ **No**		
If yes, please specify Maximum Approved Fill Rate	N/A	*Units*	
Total Waste Received within Monitoring Period (Year)	5,031	*Units*	Cubic Metres
Total Waste Received within Monitoring Period (Year) *Methodology*	surveyed using a Trimble R10 GNSS		
Estimated Remaining Capacity	158,410	*Units*	Cubic Metres
Estimated Remaining Capacity *Methodology*	difference between annual surveys and approved total capacity		
Estimated Remaining Capacity *Date Last Determined*	January 2025		
Non-Hazardous Approved Waste Types	☒ Domestic ☐ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☐ Tires	☐ Contaminated Soil ☐ Wood Waste ☐ Blue Box Material ☐ Processed Organics ☐ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other: Domestic and Non-hazardous solid industrial waste (per ECA)
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*			
Year Site Opened *(enter the Calendar Year only)*	unknown	**Current ECA Issue Date**	January 17, 2008
Is your Site required to submit Financial Assurance?	○ **Yes** ◉ **No**		
Describe how your Landfill is designed.	◉ Natural Attenuation only ○ Fully engineered Facility ○ Partially engineered Facility		
Does your Site have an approved Contaminant Attenuation Zone?	○ **Yes** ◉ **No**		

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

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

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

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

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
MW-ERN-101	insufficient water to sample	May 23 and August 21, 2024

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

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

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.
I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed, as deemed appropriate for this Site in my professional judgement, the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analyzed to ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories, or as amended from time to time by the ministry.

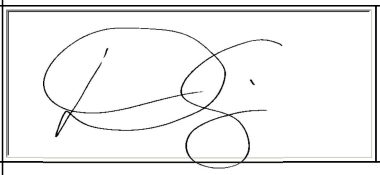
The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MECP to undertake a complete review the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. The Checklist should in no way supersede the MECP's responsibility to undertake their complete review of our report(s) to ensure Site compliance with environmental regulations, standards and/or approvals.If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

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

◉ **No changes to the monitoring program are recommended**	See report for discussion.
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No Changes to site design and operation are recommended**	See report for discussion.
○ **The following change(s) to the site design and operation is/ are recommended:**	

Name:	David Carnegie, M.Sc., P.Eng.		
Seal:	Add Image		
Signature:		**Date:**	April 30, 2025
CEP Contact Information:	David Carnegie, M.Sc., P.Eng.		
Company:	Malroz Engineering Inc.		
Address:	308 Wellington St., 2nd Floor, Kingston ON		
Telephone No.:	613-548-3446 ext. 27	Fax No. :	Type Here
E-mail Address:	carnegie@malroz.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

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

Name (s)	Wilton Creek
Distance(s)	Along Western property boundary

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

Sampling and Monitoring Program Status:

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

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

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

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

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

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

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Refer to Table 6 in Report	PWQO	Trigger mechanism not activated, see report for discussion.
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	◉ **Yes** ○ **No**	See report for discussion.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	◉ **Yes** ◯ **No**	If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range (Type Here) See report for discussion. Surface water parameters generally fall within the historic range of results.
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	◉ Yes ◯ No ◯ Not Known ◯ Not Applicable	If yes, provide details and whether remedial measures are necessary (Type Here): See report for discussion. Remedial measures were not indicated by the trigger mechanism.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	◯ **Yes** ◉ **No** ◯ **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.
I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed, as deemed appropriate for this Site in my professional judgement, the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MECP, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories, or as amended from time to time by the ministry.
The completion of this Checklist is a requirement of the MECP. As always, we rely upon the MOE to undertake a complete review the report(s) provided regarding the waste disposal site/landfill, and provide their comments and acceptance of our interpretation, conclusions and recommendations. This Checklist should in no way supersede the MECP responsibility to undertake their complete review of our report(s) to ensure compliance with environmental regulations, standards and approvals.
If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

Select Date

Recommendations:

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

◉ **No Changes to the monitoring program are recommended** ○ **The following change(s) to the monitoring program is/are recommended:**	Type Here
◉ **No changes to the site design and operation are recommended** ○ **The following change(s) to the site design and operation is/are recommended:**	Type Here

CEP Signature	
Relevant Discipline	Engineer with relevant experience and training.
Date:	April 30, 2025
CEP Contact Information:	David Carnegie, M.Sc., P.Eng.
Company:	Malroz Engineering Inc.
Address:	308 Wellington St., 2nd Floor, Kingston ON
Telephone No.:	613-548-3446 ext. 27
Fax No. :	Type Here
E-mail Address:	carnegie@malroz.com

Save As		Print Form

Notice to Reader

This document has been prepared by Malroz Engineering Inc. (Malroz) on behalf of the Loyalist Township in fulfilment of Conditions 5, 6 and 7 of Provisional Certificate of Approval (C of A) No. 370802 as amended in 2008 for the Violet Landfill (the Site).

Malroz has prepared this report using information understood to be factual and correct and assumes no responsibility for the accuracy of information provided by others.

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

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

Respectfully Submitted,

Malroz Engineering Inc.

per: Ryan Fox, P.Eng.
Environmental Engineer

and: David Carnegie, M.Sc., P.Eng.
Project Manager

Table of Contents

Figures

Tables

Appendices

1.0 Introduction

Malroz Engineering Inc. (Malroz) was retained by Loyalist Township (the Township) to assist the municipality in fulfilling the annual monitoring and reporting requirements of Provisional Certificate of Approval (C of A) No. A370802 for the Violet Waste Disposal Site (WDS). The components of the required program include: annual monitoring of surface water and groundwater quality; measurement of landfill gas; and, monitoring the development and operations (D&O) of the WDS. A copy of the current Certificate of Approval for the WDS is provided in Appendix A of this report.

1.1 Purpose of Report

This 2024 report fulfills the annual reporting requirement for the Violet WDS. The report addresses:

- delineation of the existing limits of the fill area of the WDS;
- quantity of wastes received and deposited on to the WDS;
- remaining WDS capacity;
- conformance with the D&O plan;
- operational problems encountered and/or complaints received and remedial actions taken;
- the status of monitoring wells and their conformance with O. Reg. 903/90;
- groundwater and surface water monitoring and sampling, at locations predetermined by the C of A (see Appendix A) and later revised in accordance with MECP correspondence;
- monitoring program results, data interpretation, and recommendations; and
- waste deposit locations for the next 12-month period.

2.0 Background

The WDS has been in operation since approximately 1971 and operates under C of A No. A370802. Historical documents that have been referenced in preparation of this report have included the 1996 through 2023 Annual Reports prepared by Malroz or others (e.g. AECOM, Hydroterra), and the Development and Operations Plan prepared by Totten Sims and Hubicki Associates (1992).

According to previous reports, exceedances of the MECP Guideline B-7 (formerly Reasonable Use Policy) have not been previously detected at the WDS. The 2023 annual report for the WDS (Malroz, 2024), estimated that the WDS had capacity to service the residents of Loyalist Township for 20 to 30 years based on the maximum and average historic fill rates, respectively.

The geologic and hydrogeological setting of the area has been detailed in studies conducted by others from the 1970s through to the 1990s. The subsections which follow summarize the site, geologic and hydrogeologic settings of the WDS and surroundings.

2.1 Site Setting

The WDS is located on Parts of Lots 13 and 14, Concession 4 and 5 in Loyalist Township (former Township of Ernestown), approximately 1 km south of Violet and approximately 8 km southwest of Odessa (see Figure 1, Appendix B). The WDS totals an area of approximately 23.2 ha, including 8 ha of buffer area acquired in 1991 and 1994 (see Figure 1, Appendix B).

Surrounding land use is undeveloped woodlands and agricultural lands to the west, agricultural lands to the south, a cemetery and fallow agricultural lands to the north and residential and agricultural land use to the east. An active gravel pit is located approximately 200 meters south of the property.

Residential properties in the surrounding areas are not municipally serviced and operate on private wells and septic systems with the closest private water supply well located approximately 30 m east of the Site on the east side of Violet Road. The closest surface water body is Wilton Creek which abuts the west WDS property boundary.

The WDS is bordered by a fence along the north and east sides, Wilton Creek to the west, and undeveloped land to the south. The site layout and area approved for waste disposal are shown on Figure 1, Appendix B.

2.2 Geologic Setting

The geologic setting has been described by Hydroterra as:

> "Within the landfill property, silty till underlies the easterly two-thirds of the site, and glaciofluvial sand/gravel underlies the westerly one-third of the site bordering Wilton Creek. These overburden deposits directly mantle the Paleozoic limestone bedrock and vary in thickness from four metres at Violet Road to about 12 metres within the bedrock valley beneath the creek."[1]

A cross section and borehole logs from previous investigations are provided in Appendix C.

2.3 Hydrogeological Setting

The hydrogeological setting has been described by Hydroterra as follows:

> "The potentiometric surface slopes northwestward beneath the landfill toward Wilton Creek. Adjacent to the creek, upward groundwater gradients are exhibited by the flowing conditions within the bedrock monitors."[1]

> "Refuse-generated leachate percolates downward through the landfill to the underlying bedrock aquifer, and then moves in a direction normal to the equipotential contours toward discharge at Wilton Creek. The leachate plume should be confined within the Wilton Creek corridor, considering that groundwater

---

Township of Ernestown Violet Landfill A370802 1996 Annual Monitoring Report, prepared by Hydroterra Ltd., April 1997.

> movement along the west bank is toward the creek and that the thick granular-filled bedrock valley extends beneath the watercourse."[1]
>
> "At an estimated annual recharge of 100 mm within the upgradient till plain and 450 mm within the refuse, the groundwater/leachate flux beneath the landfill may average about 180 m^3/day (or about 0.002 m^3/sec) to the receiving watercourse."[1]

Hydroterra explains that Wilton Creek flow is continuously monitored by Cataraqui Region Conservation Authority at Morven, about 4 kilometers downstream of the landfill. To provide the reader with an appreciation for the seasonal Wilton Creek surface water flow, the following monitoring data at the Morven station were presented:

May 15, 1996	3.75 m^3/sec (324,000 m^3/day)
October 11, 1996	0.98 m^3/sec (85,000 m^3/day)
January 10, 1997	4.12 m^3/sec (356,000 m^3/day)

Hydroterra discussed the application of the MECP Reasonable Use Guideline B-7 and concluded that the guideline was not applicable at the Violet Landfill site because the municipality owns the land between the landfill and creek, and the landfill leachate should discharge entirely to the creek.

3.0 MECP Correspondence

Malroz is not aware of any MECP correspondence regarding the 2023 annual report or WDS operations in 2024.

4.0 Report on Development and Operations Plan

The subsections which follow summarize development and operations activities associated with the WDS.

4.1 Service Area and Population

The Violet WDS receives household waste from the former Township of Ernestown and the Village of Bath. The service population for the WDS has historically been approximately 97% of the population of Loyalist Township. It is expected that the remaining 3% of the population is serviced by the Amherst Island WDS. In 2021 (most recent census) the population of Loyalist Township was reported to be 17,943[2]. The reported population during the previous census (2016) was 16,971. The population serviced by the WDS in 2024 was estimated by Loyalist Township to be approximately 17,493.

4.2 Site Access

The Violet WDS is accessed from Violet Road, approximately 1 km south of the Village of Violet. Access to the site is controlled by a locked gate and restricted to posted times.

4.3 Phasing of Site Usage

The WDS was initially approved for waste disposal on 7.0 ha, however, this area was overrun at its southern and eastern edges and deposited waste covers approximately

[2] 2021 Census Profile, Loyalist Township, Ontario. Statistics Canada.

7.79 ha. This overrun was acknowledged in the 1994 C of A, and has been compensated by a reduction in the amount of waste to be placed over the remainder of the WDS. Further discussion of site capacity is provided in Section 4.7.

Previous reports for the WDS identify three phases of waste distribution and contours depicting the final shape/elevation of the waste mound (see Figure 2, Appendix B). Active filling continued in Phase 1 and a portion of Phase 2, in the southwest-south portion of the WDS (Figure 1, Appendix B).

Areas that have exceeded their final contours are presented in Figure 3 (see Appendix B) and include lateral exceedances of the licensed fill area to the east and south which have been considered in the 1992 D&O plan, and by prior amendment to the C of A. Waste in Phase 1 has vertically exceeded the proposed interim fill height of 120 masl[3], in the centre of the landfill, but remains below the maximum planned elevation of 126 masl for Phase 3. We note that topographic contours of the waste within the eastern portion of Phase 1 and southwestern portion of the active fill area also exceed the vertical limits of the proposed final contours identified in the D&O plan (see Figure 3, Appendix B). It is our understanding that the fill pile will continue to be shaped to meet the proposed final contours as filling progresses (i.e. material exceeding vertical limits will be redistributed within the licensed fill area).

4.4 Site Operation

The Violet WDS continues to be a relatively well-operated facility. During 2024, operation of the site remained in general compliance with its Certificate of Approval and D&O Plan[3]. Minor exceptions related to the vertical distribution of fill in isolated areas are discussed in Section 4.3.

Approximately 12,875 tonnes of ditching materials, gravel from shoulder restoration, and excess soils generated during regular Township operations are stockpiled to the west of the active fill area for use as future interim cover material, to advance a berm along the toe of the active fill area, and for on-site road building/maintenance. Cover material is also stockpiled within a soil berm located along the east edge of the landfill. Waste is periodically levelled and covered, with interim cover applied at a waste-to-cover ratio of approximately 4:1.

Weekly ‘curb-side’ household waste collection comprises the primary source of material deposited at the WDS, with a comparatively small amount of waste brought to the WDS by residents throughout the year. Curb-side waste collection of yard/brush waste is completed twice per year. The WDS receives white goods, metals, e-waste, scrap metal and tires for transfer to registered recyclers and end-use processors. The WDS also accepts waste from municipal operations and non-hazardous waste from industrial, commercial, and institutional (ICI) users. Curbside collection of recyclables is contracted to Waste Connections Inc. The Township’s waste management and recycling information, presented on the Township’s website, is provided in Appendix D.

The Township uses a weigh scale to measure and record the amount of incoming waste at the WDS. An attendant was present during operating hours to direct the deposition of

[3] Totten, Sims and Hubicki Associates, 1992, Development and Operation Plan for the Violet Landfill Site.

waste. The areas of active waste placement in 2024 and proposed for 2025 are presented in Figure 1, Appendix B. Interim cover has been placed on fill areas outside of the active fill and staging areas. Intermediate cover was placed on completed portions of Phase 1 in 2019 and 2020, as previously described (Malroz, 2021). Capacity remains within the Phase 1 area, and this area will continue to be filled in 2025 as indicated in Figure 1.

Selective removal of trees and brush was completed within the licensed area of the Site in 2024 to improve access to the Phase 1 cell nearest the cemetery (see Figure 1, Appendix B). Additional work is planned along the perimeter of the licensed fill area in 2025 to facilitate ongoing maintenance and monitoring of the WDS.

An on-site fuel tank (used to refuel site equipment) was inspected in 2024, and results of the inspection indicate that the tank will require replacement within the next five years. The tank is tentatively scheduled for replacement in 2025.

No operational concerns were reported at the WDS. There were no public complaints concerning adverse impacts from the WDS. Township staff reported that no waste was refused from non-Township residents in 2024.

4.5 Record Keeping

Daily records of waste materials received at the site were maintained and summarized weekly. An annual summary of the records is provided below.

Year	Curbside Residential Waste (tonnes)	Residential Waste Collected at the WDS (tonnes)	ICI Waste Collected at the WDS (tonnes)	Waste from Loyalist Township Facilities (tonnes)	Tires (#)	Brush Collection (tonnes)	Leaf and Yard Waste (tonnes)	Cover (tonnes)
2017	2078.45	87.88	322.87	119.44	13	65.76	127.31	280.13
2018	2125.59	66.02	120.12	61.12	0.20 (tonne)	60.83	178.83	344.46
2019	2179.38	183.27	425.18	131.70	10	19.18	155.15	628
2020	2515.03	417.25	334.25	120.16	0.6 (tonne)	2.01	258.29	1671.39
2021	2530.65	222.63	366.63	146.13	0.25 (tonne)	100.66	174.70	2720.80
2022	2497.47	201.03	391.70	129.22	0	29.06	195.61	1266.67
2023	2396.95	69.33	263.51	113.74	0	152.11	174.64	844.48
2024	2237.40	52.21	297.38	123.17	0.27 (tonne)	8.99	167.80	1093.13

Notes: Residential waste includes waste collected at the landfill and Earth Day collection. Input: RF
Cover includes ditching material and street sweeping waste. Checked: ZL
ICI includes roadside, municipal and commercial sites, bus shelters, parks, fire department, and utilities.
Data prior to 2017 not provided.

A comparison of the attendant records from 2024 and historic data indicates that the amount of total waste received at the WDS was generally lower than 2023. This included decreases in the amounts of residential waste from the curbside pickup, residential waste collected at the WDS, brush collection, and leaf and yard waste. The amount of cover material used (approximately 1093 tonnes) in 2024 was higher than that reportedly used (approximately 844 tonnes) in 2023.

4.6 Waste Diversion

A summary of waste diverted from the Violet WDS in 2024 is provided below. Quantities of blue box materials, scrap metal, e-waste, tires, and mattresses diverted from the WDS are generally consistent with previously reported years. Blue box materials and scrap metal reported the lowest amounts since 2017.

Year	Blue Box Materials (tonnes)	Scrap Metal (tonnes)	E-Waste (tonnes)	Tires (tonnes)	Mattresses (tonnes)
2017	1077	51.44	6.85	-	-
2018	1086	45.52	7.43	-	-
2019	1032.5	46.15	7.64	-	-
2020	1063.0	61.95	12.02	6.03	5.66
2021	1048.38	42.44	7.47	0.74	-
2022	1030.55	50.40	19.40	11.25	-
2023	962.85	24.28	9.00	9.92	7.59
2024	975.20	27.45	0.00	22.82	12.83

Notes: Data prior to 2017 not provided. Input: RF
Scrap metal includes white goods. Checked: ZL

It is understood that collection and reporting of blue box materials will transition from the responsibility of the Township in 2025 due to the forthcoming Province-wide implementation of a producer responsibility model for waste diversion.

4.7 Remaining Site Capacity and Financial Reporting

Historic fill rates and average annual usage were presented in the 2016 Annual Report prepared by AECOM. AECOM reported that 2,634 tonnes of waste were deposited at the WDS in 2016 and that since 2008, the WDS has used an average of 5,501 m^3 of capacity per year. AECOM reported that 203,366 m^3 of capacity remained at the WDS based on the results of the 2016 landfill capacity survey. Subsequent surveys and capacity calculations by Malroz have been based on these volume calculations.

Malroz conducted a survey of the active fill area in 2024 using a Trimble R10 GNSS system. Deposited volumes are subject to inherent errors associated with surveying uneven surfaces such as waste faces; therefore, reported volumes are approximate in nature. The survey indicates that approximately 5,031 m^3 of waste and cover were placed at the site in 2024. This rate of fill is lower than the average fill rate (5,501 m^3) during the 2008 to 2024 period, but within the historical range of reported fill rates.

The remaining waste capacity of the Violet WDS was previously reported to be 165,065 m^3 (Malroz, 2024). Based on the results of the 2024 survey, the site has approximately 158,410 m^3 of capacity remaining. Using the estimated remaining capacity of 158,410 m^3 and the average fill rate for the 2008 to 2024 period, the anticipated lifespan of the

WDS is an estimated 29 years. The minimum lifespan is estimated to be 19 years based on the remaining capacity and the maximum historic fill rate. A summary of annually reported waste generation, volume, and calculated compaction rates is provided below.

Year	Waste Generation (tonnes)	Fill Volume from Survey (m^3)	Compaction Rate[1] (kg/m^3)
2008	3,009	8,190	459
2009	2,961	5,950	622
2010	2,688	4,505	746
2011	2,587	5,710	566
2012	2,971	4,570	813
2013	3,132	4,600	753
2014	2,724	4,600	831
2015	2,775	4,925	704
2016	2,634	5,509	598
2017	2,609[2]	5,760.5*	566
2018	2,362[2]	5,760.5*	513
2019	2,920	4,994	731
2020	3,387	4,748	891
2021	3,266	7,652	533
2022	3,219	5,074	805
2023	2,844	5,935	599
2024	2,710	5,031	673
	Average	5,501	676

Notes:

Input: RF

Checked: ZL

*quantities assumed to be half of the volume measured between 2016 and 2018.

Data between 2008 and 2016 based on information provided by AECOM in the 2016 D&O Report (AECOM, 2017).

[1] Annual compaction rates are calculated using a waste-to-cover ratio of 4:1.

[2] Corrected to exclude daily cover material.

It is our understanding that Loyalist Township is required to report certain data regarding the Violet WDS in its annual financial statements. The requested information is provided below.

Item	Estimated Values as of 2024
Total Site Area (ha)	23.2
Approved Area of Waste Disposal (ha)	7
Current Area of Waste Disposal (ha)	7.79 [3]
Total Site Capacity Including Final Cover (m^3)	958,430
Allowance for Final Cover (m^3)	58,430
Total Site Capacity (m^3)	900,000
Capacity Used to Date (m^3)	741,590
Remaining Capacity for Waste Disposal (m^3)	158,410
Minimum Lifespan [1]	19
Anticipated Lifespan [2]	29
Estimated Closure Cost (2025 Dollars)	$3,770,815
Estimated Post closure Monitoring Cost (2025 Dollars)	$19,500
Estimated Post Closure Annual Maintenance (2025 Dollars)	$1,600

Closure, monitoring, and maintenance costs based on estimates provided in an email to Thomas Bertin dated March 14, 2025.

Input: RF
Checked: ZL

[1] minimum lifespan based on remaining capacity and maximum historic fill rate observed.

[2] anticipated lifespan based on remaining capacity and average fill rate since 2008.

[3] includes area of waste deposited outside of the licensed fill area recognized by 1992 D&O and 1994 C of A.

A summary of estimated closure costs updated waste quantities and anticipated life span was provided in a March 14, 2025 email to Township staff. These costs are based on a number of assumptions and limitations which are described in the aforementioned transmittal. A full review of closure costs should be conducted at least 10 years prior to closure and include obtaining quotes for services and materials required for closure to refine the closure costs estimate.

5.0 Groundwater Monitoring and Sampling

The C of A requires the collection of groundwater samples in the spring and fall. Hydroterra recommended groundwater sampling during maximum runoff events (May) and during critical low flow events (August). A summary of the 2024 groundwater monitoring and sampling program is provided in the subsections which follow. The groundwater monitoring program is outlined in Table 1, Appendix E.

5.1 Well Condition

The C of A requires a report on the status of monitoring wells at the WDS and a statement regarding their compliance with O. Reg. 903/90. Monitoring wells continued to be maintained in good condition, in accordance with O. Reg. 903/90.

5.2 Groundwater Monitoring and Sampling Scope

The 2024 groundwater monitoring and sampling program was completed on May 23 (spring) and August 21 (summer). The groundwater program was completed as specified in the C of A and the 1992 Totten Sims Hubicki's Development and Operations Plan (as revised from time to time with the concurrence of the MECP), with the following variations:

- groundwater samples collected for metal analyses were field filtered,
- the suite of analyses was changed to Schedule 5, Column 2 of the Landfill Standards[3],
- samples could not be collected from MW-ERN-101 during the May and August sampling events due to dry conditions, and
- samples were collected from MW-ERN-104(1) and MW-ERN-106(2) for VOC analyses on August 21, 2024.

Monitoring well locations are plotted in Figure 1, Appendix B.

5.3 Methane Monitoring Results

Methane gas headspace vapours were calculated in monitoring wells during each sampling event using measurements from a combustible gas indicator equipped with a methane elimination switch. Methane concentrations were calculated as the difference in concentration between full gas response and methane elimination response.

Methane concentrations are summarized in Table 2, Appendix E. Methane concentrations were generally reported as no measurable response or less than 1% of the lower explosive limit (LEL) in the monitoring wells during each event, with the following exceptions:

- Methane concentrations at MW-ERN-112 were detected at >100% of the lower explosive limit (LEL) during the May and August monitoring events.

- Methane concentrations at MW-ERN-006 were detected at 6% of the LEL during the May monitoring event. No measurable concentration of methane was reported during the August monitoring event.

Monitoring well MW-ERN-112 is screened in sand beneath historic fill within the licensed area of the landfill. Methane concentrations at this well have generally varied between <1% and >100% LEL. Monitoring well MW-ERN-006 is screened in sand northwest of the fill area. Methane concentrations at this well have generally varied between <1% and >100% LEL.

Elevated methane concentrations are a byproduct of anaerobic decomposition of organic compounds (in this case anticipated to be waste, but in other locations this may be associated with naturally occurring organic matter). Caution should be exercised when undertaking work within the former and active fill areas as methane gas may accumulate in the soil. Concentrations approaching/or in excess of 100% LEL indicate that explosive conditions may be encountered; however, we note that these readings are measured from a piezometer which has limited air exchange and is screened several metres below ground surface. Malroz did not identify measurable methane concentrations in the ambient air.

5.4 Groundwater Flow Direction

Depth to groundwater measurements were collected from the monitoring wells during the May and August 2024 groundwater sampling events. Groundwater elevations were

calculated using depth to water measurements and survey data previously provided by AECOM[4]. Groundwater monitoring results are generally consistent with previous years.

Shallow groundwater flow within the overburden across the WDS is inferred to flow predominantly west towards Wilton Creek (see Figure 4, Appendix B). Artesian conditions were reported at bedrock monitoring wells MW-ERN-003 and MW-ERN-005, consistent with the conceptual understanding that Wilton Creek is within an area of groundwater discharge.

5.5 Groundwater Chemistry

The visual clarity of groundwater samples was variable and generally consistent with the reported range of observations in previous years. A sulphur-like odour was noted at eight of the twelve monitoring wells on at least one occasion in 2024 (see Table 2, Appendix E); these observations are generally consistent with previously reported observations.

Based on our conceptual understanding of the Site, the groundwater beneath the landfill is expected to discharge to Wilton Creek and is not utilized as a source of drinking water. As such, the surface water monitoring program plays an integral role in evaluating leachate impacts leaving the site.

5.5.1 Overburden Groundwater Chemistry

Overburden groundwater chemistry was assessed at monitoring wells MW-ERN-101, MW-ERN-102, MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-109, MW-ERN-110, and MW-ERN-112.

The landfill has two background overburden monitoring well locations (MW-ERN-101 and MW-ERN-102). Monitoring well MW-ERN-101 was dry during the May and August sampling events and was not sampled in 2024.

A summary of analytical results for groundwater is presented in Table 3, Appendix E.

Exceedances of the ODWS[5], objectives, or guidelines[6] in the overburden wells are as follows:

Parameter	May 23, 2024	August 21, 2024
alkalinity	MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-110, MW-ERN-112	MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-112
chloride	MW-ERN-112	none

[4] *1997 Annual Report, Loyalist Township, Violet Landfill Site Certificate of Approval No. A370802*, prepared by Totten Sims Hubicki Associates, May 1998.

[5] O. Reg. 169/03 as amended 2018.

[6] Ontario Ministry of the Environment (2006). *Technical support document for Ontario drinking water standards, objectives and guidelines.*

DOC	MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-110, MW-ERN-112	MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-112
hardness	all sampled overburden wells	all sampled overburden wells
iron	MW-ERN-104(1), MW-ERN-106(2), MW-ERN-112	MW-ERN-106(2)
sodium	MW-ERN-112	none
TDS	MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-110, MW-ERN-112	MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-110, MW-ERN-112
Temperature (field)	MW-ERN-006	none

Background groundwater is characterized by concentrations of hardness which exceed the Ontario drinking water operational guideline. Alkalinity is classified as an operational guideline related to drinking water systems. Chloride, DOC, TDS, iron, sodium and temperature are classified as aesthetic objectives related to drinking water systems. These operational and aesthetic parameters are not considered direct health risks by the MECP.

A statistical summary of historic groundwater chemistry is presented in Table 4, Appendix E. Based on historic data collected at the Site from the background (MW-ERN-102) and leachate (MW-ERN-112) groundwater monitoring wells, Malroz determined that leachate at the Site may be characterized and tracked using site-specific leachate indicators including ammonia, boron, conductivity, and iron in groundwater.

Concentrations of the leachate indicators were generally elevated at MW-ERN-112 compared to background which is expected given that MW-ERN-112 is screened in sand beneath historic fill within the licensed area of the landfill. Groundwater chemistry at MW-ERN-112 remains generally consistent with previous results and continues to provide reasonable characterization of the site-specific leachate. Concentrations of iron at MW-112 were significantly lower (i.e., by an order of magnitude or more) than previous results, each of which were below the previously reported historically low concentration of iron.

Consistent with past results, overburden monitoring wells inferred to be downgradient of the landfill including MW-ERN-104(1), MW-ERN-105(2) and MW-ERN-106(2) reported elevated concentrations of the site-specific leachate indicators relative to the background well (MW-ERN-102). Concentrations of leachate indicators in these wells were generally lower than those detected in MW-ERN-112, indicating some attenuation of the leachate; with the exception of iron at MW-ERN-106(1) in fall 2024 which was within the historic range of results but reported a higher concentration of iron than at MW-ERN-112 during the August sampling event.

Concentrations of leachate indicators in monitoring wells inferred to be cross-gradient of the landfill (MW-ERN-109 and MW-ERN-110) were generally slightly higher relative to

background concentrations; however, lower than those reported at the downgradient overburden wells and leachate well (MW-ERN-112).

Groundwater quality trends were tracked for the overburden wells using the leachate indicator parameters ammonia, boron, conductivity, and iron. Historical groundwater quality trends for the leachate indicator parameters are provided in Appendix F. Results of the trend analyses indicate that leachate indicator parameters in the overburden groundwater unit are consistent with historical results.

The MECP has requested a comparison of ERN-104(1), ERN-105(2) and ERN-106(2) to the Provincial Water Quality Objectives (PWQO). Malroz continues to disagree with such a comparison as groundwater chemistry cannot be equated to surface water chemistry due to fundamental differences (e.g. redox). Results from the comparison of these wells to the PWQO are discussed below.

- Un-ionized ammonia concentrations exceeded the PWQO at monitoring well MW-ERN-104(1), MW-ERN-105(2), and MW-ERN-106(2) during the May and August sampling events.

- Boron concentrations exceeded the PWQO at monitoring wells MW-ERN-104(1), MW-ERN-105(2), and MW-ERN-106(2) during the May and August sampling events.

- Iron concentrations exceeded the PWQO at monitoring wells MW-ERN-104(1), and MW-ERN-106(2) during the May sampling event, and at MW-ERN-106(2) during the August sampling event.

The MECP has requested that results from these wells be discussed with relation to the surface water results. This discussion is provided in Section 6.5, following presentation of the surface water data.

5.5.2 Overburden Groundwater VOC Analyses

Samples were collected for VOC analyses at MW-ERN-104(1) and MW-ERN-106(2) during the August sampling event. Results of VOC analyses were below detection limits for the assessed parameters with the exception of benzene, 1,4-dichlorobenzene, and chlorobenzene at both wells. Each parameter met the ODWS, and was generally within the historic range of concentrations for each respective well (see Tables 3 and 4, Appendix E), with the following exceptions:

- Concentrations of chlorobenzene and 1,4-dichlorobenzene were reported to be historically high concentrations at monitoring well MW-ERN-106(2) during the August sampling event. Concentrations continue to meet the ODWS at this location, and are not indicative of increasing trends

5.5.3 Bedrock Groundwater Chemistry

Bedrock groundwater quality was evaluated through samples collected from monitoring wells MW-ERN-001, MW-ERN-003, MW-ERN-005, and MW-ERN-006 (see Table 3, Appendix E).

No exceedances of the ODWS chemical standards were reported for the evaluated parameters in the bedrock wells.

Exceedances of aesthetic objectives or operational guidelines[5] in bedrock monitoring wells were reported as follows:

Parameter	May 23, 2024	August 21, 2024
DOC	MW-ERN-005	MW-ERN-005
hardness	all sampled bedrock wells	all sampled bedrock wells
iron	none	MW-ERN-003, MW-ERN-005, MW-ERN-006
TDS	MW-ERN-005, MW-ERN-006	MW-ERN-005, MW-ERN-006
temperature (field)	MW-ERN-006	none

The parameters which exceeded the guidelines in the bedrock wells were also found to exceed the guidelines at one or more of the overburden wells.

Generally, the concentrations of the Site-specific leachate indicators (ammonia, boron, conductivity, and iron) were lower in the bedrock wells than the overburden wells with the exception of MW-ERN-006, during the August sampling event which reported higher boron and iron concentrations than the overburden monitoring wells downgradient of the landfill. Concentrations of iron at monitoring well MW-ERN-105 during the August sampling event was also higher than most of the overburden monitoring wells downgradient of the landfill.

The historical groundwater quality trends for the bedrock wells are summarized graphically in Appendix F. Results of the trend analyses indicate that leachate indicator parameters are generally consistent with historical results, with the following exceptions:

- A historically high concentration of boron was reported at MW-ERN-006 during the May 2024 sampling event. The previous maximum concentration at this location was recorded during the May 2023 sampling event. The concentration of boron during the summer sampling event was lower than the spring sampling event, however, the concentration of boron at this location has remained elevated compared to historical results for the past two years. Concentrations of boron generally appear to trend upward at this location over time, and should continue to be evaluated during future sampling.

The results of bedrock monitoring well sampling suggest that leachate is present in the bedrock groundwater unit, but attenuation is occurring.

6.0 Surface Water Monitoring and Sampling

The subsections which follow provide a summary of the results of the surface water monitoring and sampling program including surface water flow rate, analytical results and results of the trigger mechanism evaluation. The surface water monitoring program is outlined in Table 5, Appendix E.

6.1 Surface Water Monitoring and Sampling Scope

Surface water is monitored and sampled at three previously established stations comprising locations upstream (SW-001) of the landfill, near the anticipated area of groundwater discharge (SW-002), and downstream of the landfill (SW-003).

A polyester recovery program was approved at the landfill through a C of A amendment issued by the MECP in 1996. The amendment required an increase in surface water sampling frequency to four times annually.

The polyester program was discontinued by the Township and the sampling frequency was reduced to 3 times annually in 2013 by removing the winter event. As a component of the sampling program change, volatile organic compounds (VOC) were discontinued from the surface water program, and it was agreed that samples collected during the summer sampling event would be submitted for the comprehensive list of parameters outlined by Schedule 5, Column 3 of the Landfill Standards[7].
The 2024 surface water monitoring and sampling program was completed on May 23 (spring), August 21 (summer), and October 31 (fall). Malroz followed the surface water program as specified in the C of A with the following variations:

- The suite of laboratory analyses was changed to Schedule 5, Column 4 of the Landfill Standards[3], as recommended in the 2008 annual report, and accepted by the MECP in a letter dated September 24, 2009.
- VOC analyses were not conducted on the surface water samples at the August sampling event. Surface water samples from the summer sampling event were instead analyzed for an extended suite of parameters (Schedule 5, Column 3 of the landfill standards[3]). These changes were proposed in the 2010 Annual Monitoring Report and accepted by the MECP in a subsequent letter dated June 20, 2013.
- The winter surface water sampling event was replaced by a fall sampling event per the MECP letter dated June 20, 2013.

6.2 Surface Water Flow Rates and Elevation

Wilton Creek flow is continuously monitored by Cataraqui Region Conservation Authority at Morven, approximately 4 kilometers downstream of the landfill. Malroz measured Creek elevations at a culvert located next to the downstream sampling station (SW-003) as a component of the 2024 surface water monitoring program.

[7] Ministry of the Environment, Landfill Standards, A Guideline on the Regulatory and Approval Requirement for New or Expanding Landfilling Sites (2012)

The average creek flows and elevations for each sampling date are as follows[8]:

Date	Flow (m^3/sec)	Elevation (m)*
May 23, 2024	0.274	82.96
August 21, 2024	0.166	81.98
October 31, 2024	0.095	82.02

Input: RF
Checked: RG

*Elevations are based on depth to water measurements taken at the culvert and the culvert elevation (83.47) as surveyed by AECOM

Based on the average groundwater/leachate flux estimate by Hydroterra[1] of 0.002 m^3/sec, the stream flows measured in 2024 were between approximately 48 and 137 times greater than the estimated groundwater/leachate flux during the sampling events.

6.3 Surface Water Sample Station Locations

The UTM coordinates of each surface water monitoring station (as recorded in August 2024) are summarized below. All coordinates reference Zone 18 of the NAD 83 Datum. The maximum deviation of UTMs for the sampling stations between events in 2024 varied between 2 and 8 m.

Station	Easting	Northing	Est. Deviation
SW-001	355470	4902369	8 m
SW-002	355389	4902126	7 m
SW-003	355268	4901992	6 m

Input: RG
Checked: RF

Some variation in the recorded UTM coordinates from year to year is anticipated as a result of intrinsic error associated with GPS drift or signal reception issues associated with tree cover. Locations sampled in 2024 were generally consistent with those sampled in 2023. Photos of the surface water stations are presented in Appendix G.

6.4 Surface Water Chemistry

Surface water chemistry results were compared to the PWQOs, and the Table A and B criteria as described in the MECP (2010) guidance document[9] for monitoring and reporting for waste disposal sites (see Table 6, Appendix E).

[8] Real-Time Hydrometric Data for Wilton Creek near Napanee (02HM004), ON. Government of Canada, Environment and Natural Resources. https://wateroffice.ec.gc.ca/

[9] Ministry of the Environment Operations Division (2010). *Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water: Technical Guidance Document.*

Results of the 2024 surface water sampling program generally met the PWQOs, and Table A and Table B criteria with the exception of the following parameters:

PWQO Comparison

Parameter	Spring (May)	Summer (Aug)	Fall (Oct)
Iron	SW-002, SW-003	-	SW-002, SW-003
Total phosphorus	-	-	SW-003
Zinc	-	-	-
Dissolved oxygen (field)	-	SW-003	-

Table A Comparison
There were no exceedances of Table A in 2024

Table B Comparison
There were no exceedances of Table B in 2024

The criteria listed in Table A reportedly represent the lowest chronic concentration for which adverse effects have been noted in the literature. The Table B criteria are based on selected 2007 Canadian Water Quality Guidelines (CWQGs) and have a similar intent to Table A criteria. The CWQGs have been developed for the protection of marine and freshwater species. Differences between the Table A and Table B values (i.e. zinc, chloride) may be due to differences in literature cited that relate to the scope of protection (freshwater species only, versus freshwater and marine species). The PWQO, Table A and Table B values may also vary as a result of the age of the criteria. The more recent Table A (2009) and Table B (2007) values are often based on scientific literature that is more recent than the PWQOs (1994).

For PWQO parameters which do not have a Table A or Table B value, the objective is a numerical value representing a chronic concentration which, if exceeded, would pose a potential threat to the survival of some forms of aquatic organisms. Total phosphorus is an exception to this as the value has been defined with the intent of preventing nuisance aquatic plant growth.

Surface water results are reviewed with specific attention to leachate indicator parameters: un-ionized ammonia, conductivity, iron, and boron. Historical surface water quality trends for the leachate indicator parameters are provided in Appendix F. Results of the trend analyses indicate that leachate indicator parameters are within the historic range of concentrations. Our observations with respect to the leachate indicators and associated trends are as follows:

- Measurable concentrations of un-ionized ammonia were reported at each station during each sampling event in 2024. Concentrations of un-ionized ammonia met the PWQO at each surface water station during each sampling event in 2024.

- Conductivity values were relatively consistent between the three stations during each sampling event; however, were slightly higher at SW-002 and SW-003 than background, which is consistent with previous results. Conductivity values observed at surface water stations during the summer and fall sampling events were higher than those reported during the spring sampling event.

- Iron concentrations at SW-002 and SW-003 exceeded the PWQO during the spring and fall sampling events. Iron concentrations at the landfill adjacent (SW-002) and downgradient (SW-003) surface water stations were higher than those reported at the background (SW-001) station which met the PWQO during all three sampling events.

- Surface water samples collected in August were analyzed for an extended suite of parameters which included the leachate indicator boron and an expanded suite of metal parameters summarized in Table 6, Appendix B. Boron concentrations were relatively consistent between the background (SW-001), landfill adjacent (SW-002), and downgradient surface water stations (SW-003); however, were slightly higher at SW-002 and SW-003 than background, which is consistent with previous results. Concentrations of boron met the PWQO.

Malroz evaluated historic concentrations of site-specific leachate indicators in surface water (conductivity, iron, unionized ammonia, and boron) at the background station (SW-001) and calculated the 75th percentile for each. Results of the evaluation indicated the 75th percentile of data met the PWQO (where applicable) for each of the site-specific leachate indicators (see Table 6, Appendix E).

Evaluation of concentrations of leachate indicator parameters in surface water indicate some leachate influence on Wilton Creek in 2024. This is consistent with previous results.

6.5 Surface Water and Groundwater Interactions

Wilton Creek is located downgradient of the Site and inferred to be within an area of groundwater discharge (see Section 2.3).

Based on a review of the groundwater chemistry in monitoring wells proximal to Wilton Creek and surface water chemistry for site specific leachate indicators boron, un-ionized ammonia, iron, and conductivity, there is evidence of leachate impact to surface water.

As summarized in Section 5.5.3 and illustrated in the trend graphs in Appendix F, the concentration of boron exceeded the previously reported historical high at monitoring well MW-ERN-006 during the May sampling event and concentrations of boron at this station generally appear to be trending upward over time. However, the concentrations of boron in Wilton Creek met the PWQO during the August sampling event, and were within historical ranges for each respective surface water station in 2024.

Despite evidence of leachate discharge to Wilton Creek, concentrations of site-specific leachate indicator parameters either met their respective objectives/criteria or established surface water trigger mechanism (e.g. iron and un-ionized ammonia) during

the surface water sampling events, suggesting that there is attenuation of leachate within the Wilton Creek.

6.6 Surface Water Trigger Mechanism

In correspondence dated June 21, 2012, the MECP indicated their acceptance of the trigger mechanism proposed by Malroz in the 2010 annual report. The new trigger mechanism eliminates the use of 75th percentile values and reduces the Tier 2 trigger monitoring period to 90 days from 120 days. As agreed with the MECP, the trigger concentration for iron was increased to 1 mg/L (APV) and trigger value for un-ionized ammonia will remain 0.02 mg/L (PWQO).

The new trigger mechanism is as follows:

> Tier 1 is an “alert level” which would trigger a review of the data. If two consecutive values in the downstream station exceed 0.02 mg/L for un-ionized ammonia or 1.0 mg/L for iron, and if the upstream monitoring results indicate that the landfill is the probable cause, then a Tier 2 investigation is triggered.
>
> Tier 2 is an “investigative mode” to confirm a potential unacceptable impact. This includes the completion of four (4) additional surface water sampling rounds within 90 days following the Tier 1 trigger. Sampling would be combined with an investigation to determine if the landfill site is the probable cause of the Tier 1 non-compliance results. Non-compliance would result if two consecutive values of un-ionized ammonia exceed the PWQO or two consecutive values of iron exceed 1.0 mg/L. If the Tier 2 water quality sampling investigation confirms a continuing status of non-compliance related to the landfill site, the MECP will be notified, and the site contingency plan triggered.
>
> Tier 3 is a “contingency plan monitoring mode” which will either confirm that implementation of the contingency plan has been effective or trigger the next stage of the contingency plan.

The concentrations of un-ionized ammonia and iron met the respective trigger values at the downstream station (SW-003) during each sampling event in 2024. Therefore, the trigger mechanism was not activated.

7.0 Conclusions and Recommendations

The following subsections summarize our conclusions and recommendations with respect to development, operations, and annual monitoring at the Violet WDS.

7.1 Development and Operations

Loyalist Township (Township) operated the Violet Waste Disposal Site (WDS) in general compliance with its current Certificate of Approval (C of A) No. A370802, and Development and Operation (D & O) Plan in 2024.

Malroz conducted a topographic survey of the active fill area on January 2, 2024 to estimate the volume of waste and cover material placed since the prior survey. An estimated 5,031 m^3 of waste and cover material was deposited within the active fill area

at the site in 2024. This volume is lower than the historic average fill rate (5,501 m^3) for the 2008 to 2024 period, but within the historical range of reported fill rates.

Malroz calculated a range of predicted life spans based on the average fill rate (since 2008) and the maximum reported fill rate since 2008. On the basis of this range of fill rates, the site has between approximately 19 and 29 years of capacity remaining.

Lateral (east and south) exceedances of the licensed fill area were previously identified and have been considered in the 1992 D&O plan, and by prior amendment to the C of A.

Results of a previously completed drone survey (GeoOptic, 2020) and the Malroz topographic survey conducted in 2024 identified areas that exceeded the proposed final contours identified in the D&O plan. The elevation of waste placed in the active fill area (central portion of Phase 1) was identified to exceed the proposed upper limit (120 masl) of the initial waste lift as described in the 1992 D&O Plan, but remains below the maximum proposed height of the landfill (126 masl).

Waste and cover placed in the eastern and southwestern portions of Phase 1 of the active fill area also exceeded the final contour elevations (see Figure 3, Appendix B). It is our understanding that the fill pile will continue to be shaped to meet the proposed final contours as filling progresses (i.e. material exceeding vertical limits will be redistributed); however, this approach should be confirmed with the MECP for concurrence.

7.2 Methane Monitoring

Methane gas is a natural by-product of waste degradation. Methane concentrations at monitoring wells MW-ERN-006 and MW-ERN-112 were detected at 6% and >100%, respectively, of the lower explosive limit (LEL) during the May and/or August monitoring events. Evaluation of methane concentrations at other monitoring wells yielded results that were less than 1% the LEL. Malroz did not identify measurable methane concentrations in the ambient air.

Concentrations of methane in 2024 were generally consistent with past results and will continue to be monitored in 2025.

7.3 Groundwater Monitoring and Sampling

Leachate trends in groundwater have been tracked using four indicators: boron, conductivity, iron and ammonia (un-ionized ammonia in surface water). Concentrations of these parameters in 2023 were within the historic ranges for the sampled wells with the following exception:

- A historically high concentration of boron was reported at bedrock monitoring well MW-ERN-006 in May 2024. The previous maximum concentration at this location was in May 2023. The concentration of boron during the summer sampling event was lower than the spring sampling event, the concentration of boron at this location has remained elevated compared to historical results for the past two years . Concentrations of boron generally appear to trend upward at this location over time.

7.4 Surface Water Monitoring and Sampling

Shallow groundwater in the overburden is inferred to flow west across the site toward Wilton Creek, based on the available data. Shallow groundwater is inferred to discharge to the Wilton Creek.

Leachate has been identified in the downgradient groundwater monitoring wells located between the landfill and Wilton Creek. Groundwater and surface water data continue to suggest that there is some limited leachate impact to the Wilton Creek. Results of the trend analyses indicate that leachate indicator parameter concentrations measured in 2024 are within the historic range of concentrations.

The surface water trigger mechanism was not activated in 2024. Concentrations of iron and un-ionized ammonia at the downstream surface water station (SW3) remained below the trigger value at each sampling event. Therefore, the site is operating in conformance with its compliance criteria.

7.5 Recommendations

We offer the following recommendations regarding the 2024 results and conclusions:

- Clarify with the MECP whether the material comprising the first lift of Phase 1 may be left in place (as it remains below the final elevation of 126 masl for Phase 3) or requires reshaping to the meet the proposed interim fill contour (120 masl) as noted in our 2020-2023 D&O reports. Consideration should be given to leaving the fill material in place as the increased separation between the waste material and grade is anticipated to promote attenuation of leachate. The fill mound can be reshaped to meet the proposed final contour design as the landfill approaches final closure.
- Elevated methane concentrations are expected at the landfill as a byproduct of anaerobic decomposition of organic compounds. Caution should continue to be exercised when undertaking work within the former and active fill areas as methane gas may accumulate in the soil.
- The leachate concentration should continue to remain constant or may increase in strength in future years with the continued disposal of refuse. The degree of impact to groundwater and surface water will depend on materials disposed, percolation rates, groundwater flux, and available streamflow. Periodic cover of the waste, progressive capping, and minimizing the active fill area should be continued to limit percolation rates and subsequent generation of leachate.
- The surface water program should continue with sampling in May/June (spring), August (summer) and October (fall). Surface water samples collected during the August event will continue to be analyzed for an enhanced suite of parameters (Schedule 5, Column 3 of the MECP Landfill Standards[3].
- The groundwater program should continue with sampling in May/June (spring) and August (summer) as defined in the provisional C of A.

Appendix A
Certificate of Approval

Ontario

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

250 Davisville Avenue
Toronto ON M4S 1H2

250, avenue Davisville
Toronto ON M4S 1H2

APPROVALS BRANCH
3rd Floor
Phone: (416) 440-3547
Fax: (416) 440-6973

31 January 1994

Township of Ernestown
263 Main Street
P.O. Box 70
Odessa, Ontario
K0H 2H0

Attention: Mr. M.G. Wade, P.Eng.,
Chief Administrative Officer

Dear Mr. Wade:

Re: Violet Road Landfill Site
Provisional Certificate of Approval No. A 370802

Enclosed please find Provisional Certificate of Approval No. A 370802, dated January 14, 1994, which has been issued to the Township of Ernestown Landfill Site.

This Provisional Certificate of Approval has been issued to approve the April 1992 "Development and Operation Plan" report with the exception of the changes noted in the enclosed Certificate. The Certificate also consolidates and thereby revokes all previously issued Certificates and Notices issued under Part V of the Environmental Act (EPA) for the Violet Road Landfill Site.

In addition, this Certificate requires the purchase of the privately owned land which is located between the site and the Wilton Creek to bring the site into full compliance with the Ministry's Reasonable Use Policy. This land should be designated as buffer zone and should not be used for aggregate extraction which may impair the attenuation of leachate contaminants between the site and the Creek.

.../2

Please note that you have to register this Certificate together with the overfilled areas to the south and west of the site boundary on title to the lands comprising the waste disposal site. Should you have any questions regarding the above, please contact Mr. O. Ibrahim, Waste Sites and Systems Unit, at (416) 440-3717.

Yours truly,

A. Dominski, P.Eng., Acting Supervisor
Waste Sites & Systems Approvals Unit
Industrial Approvals Section

OI/nb
c.c.: Peggy Farnsworth, Southeastern Region

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

Township of Ernestown
P.O. Box 57
Odessa, Ontario
K0H 2H0

for the use and operation of a 7 hectare landfilling area within a total site area of 14 hectares

all in accordance with the following plans and specifications:

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

Located: Parts of Lots 13 and 14, Concessions 4 and 5
Township of Ernestown
Lennox and Addington Counties

which includes for the use of the site only for the disposal of domestic, commercial, and non-hazardous solid industrial waste (Note: A change in the use of the site or the addition of new categories of wastes requires a new application and amendments to the Provisional Certificate of Approval)

and subject to the following conditions:

1. This Provisional Certificate of Approval consolidates and thereby revokes all previously issued Provisional Certificates of Approval and Notices issued under Part V of the Environmental Protection Act to the Township regarding Violet Road Landfill Site.

2. This Provisional Certificate of Approval shall be registered on the title to the lands comprising the site. No operation shall be carried at the site after sixty days from this condition becoming enforceable unless this Provisional Certificate including the reasons for these conditions have been registered by the Township as an instrument in the appropriate Land Registry Office against title to the site and a duplicate registered copy thereof returned by the applicant to the Director.

3. Except as otherwise provided by these conditions, the site shall be designed, developed, used, maintained and operated in accordance with the plans and specifications provided in the report entitled "Development And Operation Plan For The Violet Landfill Site" prepared by Totten Sims Hubicki Associates, dated April 1992.

4. Aggregate extraction currently taking place shall be restricted to a minimum of 1 metre above the water table in all areas between the site and Wilton Creek.

5. Groundwater samples shall be collected semi-annual basis (i.e Spring and Fall). The samples shall be analyzed for the parameters listed in Section 3.25 of the April 1992 "Development and Operation Plan" report.

6. Monitoring for trace organic compounds shall be conducted annually at two wells (to be determined by the consultant).

7. Surface water samples shall be collected three times annually as follows:

   (i) In the spring and late fall when maximum runoff events occur;

   (ii) In the summer and early fall when the critical low flow occurs;

   (iii) In the winter when the groundwater flow component to Wilton Creek may be significant.

   The samples shall be analyzed for the parameters listed in Section 3.24 of the April 1992 "Development and Operation Plan" report.

8. The Township shall undertake all necessary efforts to acquire the privately owned land between the site and the Wilton Creek to extend the buffer zone at this site to ensure compliance with the Ministry's Reasonable Use Policy (RUP) and the Provincial Water Quality Objectives (PWQO). If for any reason(s) the Township fails to acquire the private land by December 31, 1994, then a detailed plan describing the remedial measures necessary to ensure compliance with the Ministry's RUP and PWQO together with a schedule for implementing these measures shall be submitted for approval to the Director by April 30, 1995. The plan, as approved by the Director, must be implemented as soon as possible following approval by the Director.

9. If the Township is successful in acquiring the private land as required by condition 8, the Township must submit to the Director by April 30, 1995, a detailed contingency plan. The plan must be implemented in the event contaminant migration causes exceedence or is likely to cause exceedence of the criteria contained in the Ministry's RUP and/or PWQO within or beyond the Wilton Creek.

10. An annual report on the operation and development of the site, and on the monitoring of the site shall be submitted by the Township to the Director of Southeastern Region and to the Kingston District Office, Ministry of the Environment and Energy. Each report shall cover each successive calender year with the report being submitted no later than May 31 of the year following the year being reported upon. This annual report, based on the previous year's site operation and monitoring programs, shall collate, interpret and discuss:

10.1 The data collected from the previous year's monitoring programs for the site including, without limitation:

a) analysis and interpretation of the results of the surface water and groundwater monitoring program;

b) review of the adequacy of the monitoring program and a recommendation for any changes that may be necessary;

10.2 The previous year's operation and development, including:

a) a monthly summary of the quantity, source and types of waste deposited at the site;

b) any changes to the operation, equipment or procedures at the site;

c) any operational problems encountered and the remedial measures taken;

d) an updated site plan showing the areas of fill, buffer zones, contours, monitoring locations and surface water control facilities;

e) recommendation respecting any proposed changes in the operation of the landfill; and,

f) a projection of the likely closure date of the site.

11. Changes to the monitoring program shall be made in accordance with the recommendations of the annual report provided that the Regional Director agrees in writing to such changes.

12. The overfilled areas to the south and west of the licensed area boundary are to be closed in accordance with the April 1992 "Development and Operation Plan" report. However, the final cover to be used shall consist of a minimum of 60 cm of compacted soil material covered by a minimum of 15 cm of top soil. The 60 cm layer of compacted soil material shall have a maximum hydraulic conductivity of 10^{-6} cm/s unless prior written approval from the Regional Director is obtained.

13. Based on the predicted closure date to be provided in the Annual Monitoring and Site Progress Report as required under condition No. 10 of this Certificate, the Township must submit to the Director, no less than 3 months before the predicted closure date, a final report on the plan of closure and the post closure care.

SCHEDULE "A"

This Schedule "A" forms part of Provisional Certificate of Approval A 370802.

1. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated February 8, 1971.

2. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated December 14, 1971.

3. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated January 12, 1972.

4. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated January 17, 1973.

5. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated January 16, 1974.

Schedule "A" Continued

6. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated September 15, 1975.

7. Application for a Certificate of Approval for a Waste Disposal Site and Supporting Information to an Application for Approval of a Waste Disposal Site dated February 6, 1976.

8. Letter from Ministry of the Environment and Energy to Ernestown Township, including an attached "Provisional Certificate of Approval", dated July 14, 1980.

9. Letter from Totten Sims Hubicki Associates to Mr. R. B. Baker, Regional Director, Southeastern Region, dated April 13, 1984.

10. Memorandum from P. R. Moore, Approvals and Planning, Southeastern Region to Mr. J. R. Firth, Abatement Section, Southeastern Region, dated May 24, 1984.

11. Letter from L. Wilcox, Waste Sites and Systems Unit, Approvals Branch to Mr. L. Parr, Totten Sims Hubicki Associates, dated June 15, 1984.

12. Letter from Mr. Paul R. Moore, Approvals and Planning, Southeastern Region to Mr. M. S. Carroll, Township Engineer, Ernestown Township, dated May 17, 1989.

13. Report entitled "Development and Operation Plan For The Violet Road Landfill Site, Certificate Of Approval No. A 370802" prepared by Totten Sims Hubicki Associates, dated April 1992.

14. Letter from Mr. Ian Wilson, Reeve, Ernestown Township to The Honourable Ruth Grier, Minister, Ministry of the Environment and Energy, dated October 7, 1992.

15. Letter from T. A. McCleneghan, Township Engineer, Ernestown Township to Mr. M. J. Coleman, Environmental Officer, Kingston District Office, dated October 29, 1992.

16. Memorandum from Ms. Peggy Farnsworth, Approvals and Planning, Southeastern Region to Mr. A. Dominski, Waste Sites and Systems Unit, Approvals Branch, dated January 5, 1993.

Schedule "A" Continued

17. Letter from the Honourable Ruth Grier, Minister, Ministry of the Environment and Energy to Mr. Ian Wilson, Reeve, Ernestown Township, dated January 21, 1993.

18. Letter from Mr. Brain R. Ward, Regional Director to Mr. M. G. Wade, Chief Administrative Officer, Ernestown Township, dated February 19, 1993.

19. Letter from Mr. M. G. Wade, Chief Administrative Officer, Ernestown Township to Mr. Wilfred B. Ng, Director, Approvals Branch, dated August 13, 1993.

20. Letter from Mr. W. Ng, Director, Approvals Branch to Mr. M. G. Wade, Chief Administrative Officer, Ernestown Township, dated September 20, 1993.

21. Letter from Mr. M. G. Wade, Chief Administrative Officer, Ernestown Township to Mr. Wilfred B. Ng, Director, Approvals Branch, dated November 11, 1993.

22. Letter from Mr. W. Ng, Director, Approvals Branch to Mr. M. G. Wade, Chief Administrative Officer, Ernestown Township, dated November 30, 1993.

23. Letter from Mr. M. G. Wade, Chief Administrative Officer, Ernestown Township to Mr. Wilfred B. Ng, Director, Approvals Branch, dated December 8, 1993.

24. Memorandum from Mr. M. J. Coleman, Environmental Officer, Kingston District Office to Mr. O. Ibrahim, Waste Sites and Systems Unit, Approvals Branch, dated January 7, 1994.

25. Document entitled "Public Participation For The Violet Road Landfill Site, Certificate of Approval No. A 370802" prepared by Totten Sims Hubicki Associates, dated January 1994.

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

1. The reason for condition (1) is to clarify that this Provisional Certificate of Approval sets out all of the requirements imposed with respect to this site, other than requirements imposed by legislation and the common law.

2. The reason for condition (2) is that Section 46 of the Environmental Protection Act, prohibits any use being made of the lands after they cease to be used for waste disposal purposes within a period of twenty five years from the year in which such land ceased to be used unless the approval of the Minister for the proposed use has been given. The purpose of this prohibition is to protect future occupants of the Site and Environment from any hazards which might occur as a result of waste being disposed of on the Site. This prohibition and potential hazard should be drawn to the attention of future owners and occupants by the Provisional Certificate of Approval being registered on title.

3. The reason for condition (3) is to ensure that this waste disposal site is operated in accordance with the application for this Provisional Certificate of Approval and the supporting documentation submitted therewith, and not in a manner which the Director has not been asked to consider.

4. The reason for condition (4) is to maintain the natural environment's ability to attenuate leachate contaminants between the site and the creek.

5. The reason for conditions 5, 6, and 7 is to ensure that the monitoring program at the site is continued so that any contaminant discharges from the site are detected before any hazard to health or safety is created.

6. The reason for condition (8) is to ensure that the Township is in control of the property being dedicated as an attenuation zone. However, if the Township fails to acquire an attenuation zone a detailed mitigation plan should be in place in order to alleviate the off-site contaminant migration.

7. The reason for condition (9) is to ensure that a contingency plan is in place if the monitoring results indicate an unacceptable impact of landfilling operations on groundwater and/or surface water resources beyond the property boundary.

8. The reason for condition (10) is to provide for the regular review of the operation and development of the site and of monitoring data collected at the site. This will ensure that the site is used and operated in accordance with this Certificate and that potential operational or environmental problems are identified and the necessary remedial measures may be implemented. Operation of the site without regular review may result in nuisance or hazard to public health and safety.

9. The reason for condition (11) is to ensure that changes to the monitoring program may be effected by way of the recommendations of the annual monitoring report but only upon approval of the recommended changes by the Regional Director in order to ensure the continued adequacy of the program.

10. The reason for condition (12) is to ensure that the overfilled areas to the south and west of the licensed area boundary are to be closed in a proper manner to minimize off-site environmental impacts.

11. The reason for condition (13) is to ensure that the Township provides final plans for orderly development of the site after closure and that the health and safety of the public and environment are protected.

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

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

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

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

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

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
112 St. Clair Avenue West,
Suite 502,
Toronto, Ontario,
M4V 1N3

AND

The Director,
Section 39, Environmental Protection Act,
Ministry of the Environment and Energy,
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

DATED AT TORONTO this 31st *day of* January, 1994.

P. DeAngelis, P. Eng.,
Director,
Section 39,
Environmental Protection Act

Ontario

Ministry of Environment and Energy

Ministère de l'Environnement et de l'Énergie

250 Davisville Avenue
Toronto ON M4S 1H2

250, avenue Davisville
Toronto ON M4S 1H2

APPROVALS BRANCH
3rd Floor
Tel. (416) 440-3544
Fax (416) 440-6973

October 25, 1994

Mr. David A. McIntosh, P.Eng.,
Township Engineer
Township of Ernestown
263 Main Street
Box 70, Odessa, Ontario
K0H 2H0

Dear Mr. McIntosh:

Re: Violet Landfill Site Certificate of Approval No. A 370802

Enclosed is a Notice of Amendment for the above mentioned Provisional Certificate of Approval dated January 14, 1994. The Notice provides for the trial use of by-product materials (solid non-hazardous waste) from KIMCO Ltd., which is located in Kingston, Ontario. This material will be used as an alternative daily cover material. The amendment restricts the amount of materials that can be accepted from KIMCO Ltd. to a maximum of 140 tonnes per month.

Please make sure that compliance testing is performed annually to ensure that no hazardous materials are introduced at the site. All other terms and conditions as outlined in the original Certificate of Approval remain unchanged.

If you have any questions regarding the above, please contact Mr. Osman Ibrahim of this office at (416) 440-3717.

Yours truly,

A. Dominski, P. Eng.,
Supervisor, Waste Sites and System Unit, Approvals Branch

OI/am

cc: R. P. Michae, MOEE Kingston

TO: Township of Ernestown
263 Main Street
Box 70, Odessa, Ontario
K0H 2H0

You are hereby notified that the terms and conditions of Provisional Certificate of Approval No. A 370802 are amended to allow for the trial use of by-product materials from KIMCO Ltd. as an alternative daily cover material in accordance with the following plans and specifications:

i. The report entitled "By-Product Material Assessment Study" prepared by Spectrum Associates; dated February 16, 1994.

ii. The letter dated July 22, 1994, from David McIntosh, Township Engineer to Donald Carr, Approvals Branch.

iii. The letter dated October 12, 1994, from David McIntosh, Township Engineer to Osman Ibrahim, Approvals Branch.

In addition, the following conditions are added:

14. The Township of Ernestown is allowed to accept a maximum of 140 tonnes per month on a trial basis of by-product materials (solid non-hazardous waste) from KIMCO Ltd. which is located in Kingston, Ontario. This material will be used as an alternative daily cover.

15. Should the product, while under evaluation, cause any environmental concern, the landfill owner or operator will be required to discontinue its use.

16. The impact and performance of the use of the by-product material at this site shall be detailed in the Annual Monitoring Report and in a final report submitted to the Regional Director within two (2) months of completion of the trial period.

17. Sufficient soil cover material must be available on-site for use either when conditions do not permit use of the alternative trial material or if performance of the material is unsatisfactory.

The trial period for use of the alternative daily cover shall be for a period of two (2) years or until the site is closed, which ever is less.

The reason for these conditions is to ensure that the operation of the waste disposal site is performed in an environmentally safe manner.

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

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

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

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

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

This Notice must be served upon:

The Secretary,
Environmental Appeal Board,
112 St. Clair Avenue West,
Suite 502,
Toronto, Ontario,
M4V 1N3

<u>AND</u>

The Director,
Section 39, Environmental Protection Act,
Ministry of Environment and Energy,
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

DATED AT TORONTO this 25th *day of* October, 1994.

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

HYDROTERRA LIMITED
Consultant in Groundwater Engineering
15 Glamis Place, Thornhill, Ontario L3T 3G7
(905) 889-1669

May 23, 1997

Totten Sims Hubicki Associates
654 Norris Court
Kingston, Ontario
K7P 2R9

Attention: Mr. Guy Laporte, P. Eng.

Re: Supplementary Report
Trigger Mechanisms
Violet Landfill
Township of Ernestown
HT File: 1002M

Dear Mr. Laporte:

As discussed, following are the suggested trigger mechanisms for the implementation of the proposed contingency plan in the event of excessive quality exceedances arising from the continued operation of the Violet landfill.

Trigger Mechanisms

Groundwater

As the municipality owns the downgradient lands extending to the receiving watercourse, and the leachate plume directly discharges through the thick granular-filled bedrock depression to Wilton Creek, Reasonable Use exceedances will not occur on any downgradient lands and no trigger mechanism is presented based on the groundwater quality conditions detected in the boundary monitors.

.../2

Maintenance of the bedrock/overburden monitor network is recommended to detect potentially significant leachate-quality changes within the groundwater system prior to creek discharge. With the concurrence of MOEE Regional staff, consideration should be made to limiting the on-going monitoring to three downgradient bedrock monitors and three downgradient overburden monitors, at twice-annual intervals for analyses of the previously defined chemical parameters.

Surface Water

As consistently indicated in the recent annual reports, the landfill impact will be experienced within Wilton Creek, at an intensity largely dictated by the streamflow availability. Under average conditions, the streamflow may be several hundred times greater than the leachate flux, resulting in minimal quality degradation opposite the landfill observed to date.

A "three tier" trigger mechanism is recommended to initiate the surface-water contingency plan, based on the quality determinations obtained at the downstream station SW 3 and compared to the quality determinations obtained at the upstream station SW 1.

The surface-water trigger constituents would comprise the following Compliance Evaluation Parameters: un-ionized ammonia, dissolved oxygen, iron and phenols.

For un-ionized ammonia, non-compliance is defined as a numerical elevation of an analytical value above the Provincial Water Quality Objective (PWQO) or the background concentration if it is higher than the PWQO.

For dissolved oxygen, non-compliance is defined as the lowering of the dissolved oxygen concentration below the value obtained at SW 1 and below 8 mg/L at 0° celsius; 6 mg/L between 10 and 15° celsius; and 5 mg/L between 20 and 25° celsius.

.../3

For the primarly aesthetic parameters iron and phenols, non-compliance is defined as a numerical elevation of an analytical value above the PWQO or the background concentration if it is higher than the PWQO and the presence of aesthetic degradation in the opinion of the Regional Director.

Tier I of the trigger is an "Alert" level monitoring using the Compliance Evaluation Parameters, which will be sampled at a frequency of three times per year accepted by the MOEE. Any two consecutive non-compliances for any of the four Compliance Evaluation Parameters at surface-water station SW 3 will trigger Tier II.

Any two consecutive non-compliances will be reported to the Regional Director in a report prepared by a qualified consulting firm which represents the Township within 30 days following receipt of the sampling results, for the purpose of implementing a Tier II program.

Tier II of the trigger is a "Confirmation" level which would be implemented to confirm the degree and nature of non-compliance. This could include an expanded suite of monitoring parameter and/or increased sampling frequency and would be initiated upon approval of the Tier I report by the Regional Director. Any two consecutive non-compliances at SW 3 for the parameters identified in the Tier I report will trigger Tier III.

Any apparent non-compliance will be verified by resampling for the parameter(s) of concern within one month of the sampling non-complying sample result. If non-compliance is not confirmed by the follow-up sample and if historical data are supportive, the apparent non-compliance will be discounted as being anomalous.

.../4

Tier III of the trigger will involve implementation of the contingency plan in the sequence documented in the Design and Operation report previously developed by Totten Sims Hubicki Associates. Implementation of the listed contingencies beyond Contingency No. 1 will be determined in consultation with the Regional Director, as dictated by the subsequent stream-quality results.

Please advise if there should be any outstanding consideration relating to this submission.

Sincerely,

Leon G. Bryck, P. Eng.

Ontario

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

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A370802
Notice No. 1
Issue Date: January 17, 2008

The Corporation of Loyalist Township
263 Main St
Odessa, Ontario
K0H 2H0

Site Location: Violet Waste Disposal Site
Lot 13 and 14, Concession 4 and 5, Ernestown Township
Loyalist Township, County of Lennox and Addington
K0H 2H0

You are hereby notified that I have amended Provisional Certificate of Approval No. A370802 issued on January 31, 1994 and last amended September 30, 1997 for a Waste Disposal site of a total area of 14 hectares within the Province of Ontario, as follows:

Approval of a *Pilot Operation* for the receiving and storage of no more than 700 tonnes of dewatered sludge from the INVISTA Canada Company wastewater treatment plant in Millhaven, Ontario and subsequent removal of the aforementioned sludge to the Norterra Organics biosolids plant in Kingston, Ontario.

The following definitions are hereby added to this *Certificate*:

"EPA" means *Environmental Protection Act*, R.S.O. 1990, c. E19, as amended;

"*pilot operation*" means the pilot operation for the receiving and storage of dewatered wastewater treatment plant sludge and the subsequent removal for transfer to a biosolids facility;

"*Reg. 347*" mean Regulation 347, R.R.O. 1990, made under the EPA, as amended from time to time.

The following *pilot operation* conditions are hereby added to this *Certificate* and will be **revoked on September 30, 2008:**

23. The pilot operation for receiving, storage and subsequent transfer of dewatered wastewater treatment plant sludge is approved from the date of this notice until September 30, 2008.

24. Dewatered wastewater treatment plant sludge received for storage and subsequent removal shall only be from INVISTA Canada Company and shall be placed in the specified location as listed in the site plan received December 18, 2007.

25. No more than 700 tonnes of dewatered wastewater treatment plant sludge shall be received from INVISTA Canada Company.

26. All wastewater treatment plant sludge received and stored for subsequent transfer must be covered appropriately as not to create a situation where stored material migrates beyond the specified storage area.

27. The Owner shall maintain at the site shipping tickets which record each shipment of the dewatered wastewater treatment plant sludge that is to be stored at the Site. Record shall include the date received, carrier, and weight of the sludge.

28. The Owner shall ensure while removing the sludge from transfer to the biosolids facility that measures are taken to prevent any environmental impact.

29. Should the *pilot operation* result in any environmental adverse effects including odour; the adverse effect is to be

reported to the District Manager within 24 hours. At the discretion of the District Manager, the pilot operation shall be immediately suspended and the Site shall cease storing the dewatered wastewater treatment plant sludge and shall dispose of the sludge as approved by the *Ministry*in accordance with Reg. 347 and the EPA.

30. All stored sludge that will not be removed for processing at the biosolids processing facility by October 1, 2008 shall be dispose of as approved by the *Ministry*in accordance with *Reg. 347*and the *EPA*.

The following documents are hereby added to **Schedule "A"**

26. Letter from Bruce Hughson, Loyalist Township to Yosh Imahori, Ministry of the Environment dated December 14, 2007 regarding additional information requested.

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

1. The reason for Conditions 23, 24, 25, 26, 27 and 28 are to ensure that dewatered wastewater treatment plant sludge that is received, store and subsequently removed to a biosolids plant is from a specified facility, managed on site for a specific period of time and that the *pilot operation*does not cause an adverse effect.

All other Conditions on the approval A370802 remain in effect.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A370802 dated January 31, 1994, as amended.

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

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

The Notice should also include:

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

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

This Notice must be served upon:

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

AND

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

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

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

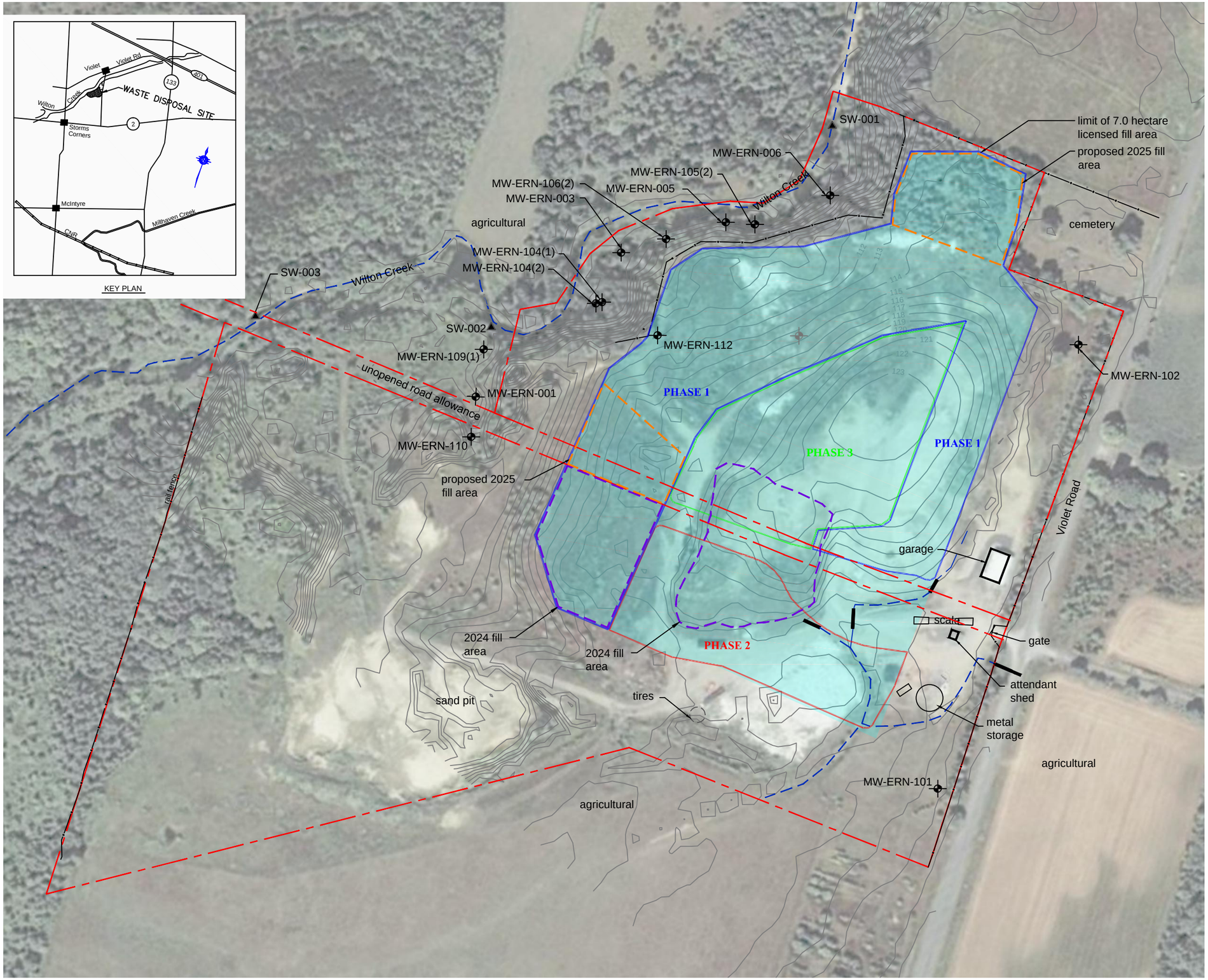
DATED AT TORONTO this 17th day of January, 2008

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

YI/
c: District Manager, MOE Kingston - District
Bruce Hughson, The Corporation of Loyalist Township

Appendix B
Figures

KEY PLAN



Approximate Scale

0 — 100 m

LEGEND

MW-ERN-106	monitoring well
SW3	surface water sampling station
WF	wire fence
123	topographic contour (1.0 interval, masl) based on January 2025 survey by Malroz in active area and April 2020 survey by GeoOptic Inc. in non-active areas
	property boundary (including 8.0 hectare buffer area)
	building footprint
	ditch/ watercourse
	Phase 1 fill area
	Phase 2 fill area
	Phase 3 fill area
	2024 fill area
	proposed fill area for 2025
	licensed fill area

Notes:

Drawing based on AECOM ACAD file 2015-60119534-1.DWG, December 2015, 2017 Google Earth aerial imagery, and the 1992 D&O by TSH.

Waste contours based on survey by Malroz January, 2025, and drone survey points provided by GeoOptic (April, 2020).

Proposed final contours and existing waste contours based on Malroz 2025 survey (NAD 83 - UTM Zone 18 N).

Rev	Date	Description	By	Checked
R0	2025-04-02	issued in final	ZL	RG

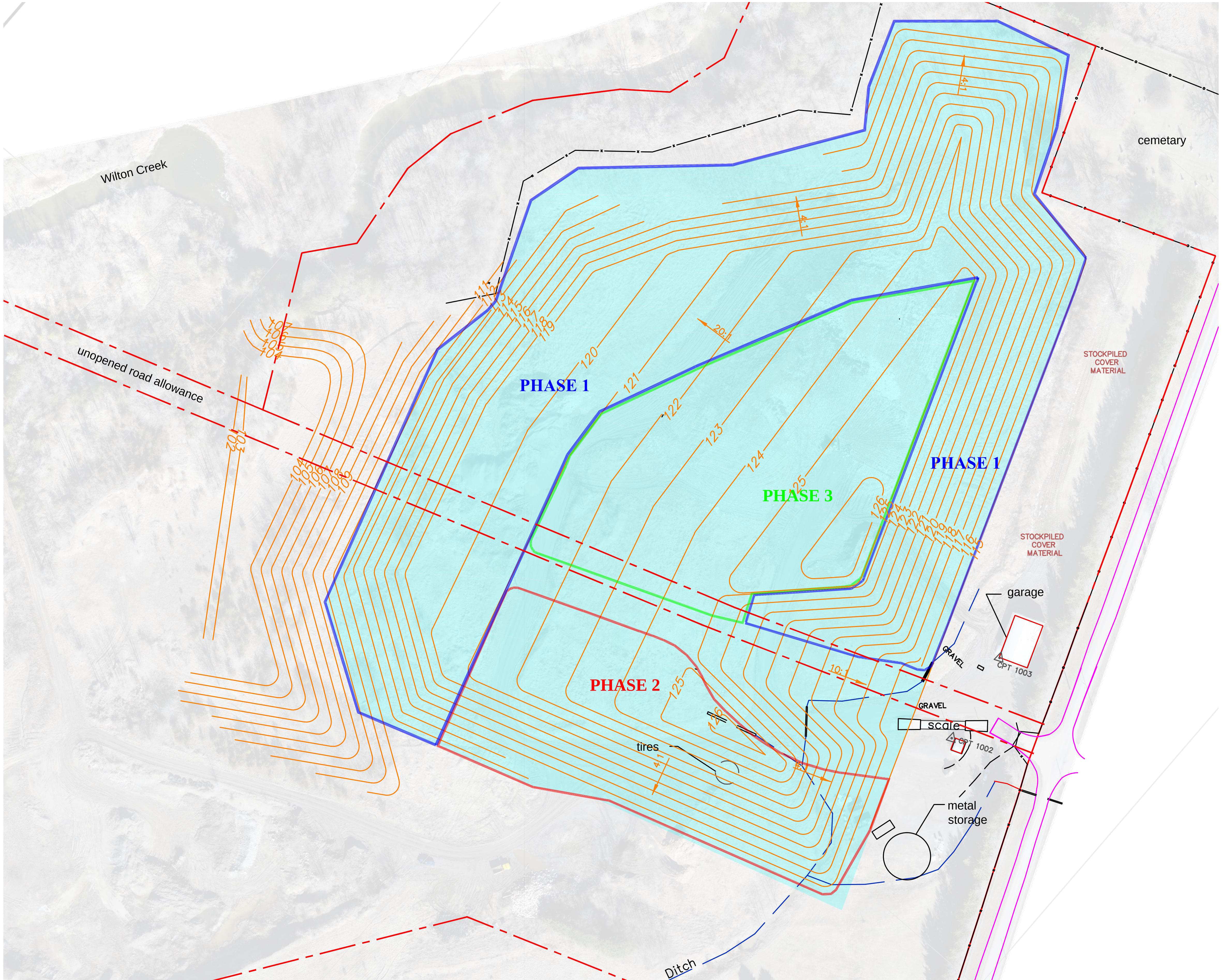
Site Layout Plan

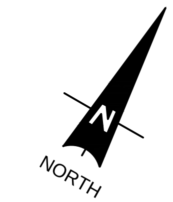
2024 Annual Development, Operations, and Monitoring Report
Loyalist Township: Violet Landfill Site
Violet, Ontario

MALROZ

Figure 1

File: 286-256.00





Approx. Scale (m)

0 100

LEGEND

WF	wire fence
	edge of road
	proposed final contours (1.0 m interval, masl)
	property boundary
	ditch
	Phase 1 fill area
	Phase 2 fill area
	Phase 3 fill area
	licensed fill area

Notes:
Drawing based on AECOM ACAD file 2015-60119534-1.DWG, December 2015 and 1992 D&O Plan by TSH.

Proposed final contours are referenced to the North American Datum of 1983.

Rev	Date	Description	By	Checked
R0	2025-04-02	issued in final	ZL	RG

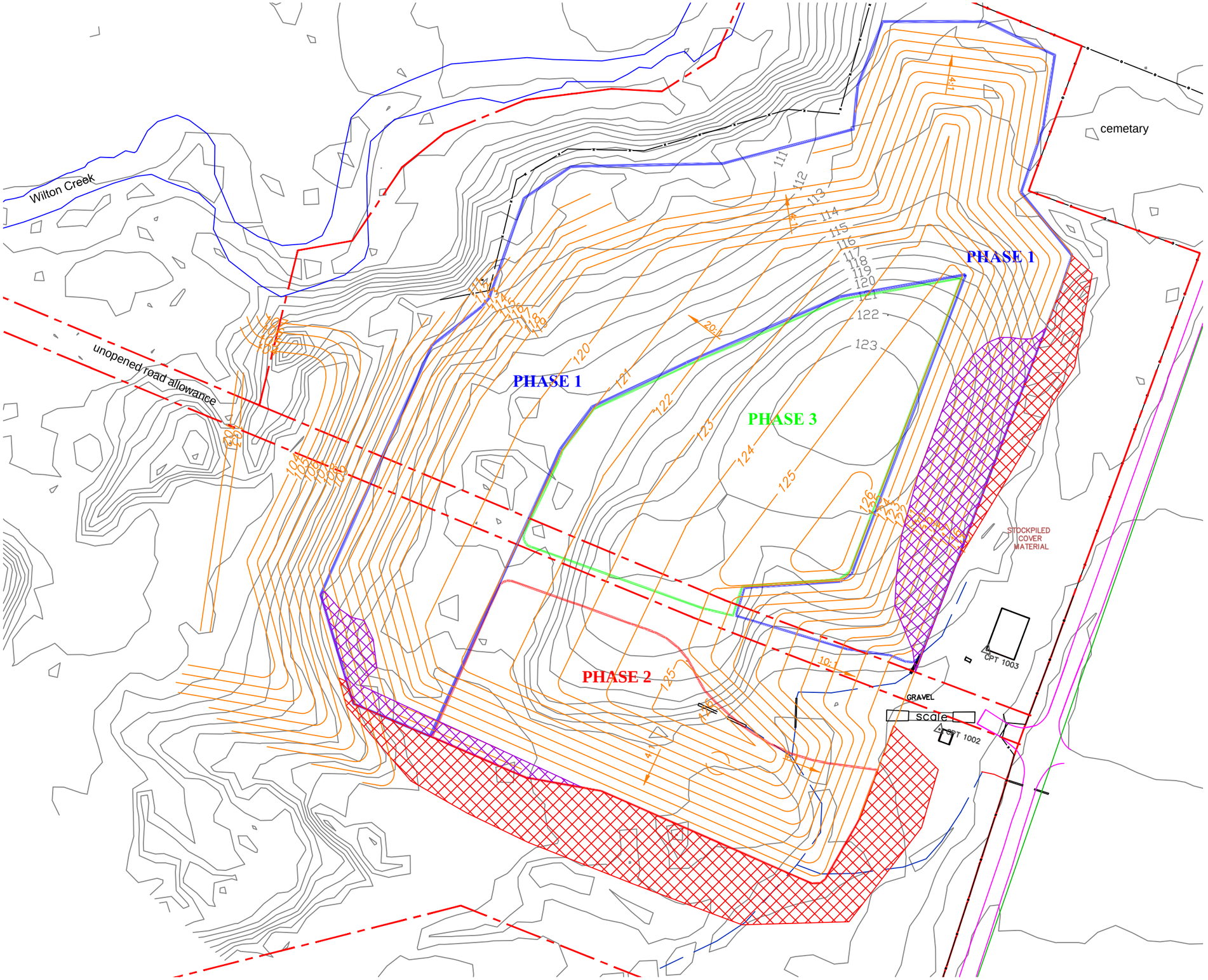
Final Waste Contours

2024 Annual Development, Operations, and Monitoring Report
Loyalist Township: Violet Landfill Site
Violet, Ontario

MALROZ

Figure 2

File: 286-256.00



N
NORTH

Approx. Scale (m)
0 100

LEGEND

- WF — wire fence
- edge of road
- 123 — topographic contour (1.0 m interval, masl) based on January 2025 survey by Malroz in active area and April 2020 survey by Geooptic Inc. in non-active areas.
- proposed final contours (1.0 m interval, masl)
- property boundary
- building footprint
- ditch
- Phase 1 fill area
- Phase 2 fill area
- Phase 3 fill area
- fill areas exceeding the original licensed fill area based on 1992 D&O Plan by TSH.
- areas where elevations exceed the proposed final contours based on 2020 survey by Geooptic Inc. and 2025 survey by Malroz.
- licensed fill area based on 1992 D&O Plan by TSH

Notes:

Drawing based on AECOM ACAD file 2015-60119534-1.DWG, December 2015 and 1992 D&O Plan by TSH.

Waste contours based on survey by Malroz January, 2025, and drone survey points provided by GeoOptic (April, 2020).

Proposed final contours and existing waste contours based on local control points and are not geodetically referenced.

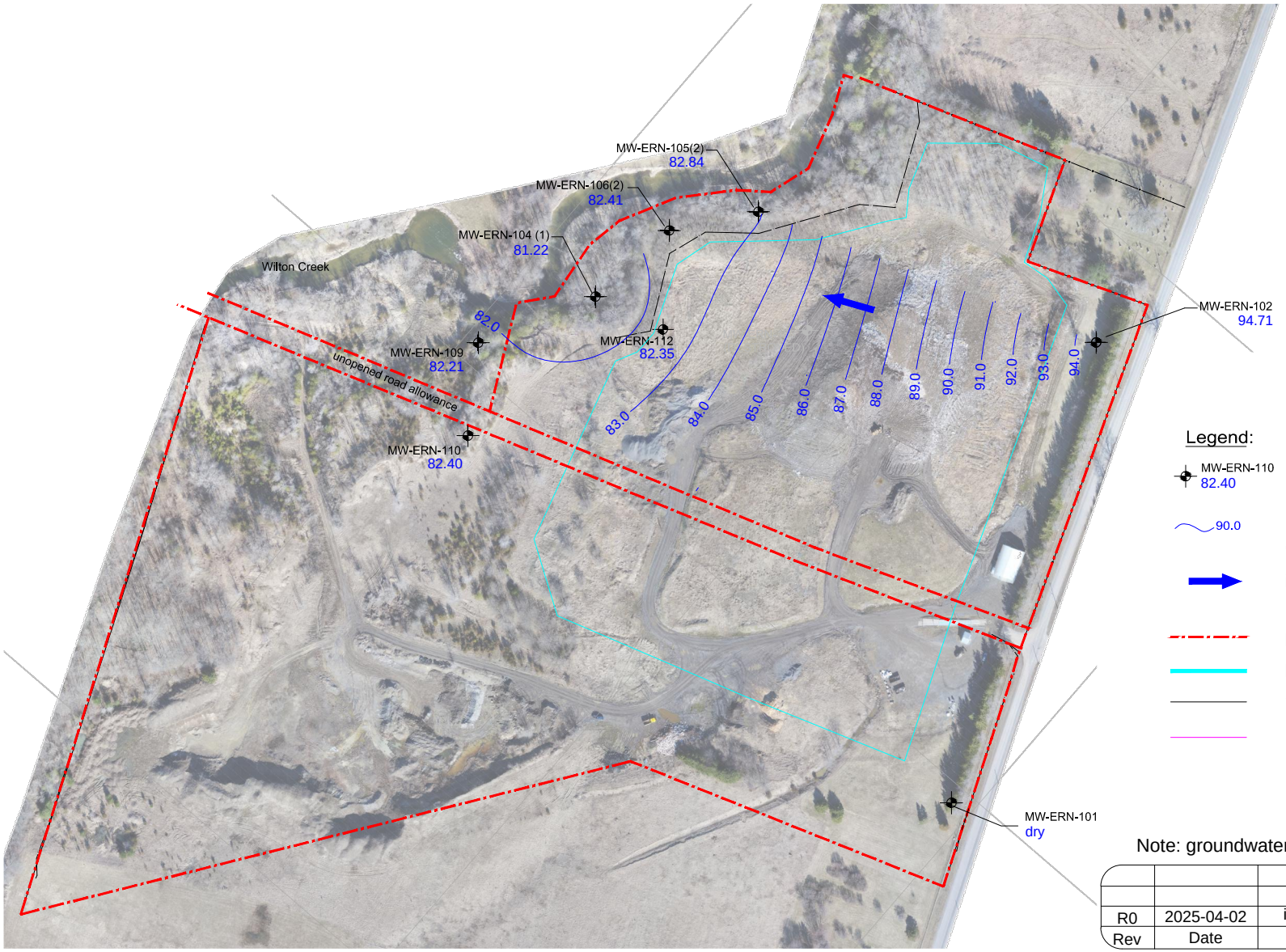
R0	2025-04-02	issued in final	ZL	RG
Rev	Date	Description	By	Checked

Comparison of Current and Final Waste Contours

2024 Annual Development, Operations, and Monitoring Report
Loyalist Township: Violet Landfill Site
Violet, Ontario

MALROZ

Figure
3
File: 286-256.00



Note: groundwater contours generated by surfer

R0	2025-04-02	issued in final	ZL	RG
Rev	Date	Description	By	Checked

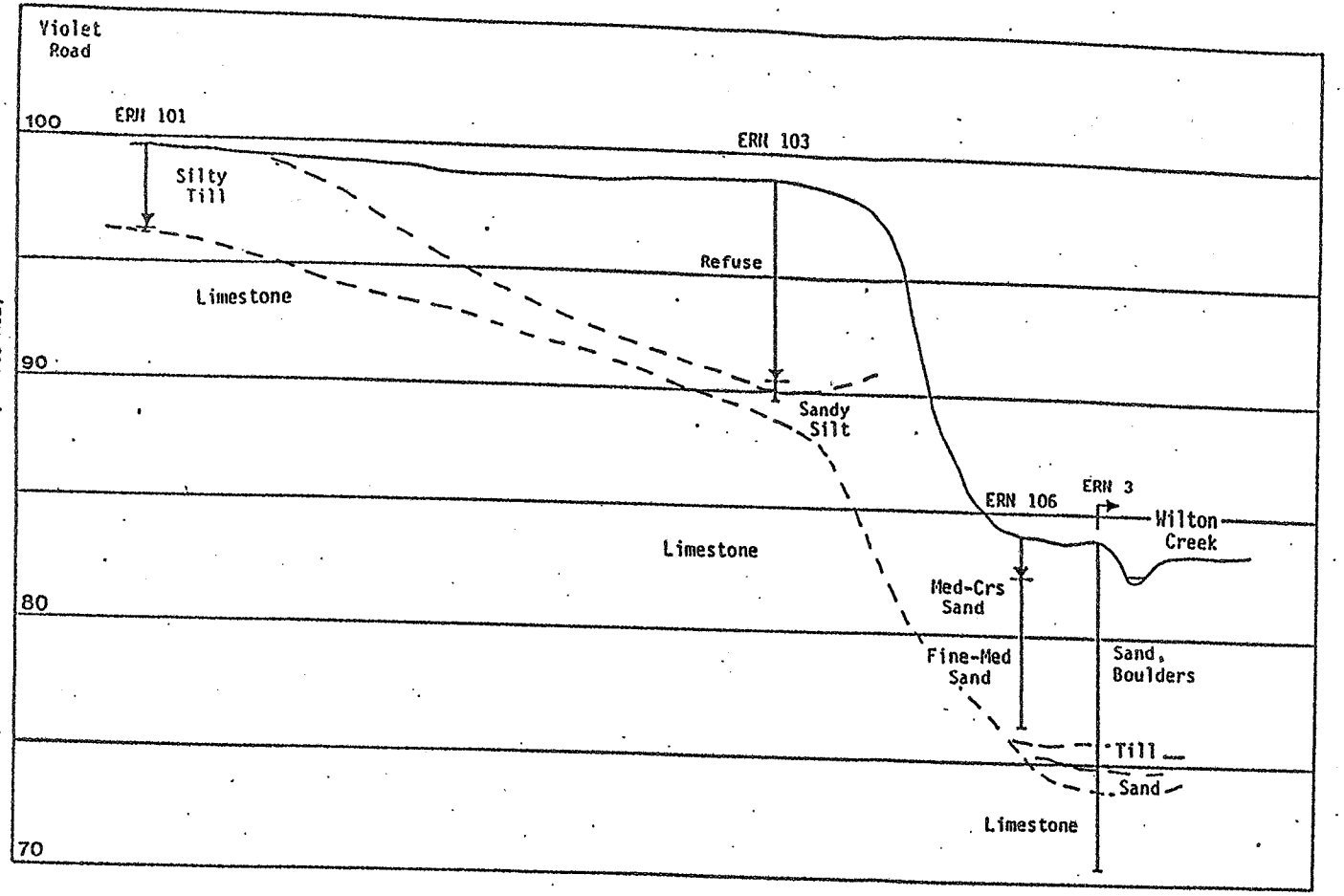
MALROZ

Groundwater Elevation in Overburden Wells (May 2024)

2024 Annual Development, Operations, and Monitoring Report
Loyalist Township: Violet Landfill Site
Violet, Ontario

Figure
4
File: 286-256.00

Appendix C
Cross-Section and Borehole Logs



Vertical Scale: 1: 200
Horizontal Scale: 1:2,000

Geologic Contact
Static Level
Flowing Well

Loyalist Township
Violet Landfill Annual Report

GEOLOGIC SECTION

HYDROTERRA LIMITED

1002H	As Shown
	May 1998
	Figure 3

APPENDIX A.1

GEOLOGIC INFORMATION
TOWNSHIP OF ERNESTOWN
VIOLET SANITARY LANDFILL
PROJECT NO. 1002

Borehole	Depth (metres below ground)	Geologic Particulars
ERN 101	0 - 2.74	Greyish brown, SILTY SAND (TILL), stony, moist dense
	2.74 - 3.43	Grey FINE-MEDIUM SAND; with limestone fragments, wet, very dense

Borehole could not be advanced below 3.43 metres - limestone bedrock surface.

Standpipe installed in borehole, comprising 50 mm flush-jointed PVC casing with commercially-manufactured slotted screen (0.25 mm openings) set from 1.91 to 3.43 metres. 13 mm rigid PVC gas monitor with lower 3-metre slotted interval set in borehole, bottoming at 2.99 metres. Silica-sand backfill placed opposite screened interval and native-soil cuttings placed in remainder of borehole. Bentonite-pellet seal set in upper interval from 0.61 to 1.22 metres. 150 mm steel casing set over groundwater monitor, extending 0.9 metres below ground and 0.9 metres above ground.

ERN 102	0 - 1.52	Greyish-brown FINE-MEDIUM SAND, loose, moist
	1.52 - 4.24	Grey, FINE-MEDIUM SAND, loose, moist to wet at depth

Refusal at 4.24 metres - limestone bedrock.

Standpipe installed in borehole, comprising 50 mm flush-jointed PVC casing with commercially-manufactured slotted screen (0.25 mm openings) set from 2.71 to 4.24 metres. 13 mm rigid PVC gas monitor with lower 3-metre slotted interval set in borehole, bottoming at 2.59 metres. Silica-sand backfill placed opposite screened interval and native-soil cuttings placed in remainder of borehole. Bentonite-pellet seal set in upper interval from 0.91 to 1.52 metres. 150 mm steel casing set over groundwater and gas monitors, extending 1.0 metres below ground and 0.8 metres above ground.

Borehole	Depth (metres below ground)	Geologic Particulars
ERN 103 (Refuse monitor)	0 - 8.84	Domestic REFUSE, gassy, odourous with substantial amount of polyester-fibre waste, moist, becoming wet at depth
	8.84 - 9.14	Grey SANDY SILT, wet, compact

Standpipe installed in borehole, comprising 50 mm flush-jointed PVC casing with commercially-manufactured slotted screen (0.25 mm openings) set from 6.09 to 9.14 metres. Silica-sand backfill placed opposite screened interval and native-soil cuttings placed in remainder of borehole. Bentonite-pellet seal set from 0.91 to 1.22 metres. 150 mm steel casing set over groundwater monitor, extending 0.9 metres below ground and 0.9 metres above ground.

ERN 104	0 - 1.22	Greyish-brown FINE-MEDIUM SAND, moist, loose
	1.22 - 8.10	Grey FINE-MEDIUM SAND, wet, loose to compact

Standpipes, comprising 50 mm PVC casing with 1.5 metres commercially slotted screens (0.25 mm openings), installed in each of three separate boreholes bottoming at 3.50 metres, 5.49 metres and 8.08 metres. Boreholes were advanced without wash water to control heaving - sand conditions; however, hollow-stem augers were almost unretrievable due to sand heaving. Subsequent deeper boreholes were rapidly advanced, with wash water introduced, as required, to prevent sand heaving.

Boreholes immediately collapsed as augers were pulled after installation of monitors, precluding the placement of granular backfill. Bentonite-pellet seals were placed in the upper unsaturated intervals of the boreholes.

Borehole	Depth (metres below ground)	Geologic Particulars
ERN 105	0 - 2.13	Brownish-grey SILTY SAND, loose, moist to wet
	2.13 - 3.66	Grey, SILTY SAND TILL, compact, wet
	3.66 - 4.57	Grey, SILTY FINE-MEDIUM SAND, compact to dense, wet
	4.57 - 5.18	Grey, SILTY SAND TILL, compact, wet
	5.18 - 7.01	Grey, MEDIUM-COARSE SAND, compact, wet
	7.01 - 7.39	Grey, SILTY SAND TILL, compact, wet

Refusal at 7.39 metres - limestone bedrock.

Standpipes, comprising 50 mm PVC casing with 1.5 metre commercially slotted screens (0.25 mm openings), installed in two separate boreholes bottoming at 4.57 metres and 7.39 metres. Shallow borehole was advanced without wash water, whereas washing was required to control sand heaving in the deeper borehole. Each borehole immediately collapsed with the removal of augers, preventing the placement of granular backfill. Bentonite-pellet seals were placed in the upper unsaturated materials of each borehole. 150 mm protective casing were placed over each monitor, recognizing the vulnerable locations of the monitors to seasonal ice-sheet rafting within the adjacent creek.

ERN 106	0 - 3.65	Greyish-brown, MEDIUM-COARSE SAND, loose to compact, moist to wet at depth
	3.65 - 7.62	Grey FINE-MEDIUM SAND, loose to compact, wet

Standpipes, comprising 50 mm PVC casing with 1.5 metre commercially slotted screens (0.25 mm openings) installed in two separate boreholes bottoming at 4.57 metres and 7.62 metres. Both boreholes required wash water to collect representative soil samples and to permit installation of monitors. Each borehole immediately collapsed during pulling of augers, placing native soils opposite screened intervals. Bentonite-pellet seals were placed in upper unsaturated formation of each borehole.

Borehole	Depth (metres below ground)	Geologic Particulars
ERN 107	0 - 2.29	Greyish-brown MEDIUM-COARSE SAND, loose to compact, moist to wet at depth
	2.29 - 4.11	Greyish-brown FINE SAND, loose, wet
	4.11 - 5.18	Grey SANDY GRAVEL, compact, wet

Standpipe installed in borehole, comprising 50 mm flush-jointed PVC casing with commercially-manufactured slotted screen (0.25 mm openings) set from 2.97 to 4.50 metres. Wash water required to install monitor. Borehole collapsed during removal of augers, placing native soils opposite screen. Bentonite seal installed in unsaturated overburden sequence.

ERN 108	0 - 5.18	Greyish-brown FINE-MEDIUM SAND, loose, wet

Standpipe, comprising 50 mm PVC casing with 1.5 metre screen (0.25 mm openings) installed in borehole bottoming at 4.42 metres. Wash water required to sample borehole and install monitor. Borehole collapsed after removal of augers, precluding installation of granular backfill. Bentonite seal placed in upper unsaturated formation.

ERN 109	0 - 3.66	Greyish-brown FINE-MEDIUM SAND, loose, moist to wet at depth
	3.66 - 5.18	Grey FINE-MEDIUM SAND, compact, wet
	5.18 - 6.70	Grey, SILTY COARSE SAND/GRAVEL compact to dense, wet
	6.70 - 8.22	Grey MEDIUM-COARSE SAND, compact, wet

Standpipes, comprising 50 mm PVC casing with 1.5 metre screens (0.25 mm openings), installed in two separate boreholes bottoming at 4.72 metres and 7.73 metres. Washing was required to sample both boreholes and to install monitor at designated depths. Boreholes collapsed immediately after augers pulled and were sealed with bentonite pellets in upper unsaturated interval.

Borehole	Depth (metres below ground)	Geologic Particulars
ERN 110	0 - 9.14	Brown FINE-MEDIUM SAND, wet

Borehole drilled without split spoon sampling to depth of 9.14 metres - materials on auger flights entirely consisted of granular sediments (sand). 50 mm monitor with 3.0 metre screen (0.25 mm openings) installed at 7.82 metres, without involving wash water into borehole. Formation collapsed as augers pulled. Bentonite seal set in upper unsaturated overburden.

ERN 111	0 - 4.27	Greyish-brown FINE-MEDIUM SAND, moist to wet at depth
	4.27 - 4.90	Grey SILTY SAND TILL, compact

50 mm standpipe installed with 3.0 metre screen (0.25 mm openings) bottoming at 4.88 metres. Wash water not used in placing monitor. Bentonite seal set in upper overburden.

APPENDIX A.1

PROJECT 1002

ERNESTOWN LANDFILL

MINISTRY OF THE ENVIRONMENT

GEOLOGIC LOGS IN VICINITY OF ORIGINAL OBSERVATION WELLS

OW 3	Brown sand	0 - 12.0 feet
	Grey gravel	12.0 - 14.0
	Brown sand	14.0 - 41.0
	Grey till	41.0 - 43.0
	Grey gravel	43.0 - 43.5
	Grey limestone	43.5 - 45.7
OW 4	Brown sand	0 - 5.0 feet
	Brown sand, boulders, trace clay	5.0 - 27.0
	Grey till	27.0 - 30.0
	Brown sand	30.0 - 33.0
	Grey limestone	33.0 - 44.0
OW 5	Brown sand, clay lenses, boulders	0 - 25.0 feet
	Grey till	25.0 - 28.0
	Brown sand	28.0 - 28.5
	Grey limestone	28.5 - 33.0
OW 6	Brown sand, clay, gravel, boulders	0 - 9.0 feet
	Grey till	9.0 - 10.0
	Brown sand	10.0 - 11.0
	Grey till	11.0 - 12.5
	Brown sand	12.5 - 16.0
	Grey limestone	16.0 - 35.2

APPENDIX A.2

PROJECT 1002

ERNESTOWN LANDFILL

ORIGINAL MONITOR-WELL DETAILS (OCTOBER, 1989)

Location	Monitor Details	Current Designation
OW 3	- 62 mm (2.5 in) diameter steel casing; 14.0 m (46 ft) deep	ERN 1
	- 38 mm (1.5 in) diameter steel casing; 4.3 m (14 ft) deep	ERN 2
	- 62 mm (2.5 in) diameter steel casing; 2.1 m (7 ft) deep	--
	- 50 mm (2.0 in) diameter steel casing; cap sealed	--
OW 4	- 38 mm (1.5 in) diameter steel casing; 10.7 m (35 ft) deep	ERN 3
	- 50 mm (2.0 in) diameter steel casing; 9.5 m (31 ft) deep	ERN 4
OW 5	- 50 mm (2.0 in) diameter steel casing; 9.3 m (30 ft) deep	ERN 5
	- 38 mm (1.5 in) diameter steel casing; bent; 0.5 m west of ERN 5	--
	- 38 mm (1.5 in) diameter steel casing; bent; 6.0 m west of ERN 5	--
OW 6	- 50 mm (2.0 in) diameter steel casing; 10.5 m (34 ft) deep	ERN 6
	- 38 mm (1.5 in) diameter steel casing; plugged; 0.75 m north of ERN 6	--

JECT NO. 1002

APP...X I...

SHT ___ OF ___

MONITOR DETAILS

OREHOLE	MONITOR					SCREENED INTERVAL	FILTER PACK	SEAL	BACKFILL
Diameter (mm)	NO.	Type	Diameter (mm)	Stick-up (m)	Elevation (r.o.p.m.)				
(ID)									
108	I	S	50	0.71		1.91 - 3.43	1.83 - 3.43	0.61 - 1.22	1.0 - 0.61
	--	G	13	0.61		1.47 - 2.99	1.83 - 3.43	0.61 - 1.22	1.22- 1.83 0 - 0.61
108	I	S	50	0.91		2.71 - 4.24	1.52 - 4.24	0.91 - 1.52	0 - 0.91
		G	13	0.91		1.07 - 2.59	1.52 - 4.24	0.91 - 1.52	0 - 0.91
108	I	S	50	0.11		6.09 - 9.14	6.09 - 9.14	0.91 - 1.22	0 - 0.91 6.09- 9.14
108	I	S	50	0.78		2.00 - 3.50	--	0 - 0.61	0.61- 3.49
	II	S	50	0.76		3.96 - 5.49	--	0 - 0.91	0.91- 5.49
	III	S	50	0.76		6.55 - 8.08	--	0 - 0.91	0.91- 8.08
108	I	S	50	0.61		3.05 - 4.57	--	0 - 0.91	0.91- 4.57
	II	S	50	0.61		5.86 - 7.39	--	0 - 0.91	0.91- 7.39
108	I	S	50	0.91		3.05 - 4.57	--	0 - 0.91	0.91- 4.57
	II	S	50	0.91		6.10 - 7.62	--	0 - 0.91	0.91- 7.62
108	I	S	50	1.40		2.97 - 4.50	--	0 - 0.91	0.91- 4.50
108	I	S	50	0.84		2.90 - 4.42	--	0 - 0.61	0.61- 4.42
108	I	S	50	0.31		3.20 - 4.72	--	0.61	0.61- 4.72
	II	S	50	0.84		6.20 - 7.73	--	0 - 0.61	0.61- 7.73
108	I	S	50	1.32		4.77 - 7.82	--	0 - 0.91	0.91- 7.82
108	I	S	50	1.07		1.83 - 4.88	--	0 - 0.91	0.91- 4.88

Project: 286 Violet Landfill

Client: Loyalist Township

File: x:\Data\286\MW112.DWG

Borehole Log: ERN-112

Sheet: 1 of 2

Driller: GET Drilling LTD. | Ground Elevation (m): To be surveyed in 2007 | Field Observer: JP

Equipment: CME 55, 6" H/S Auger | Top of Monitor (m): To be surveyed in 2007 | Field Instrument: RKI Eagle

Monitor Number: MW-ERN-112 | Date: 07/02/05

Mon. Data	Depth (ft)	Depth (m)	Lithology	Description	Sample #	Type	Blow count	% Recovery	Combustible Vapours (ppm)	Remarks
				Ground Surface Frozen Fill/Refuse						
	0	0		**Fill** domestic refuse, dry	-		-	-	-	Equipped with Above grade well protector MOE well tag # A037925
	5	1		abundant domestic refuse, polyester fibre waste material at 1.5m						
	10	3			-		-	-	-	
	15	4		coarse sand, polyester fibre waste material, moist at 4.6m	01		7 7 4 8	30	0	
	17	5		**Sand** brown, coarse, dry						
	20	6			-		-	-	-	
	23	7		becoming damp at 7.6m						
	25	8			-		6 6 20 14	30	0	
	28				-		-	-	-	

This borehole log should not be separated from the accompanying report.

MALROZ

Project: 286 Violet Landfill

Client: Loyalist Township

File: x:\Data\286\MW112.DWG

Borehole Log: ERN-112

Sheet: 2 of 2

Driller: GET Drilling LTD.

Ground Elevation (m): To be surveyed in 2007

Field Observer: JP

Equipment: CME 55, 6" H/S Auger

Top of Monitor (m): To be surveyed in 2007

Field Instrument: RKI Eagle

Monitor Number: MW-ERN-112

Date: 07/02/05

SUBSURFACE PROFILE

Mon. Data	Depth ft	Depth m	Lithology	Description	Sample #	Type	Blow count	% Recovery	Combustible Vapours (ppm)	Remarks
	29	9		**Sand** brown, coarse	-		-	-	-	
	30			becoming moist at 9.3m	-		6 8 9 11	30	0	
	31									
	32	10		becoming saturated at 9.8m	-		-	-	-	
	33									
	34									
	35			becoming grey at 10.8m						
	36	11			02		9 8 8 6	75	0	
	37									
	38				-		-	-	-	
	39	12								
	40									
	41			End of Borehole at target depth (12.2 meters)						
	42	13								
	43									
	44									
	45	14								
	46									
	47									
	48	15								
	49									
	50									
	51	16								
	52									
	53									
	54	17								
	55									
	56									
	57									

This borehole log should not be separated from the accompanying report.

MALROZ

Appendix D
List of Materials Accepted for Recycling

Garbage and Recycling

New - Garbage and Recycling App

recycle coach Stay up to date on collection days and have all your garbage and recycling questions answered!

Waste & Recycling Information Report a Problem

My Schedule What Goes Where Discovery Zone

To get waste and recycling information for where you live, select your municipality

Choose your area

Material List User Agreement Privacy Policy

To the curb by 7 a.m - maximum 40lbs/18kg a bag or can

- All your waste and recycling items **must be placed at the curbside by 7 a.m. on the morning of your collection day** to make sure everything is picked up. If you are late - collection crews are not able to return.
- Maximum weight of garbage that can be placed at the curb is **18kgs/40lbs**.

- All garbage bags placed at the curb must have a properly affixed bag tag on the **bag.**

Bag Tags

Brush/Yard Waste

Composting

FLIDO

Garbage

Giveaway Day

Landfills

Recycling

How Often and When?

- Mainland curbside pickup of garbage and recycling happens three days a week.
    - Amherst Island residents can take their garbage and recycling directly to the landfill.
- Brush and yard waste are collected separately in the spring and fall every year.
- Household hazardous waste should be taken to the Kingston Area Recycling Centre (KARC).

2024 Municipal Calendar

Download an electronic version of the 2024 Loyalist Township Municipal Calendar (pdf: 8 MB).

It provides information on garbage and recycling schedules, recycling sorting, landfills, giveaway days, local events and more!

Box 70, 263 Main Street
Odessa, Ontario K0H 2H0
Tel: 613-386-7351
info@loyalist.ca

Office Hours

Mon - Fri 8:30 a.m. to 4:30 p.m.

After-Hours Emergencies
Involving Roads, Water/Sewer Service, or a Township Facility
Call 613-507-3069

By GHD Digital (https://ghddigitalpss.com/)

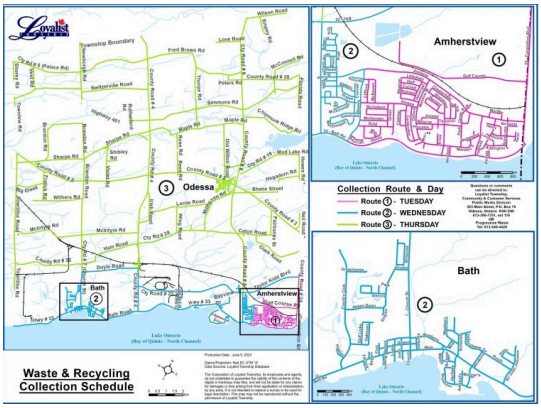
Garbage

New! Stay up to date on collection days. Download the recycle coach app at the links below.

Download on the App Store GET IT ON Google Play

Pickup schedules

If you live in mainland Loyalist Township, your garbage is picked up on the same day each week, depending on your area. This map shows the collection areas (select map for larger version).



Map legend: Pink – Area 1 – Tuesday Blue – Area 2 – Wednesday Green – Area 3 – Thursday

Garbage is picked up every week. Pickup is done by Waste Connections, the Township's contractor. We also publish the collection schedule in the municipal calendar.

What if a schedule changes?

Your pickup day may change if a holiday overlaps with a regular collection day. Sometimes your pickup will be earlier than you're used to. We print regular schedules and changes in our calendar, and changes are listed on our website. Sign

up to receive notifications when there are schedule disruptions by downloading the recycle coach app.

My garbage wasn't collected

Review the garbage pickup rules below. If you're not sure why your garbage was missed, call our office at 613-386-7351, ext. 116.

Garbage pickup rules

- Garbage must be at the curb by 7 a.m. and is usually picked up by 5 p.m.
- You can put it out at 6:30 p.m. or later the night before.

Garbage Bags

- Every bag needs a bag tag.
- Each bag must weigh no more than 18 Kg (40 lbs).
- The largest bag size is 75 cm x 95 cm (30” x 38”).

Garbage Cans

- Multiple kitchen/grocery bags can be placed in a container, to a maximum of 18 Kg (40 lbs).
- Fasten bag tag to the top bag in container.
- The largest container size is 77 litres (17 gallons).

Amherst Island residents

If you live on Amherst Island, please take your garbage and recycling to the Amherst Island landfill. Garbage must be tagged or tipping fees will apply.

Bag tags

We have a “pay as you throw” system for garbage, meaning that you need to purchase garbage bag tags. Every bag of garbage needs a bag tag when it's put out at the curb.

Visit our bag tag page to find further details regarding bag tags in Loyalist Township, or to purchase bag tags.

Purchase Bag Tags Online

Source separated organics survey

In the fall of 2020, Loyalist Township released a survey to engage with residents on current waste practices and to collect feedback on potential source separated organic waste programs. The survey closed on December 23, 2020. Results and data were analyzed and recommendations to Council followed based on the input collected. Visit our Climate Action Page to learn more about the Township's ResiLienT Climate Action Plan.

Box 70, 263 Main Street
Odessa, Ontario K0H 2H0
Tel: 613-386-7351
info@loyalist.ca

Office Hours

Mon - Fri 8:30 a.m. to 4:30 p.m.

After-Hours Emergencies
Involving Roads, Water/Sewer Service, or a Township Facility
Call 613-507-3069

By GHD Digital (https://ghddigitalpss.com/)

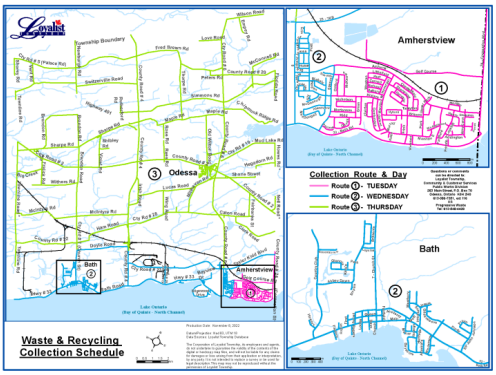
Recycling

New! Stay up to date on collection days. Download the recycle coach app at the links below.

Download on the App Store GET IT ON Google Play

Pickup schedules

If you live in mainland Loyalist Township, your recycling is picked up on the same day each week, depending on your area. This map shows the collection areas (select map for larger image).



Map Legend: Pink – Area 1 – Tuesday Blue – Area 2 – Wednesday Green – Area 3 – Thursday

Recycling pickup rotates between grey box one week and blue box the next week. Pickup is done by Waste Connections, the Township's contractor. We publish the collection schedule in the Township's municipal calendar.

Changes to schedules

Your pickup day may change If a holiday overlaps with a regular collection day. Sometimes your pickup will be earlier than you're used to. We print regular schedules and changes in our calendar, and changes are listed on our website. Sign up to receive notifications when there are schedule disruptions by downloading the recycle coach app.

My recycling wasn't collected

1. Review the recycling pickup rules below.
2. Ensure you had the right items out for the correct week.
3. Review how to properly prepare your recyclables.
4. If you aren't sure why your recycling was missed, call our office at 613-386-7351, ext. 116.

Recycling pickup rules

1. Recycling must be at the curb by 7 a.m. and is usually picked up by 5 p.m.
2. You can put it out at 6:30 p.m. or later the night before.
3. Pickup schedules alternate between blue box items one week and grey box items the next.

You can also take recyclables to the Kingston Area Recycling Corporation (KARC), 196 Lappan's Lane, Kingston. It is open year-round, Monday to Friday from 8 a.m. to 5 p.m., and Saturday from 8 a.m. to 4 p.m. This is free for Township residents.

Recycling bins

- New residents will receive one free grey and blue box per household.
- You can pick up recycling bins at the Odessa municipal office.
- Extra bins are $8 each.
- If your box is damaged, bring it back to the Odessa office and it will be replaced at no charge.

Recycling process

- Recycling materials collected in Loyalist Township are processed for recycling at the Kingston Area Recycling Centre. This video shows you what

happens to your recycled waste after it is collected at the curb and sorted at the Kingston Area Recycling Centre.

Amherst Island Residents

If you live on Amherst Island, please take your recyclables to the Amherst Island landfill.

What goes in your blue and grey bins?

When you prepare your recyclables properly, you help make sure our drivers can complete their routes efficiently. We have created a handy printable guide you can post in your home to help you sort your recyclables. Download the recycle coach app and use the *What Goes Where Tool* to search more than 15,000 items!

Blue bin

Plastic

YES: Plastic bottles, jars, tubs and lids, cartons, trays, clamshell, and other rigid plastic packaging. All plastic types with a recycling symbol on them are recyclable, regardless of the number in the symbol.

NO: Plastic pails over 10 litres, toys, laundry baskets, storage totes, or large plastics that are not a food, beverage, or household container or rigid package.

Styrofoam

YES: White rigid Styrofoam pieces, no longer than 90cm x 60cm x 20 cm (35" x 23.5" x 7.75").

NO: Coloured or dyed Styrofoam of any size, popcorn Styrofoam, or flexible Styrofoam.

Glass

YES: clear and coloured glass bottles and jars. Return beer and alcohol bottles to The Beer Store or LCBO for a refund.

NO: broken glass, window panes, mirrors, light bulbs, ceramics, drinking glasses.

Aluminum and steel

YES: metal food and beverage cans. Metal lids can be placed inside a can and pinched shut. Labels do not need to be removed. Paper cans with metal ends (i.e., coffee cans, chip cans, nut cans, frozen juice cans, etc.)

NO: Aerosol or paint cans, cooking pots or pans, foil wrap, paper-backed foil (such as takeout container lids), or foil laminates (potato chip bags)

Grey bin

Paper products

YES: newspaper, white paper, coloured paper, colour flyers, catalogues, telephone books, soft cover books, magazines, envelopes, and hard cover books with the cover removed. Place in a clean, untied grocery or paper bag or tie in bundles. This stops the paper from blowing away.

NO: gift wrap.

Plastic bags

YES: grocery bags, milk bags/pouches, frozen vegetable bags, and newspaper sleeves. Place all clean bags into an empty bag and tie shut.

NO: cereal/cracker box liners, plastic food wrap, zipper-type storage bags, diapers, meat/bacon packaging, "crinkly" outer packaging (such as pasta bags), pet food bags, or bubble wrap.

Boxboard and polycoat

YES: cereal boxes, cracker boxes, frozen food boxes, egg cartons, paper towel tubes, drink trays, greeting cards.

Polycoat: Rinse and flatten milk cartons, juice cartons, and Tetra Pak juice boxes. Place together with boxboard.

Boxboard: flatten and bundle or place inside another box.

Corrugated cardboard

Remove staples and tape. Flatten and bundle no bigger than 0.9m x 0.6m x 0.08m (36" x 24" x 8"). Tie bundles with string. There is limit of six bundles per collection. Place bundles beside your Grey Box.

NO: wax-coated boxes or soiled pizza boxes.

Hazardous Waste

NO HAZARDOUS WASTE. Household hazardous waste (HHW) includes products like used motor oil and empty motor oil containers, leftover paint, and chemicals that can't go into the garbage or recycling bin. Our HHW program is managed through the City of Kingston and is free for Loyalist Township residents.

Kingston's **HHW depot** is at 196 Lappan's Lane. It's open Thursdays and Saturdays from April through November. Check to see what they accept before you go.

Battery Recycling

Loyalist Township has a battery recycling program to help residents safely recycle batteries. Recycling your batteries helps protect your community from materials that may harm the environment if they end up in landfills.

Visit our battery recycling page to find additional information on the Township's battery recycling program.

Box 70, 263 Main Street
Odessa, Ontario K0H 2H0
Tel: 613-386-7351
info@loyalist.ca

Office Hours

Mon - Fri 8:30 a.m. to 4:30 p.m.

After-Hours Emergencies
Involving Roads, Water/Sewer Service, or a Township Facility
Call 613-507-3069

By GHD Digital (https://ghddigitalpss.com/)

Brush and yard waste

Loyalist Township provides separate collections for brush and yard waste in spring and fall. Crews will pass through an area only once for each collection. They will not return for late items.

Brush pickup

Collections are twice a year and usually in April and October. Please refer to the municipal calendar or website calendar for this year's dates.

- Brush must be at the curb no later than 7:00 a.m. on the first day of the program
- Branches no larger than 4 inches in diameter
- Please stack brush with cut ends facing out (towards road)
- Households are limited to 1.78m3 (64 cu ft) or one half-ton pickup truck load
- Yard waste is not included

Yard waste pickup

Collections are twice a year and usually in May and November. Please refer to the municipal calendar or website calendar for this year's dates.

- Yard waste must be at the curb no later than 7:00 a.m. on the first day of the program
- paper bags only (Kraft)
- brush is not included
- no plastic bags of any type*
- defined as anything that is, or once was, growing in your yard, for example, grass clippings, leaves, flowers, hedge trimmings.

- excludes food waste, pet faeces, soil, rocks, or any non-organic debris you may rake up from your lawn.

*****It is important that yard waste is not put in plastic bags of any type, even those marked as biodegradable or as suitable for municipal yard waste. They are not acceptable for Loyalist's program. Yard waste placed in plastic bags of any kind will be left at the curb.

Kingston Area Recycling Centre

Both brush and yard waste can be dropped off at Kingston Area Recycling Centre, 196 Lappan's Lane, Kingston. This is free of charge to Loyalist residents and it is open year round.

Box 70, 263 Main Street
Odessa, Ontario K0H 2H0
Tel: 613-386-7351
info@loyalist.ca

Office Hours

Mon - Fri 8:30 a.m. to 4:30 p.m.

After-Hours Emergencies
Involving Roads, Water/Sewer Service, or a Township Facility
Call 613-507-3069

Composting

Wish you could keep your kitchen scraps, eggshells, and coffee grounds out of your garbage bin?

Consider backyard composting! Composting is an ideal way to cut down on your green waste while generating a free, rich fertilizer for your vegetable and flower gardens.

Loyalist Township sells backyard compost bins at the Odessa Municipal Office for $37+HST.

Learn more about effective backyard composting, and what should and should not go in your composter!

Box 70, 263 Main Street
Odessa, Ontario K0H 2H0
Tel: 613-386-7351
info@loyalist.ca

Office Hours

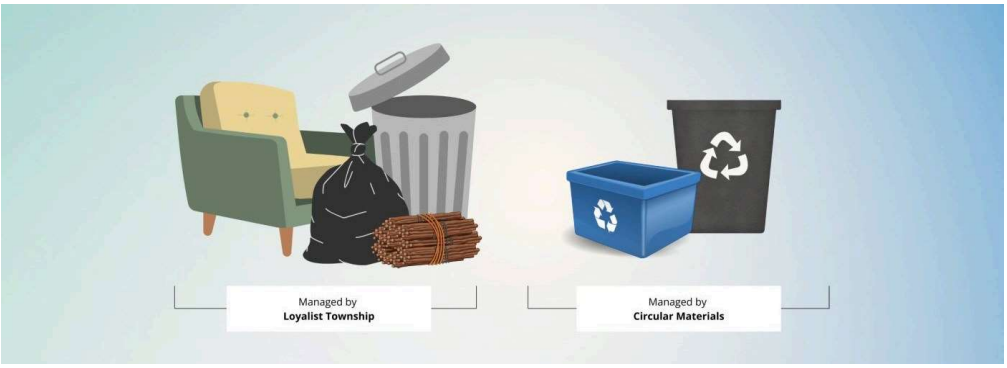
Mon - Fri 8:30 a.m. to 4:30 p.m.

After-Hours Emergencies
Involving Roads, Water/Sewer Service, or a Township Facility
Call 613-507-3069

Recycling Transition

Changes coming to recycling collection

Under the Blue Box Regulations, Ontario is changing the responsibility for recycling to producers rather than municipalities. Residential recycling programs in Ontario are moving to a new collection system that is fully funded and operated by producers of recycling materials. This shift to a framework called **extended producer responsibility** becomes effective in Loyalist Township on **July 1, 2025.** The new collection system will make recycling easier by standardizing what can be recycled across Ontario.



What does this mean for Loyalist residents?

Your residential curbside recycling will still be collected and removed. All materials previously collected will continue to be collected. It is possible more material types may be included in future by Circular Materials.

Waste Connections will continue to handle the garbage collection. Emterra Group has been contracted by Circular Materials to handle the recycling from July 1, 2025.

Timeline

- **January 1 to June 30, 2025**
    - Loyalist continues to manage all garbage and recycling.

- **July 1 to December 31, 2025**
    - **Business Owners** will need to set up their own collection agreements directly with contractors.
    - **Mainland curbside blue box** recycling collection services will remain unchanged.
    - **Amherst Island** residents should continue to drop off recycling at the Amherst Island waste management site where signage will be updated.

- **January 1, 2026 onwards**
    - Circular Materials will take full responsibility for recycling collection and management and may introduce some changes to the program.

How will this affect me?

Residents that receive curbside blue box collection

July 1, 2025 – December 31, 2025

Your curbside blue box recycling services will remain unchanged. Collection dates and acceptable materials will stay the same, but separate contractors will handle garbage and recycling collection starting July 1, 2025. Circular Materials has awarded the contract for Loyalist Township collection to Emterra Group.

- Emterra will provide curbside collection for recycling
- Emterra will handle new and replacement recycling receptacles at a location in Napanee
- Emterra will handle customer inquiries about missed recycling collection
- Waste Connections will continue to provide curbside collection for garbage.

January 1, 2026 – July 1, 2026

Curbside collection of Garbage and Recycling will continue to be provided by Waste Connections. Information on the Blue Box transition will be provided though municipally managed social media sites, our Loyalist Township garbage and recycling webpage, the Recycle Coach app, Engage Loyalist, and on an information pamphlet included with the Q1 Tax notice.

Starting January 1, 2026

Circular Materials will take full responsibility for recycling collection and management and may introduce some changes to the program.

After January 1, 2026

You will still have access to the app, Recycle Coach, where you will find information on scheduled collection days, service disruptions and acceptable recycling materials including any updates on acceptable recycling materials provided by Circular Materials. We will continue to manage all other notifications on the Recycle Coach app.

Industrial, Commercial, or Institutional (ICI) Business Owners

As of **July 1, 2025**, ICI businesses will no longer qualify for blue box recycling services provided by Circular Materials or Loyalist Township as per O. Reg. 391/21: BLUE BOX and Council Resolution 2024-127, "Blue Box Transition - Non-Eligible Sources,".

Letters have been sent to affected businesses with further details. If you believe you received this letter in error or have not received a letter, please contact Loyalist Township for clarification.

ICI businesses will continue to have access to recycling options, although they will be required to set up collection agreements with private contractors. Below is a list including some of the contracts offering collection services for ICI businesses:

- Waste Connections of Canada – Kingston
- Environmental 360 Solutions
- Emterra Group
- Waste Management

The collection and management of recycling for municipally owned and operated facilities will continue under a separate private contract.

A limited number of ICI businesses that received collection service prior to 2025, will continue to have garbage collection provided by Loyalist Township. We would like to remind qualifying ICI businesses that it is important to divert recycling materials from landfills. Co-mingled garbage and recycling will be refused at pickup. Repeat offenders may be asked to coordinate separate garbage collection contracts.

Amherst Island residents using the waste/recycling depot

January 1, 2025 – July 1, 2025

Updated signage and a more comprehensive list of acceptable materials will be developed and installed. The focus will be on enhancing your experience and providing a functional site layout that works for you. We also plan to roll out a site plan to help you become more familiar with how your waste is being sorted. You'll have access to this from July 1, 2025.

July 1, 2025 – December 31, 2025

You may continue to drop off your recycling materials at the Amherst Island waste management facility. The list of accepted materials and the number of streams will remain the same. Updated signage and onsite guidance will be available. The Emterra Circular Materials contractor will manage different bins on-site effective July 1, 2025.

Starting January 1, 2026

Circular Materials will assume responsibility for the collection of bins onsite and the management of recycling materials offsite. Our staff will continue to manage operations onsite, including both garbage and recycling. Changes to the acceptable number and types of recycling material may be adopted by the program.

After January 1, 2026

You'll still have access to Recycle Coach where you'll find hours of operation, service disruptions, and acceptable recycling materials, including any updates on acceptable recycling materials provided by Circular Materials. We will continue to manage all other notifications on Recycle Coach.

FAQs

What will stay the same?

- Your collection schedule won't change. Garbage and recycling will continue to be collected by your Zone. (Amherst Island residents should continue to drop off garbage and recycling at the Amherst Island waste management site, 145 Dump Road)
- Please continue to sort recycling materials for the appropriate collection day. Check Recycle Coach or the 2025 Township calendar for what goes where and when.

- Acceptable Blue Box Materials remain the same. You can check acceptable materials on Page 14 of the 2025 Township calendar or at our recycling webpage.
- If garbage collection was offered to you in 2024, it will remain the same.
- For new developments, the Township will provide garbage collection for residential developments only.

What will change?

- Blue box issues or concerns should be directed to Emterra.
- Starting July 1, 2025, (ICI)Industrial, Commercial or Institutional property owners, will be required to partner with their own collection contractor. Violet Landfill will not accept recycling contained in the garbage.
- Obtaining new blue boxes or exchanging broken blue boxes will be handled by Emterra.

When will the recycling transition happen?

July 1, 2025

Why is the recycling program changing?

Historically, Ontario's blue box programs were operated by municipalities who were responsible for paying about half of the costs of the program, with producers responsible for the other half. Now, under the current version of the Blue Box Regulations, Ontario is transitioning to a new model where **producers** – the organizations that produce the products and packaging – **are 100% responsible** for operating and funding the program.

Do I have to replace the recycling bins I already have?

- During the transition period, Emterra will keep providing the same recycling services, including picking up the recycling bins that we previously provided to you. Other bins that are still okay to use are those brought into the Township from other areas, but cart-style bins won't be accepted.

- After January 1, 2026, Emterra may choose to change the types of bins they collect. This will depend on the size and method they think works best. New or updated bins could include containers, carts, bags, or other types of bins for recycling. During the transition, you can continue to use the bins that you already have. Also, unless there's an agreement with a producer or organization, the person who gets a recycling bin (like a resident) doesn't actually own the blue box bins given under this rule.
- Circular Materials will share any updates about recycling changes to bins and programs using different methods, including **Recycle Coach**, which is an app that we currently offer for free to help keep you informed. (If you haven't downloaded it yet, please take advantage of the convenience it gives you. You can download from the various APP stores or via the links on our Recycling page)

Where do I get new or replacement recycling bins?

- Emterra has told us that the facility for new or replacement blue boxes will be in Napanee, but we don't know where as yet.
- We haven't been given any details yet of Emterra's requirements for new or replacement bins, but we will let you know once we do.
- It has been confirmed that there will be no cost for new or replacement blue box bins.

What about the Recycle Coach app?

Circular Materials and Loyalist Township will be using the same app platform, Recycle Coach, to provide updates and information on collection times, dates, materials, and any delays. We have an information-sharing agreement in place, so we will be able to provide seamless updates to you through an app that is already familiar and in use by many of you. (If you haven't downloaded it yet, please take advantage of the convenience it gives you. You can download from the various APP stores or via the links on our Recycling page)

What advantages does the new system have?

Extended Producer Responsibility, or EPR, is recognized as one of the most effective mechanisms to improve recycling rates. It helps advance a circular economy where materials are collected, recycled, and returned to producers for use as recycled content in new products and packaging.

What is a circular economy?

Ontario is moving from a linear economy to a circular economy. In a linear economy, natural resources are extracted, manufactured into products, consumed and then thrown away. In a circular economy, products and packaging are designed to minimize waste and then be recovered, reused, recycled and reintegrated back into production. Some great articles about this approach can be found on the RPRA website.

How will the Township ensure recycling isn't mixed with garbage?

Regular Inspection and Audits will help us determine the composition of garbage and help us make more informed discussions.

Education Campaigns will help us keep you informed about options for diversion and recycling as they become available. Education will also reinforce the importance of proper waste management techniques.

Penalties for Non-Compliance may be included in a review of our current waste by-law for those who regularly fail to separate their recycling from waste.

Does this mean our taxes won't include recycling costs in future?

Not exactly. While it may seem like the cost of recycling is being transferred to producers and removed from the consumer, there is still a cost to the Township.

Municipalities themselves are producers of recyclable materials and must pay fees to have these materials collected and managed under the Blue Box Regulation.

Examples of materials we produce include:

- Municipal Calendars
- Guides
- Construction and Utility notices
- Tax bills
- Recreation brochures and guides
- Other informative material that we provide to residents throughout the year

We pay fees to the RPRA for reporting this material and Fees to a Producer Responsibility Organization (PRO) for the collection and management of these materials.

Additionally, we are still responsible for managing a separate contract for the collection of our recycling material at Township owned and operated facilities as we fall under the (ICI) Industrial, Commercial or Institutional property owners Non-eligible sources for recycling collection. Without subsidization from Stewardship fees, we rely on tax revenue to pay for these costs.

How is the Township reducing fees associated with the recycling it produces?

While the Township is required to pay fees for the materials we produce and provide to our community, there is always room for improvement and even some cost savings along the way.

By moving more of our communications to a digital platform and offering more resources online, Loyalist can shift from a paper-based model to a more efficient digital platform, providing quick and easy access to information such as calendars, guides, notices, and tax statements.

That said, we won't do away with paper entirely. In accordance with the *Accessibility for Ontarians with Disabilities Act*, we will continue to provide copies of many Township documents in paper format to ensure everyone has equal access to information.

What is a circular economy?

Ontario is moving from a linear economy to a circular economy. In a linear economy, natural resources are extracted, manufactured into products, consumed and then thrown away. In a circular economy, products and packaging are designed to minimize waste and then be recovered, reused, recycled and reintegrated back into production. Some great articles about this approach can be found on the RPRA website.

What is the EPR model?

The **Extended Producer Responsibility, or EPR,** model shifts responsibility for the collection, processing, and recycling of blue box materials to the producers – the companies that supply these materials to you.

This change is part of Ontario's new Blue Box Regulation, passed in 2021, which takes effect over a transition period between 2023 and 2026.

Loyalist Township has been directed to adopt this model by **July 1, 2025**.

What is a PRO?

A **Producer Responsibility Organization, or PRO,** is a business established to contract with producers to help them meet their regulatory obligations under the Blue Box Regulation.

What is the RPRA?

The RPRA, or Resource Productivity and Recovery Authority, is the regulator mandated by the Government of Ontario to enforce the province's circular economy laws.

If you have other questions you can Engage Loyalist on the Recycling Transition - Circular Materials Ontario topic or email the Public Works Technical Supervisor

---

Box 70, 263 Main Street
Odessa, Ontario K0H 2H0
Tel: 613-386-7351
info@loyalist.ca

Office Hours

Mon - Fri 8:30 a.m. to 4:30 p.m.

After-Hours Emergencies

Involving Roads, Water/Sewer Service, or a Township Facility
Call 613-507-3069

By GHD Digital (https://ghddigitalpss.com/)

Appendix E
Tables

Table 1
Groundwater Program

Tasks	Location	Analyses	Frequency
i. measure standing water elevation ii. measure combustible vapours in wells iii. examine water for impact (i.e. discolouration, NAPL) iv. measure pH, EC, temperature v. purge and sample each location	MW-ERN-101, MW-ERN-102 (upgradient/background), MW-ERN-112 (overburden/landfill), MW-ERN-001, MW-ERN-003, MW-ERN-005, MW-ERN-006 (downgradient, bedrock), MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2), MW-ERN-109(1), MW-ERN-110 (downgradient, overburden)	Schedule 5, Column 2 (landfill standards)[1]: alkalinity, ammonia, barium, boron, calcium, chemical oxygen demand (COD), chloride, conductivity, conductivity (field), dissolved organic carbon (DOC), iron, magnesium, nitrate, pH (field), sodium, sulphate, total suspended solids (TSS) and un-ionized ammonia (calc.) Hardness (calc.), pH (lab), dissolved oxygen (DO) (field), temperature (field)	Spring and Summer
vi. submit samples for analyses	MW-ERN-104(1), MW-ERN-106(2)	Volatile Organic Compounds (VOC) (EPA 624)[1]	Summer only

Notes: [1] Ministry of the Environment, Landfill Standards, A Guideline on the Regulatory and Approval Requirement for New or Expanding Landfilling Sites (2012)

Data Input: TV
Data Check: RF

Table 2
2024 Summary of Field Monitoring Results

Monitoring Well ID.	Sample Date	Depth to Water [1]	TOP Elev (m)	Groundwater Elevation [2] (m)	Methane Concentration [3] (% LEL)	Observations		
						Colour	Odour	Sediment
MW-ERN-001	2024-05-23	0.81	84.50	83.69	nr	brown	slight sulphur	abundant
	2024-08-21	1.45	84.50	83.05	nr	tannic	sulphur	some
MW-ERN-003 [4]	2024-05-23	artesian	-	-	-	clear	none	trace
	2024-08-21	artesian	-	-	-	clear	none	none
MW-ERN-005 [4]	2024-05-23	artesian	-	-	-	clear	none	trace
	2024-08-21	artesian	-	-	-	clear	none	none
MW-ERN-006	2024-05-23	0.29	83.75	83.46	6	black	sulphur	abundant
	2024-08-21	0.36	83.75	83.39	nr	cloudy black	none	some
MW-ERN-101	2024-05-23	dry	100.46	dry	nr	no observations made		
	2024-08-21	dry	100.46	dry	nr	no observations made		
MW-ERN-102	2024-05-23	3.66	98.37	94.71	nr	tannic	none	trace
	2024-08-21	4.20	98.37	94.17	<1	clear	none	none
MW-ERN-104(1)	2024-05-23	2.33	83.55	81.22	nr	cloudy	slight sulphur	some
	2024-08-21	2.32	83.55	81.23	nr	slightly tanic	sulphur	trace
MW-ERN-105(2)	2024-05-23	1.42	84.26	82.84	<1	cloudy	sulphur	trace
	2024-08-21	1.57	84.26	82.69	nr	tannic	sulphur	some
MW-ERN-106(2)	2024-05-23	2.55	84.96	82.41	nr	slightly cloudy	slight sulphur	trace
	2024-08-21	2.62	84.96	82.34	nr	clear	none	trace
MW-ERN-109	2024-05-23	1.74	83.95	82.21	nr	clear	slight sulphur	trace
	2024-08-21	1.82	83.95	82.13	nr	clear	none	none
MW-ERN-110	2024-05-23	4.33	86.73	82.40	nr	clear	none	trace
	2024-08-21	4.45	86.73	82.28	nr	tannic	sulphur	some
MW-ERN-112	2024-05-23	11.89	94.24	82.35	>100	clear	sulphur	trace
	2024-08-21	11.95	94.24	82.29	>100	cloudy grey	sulphur	some

Data Input: SG
Data Check: RF

Notes:

-	denotes not applicable/available
nr	denotes no response
m	denotes metres
% LEL	denotes percentage of lower explosive limits
TOP	denotes top of piezometer
[1]	depth to water readings taken from top of piezometer
[2]	groundwater elevations calculated using AECOM survey data, top of piezometer elevation, water level data table
[3]	methane concentration in %LEL calculated as difference between full gas response concentration and methane eliminated concentration
[4]	artesian well (capped with modified well hydrant in July 1999)

Table 3
2024 Groundwater Chemistry Data

			Bedrock Wells								Background Wells				Overburden Wells								Cross Gradient						
		Well ID	MW-ERN-001		MW-ERN-003		MW-ERN-005		MW-ERN-006		MW-ERN-101		MW-ERN-102		MW-ERN-104(1)		MW-ERN-105(2)		MW-ERN-106(2)		MW-ERN-112		MW-ERN-109(1)		MW-ERN-110		ODWS		PWQO (MECP 1994)
		Sample ID	24-W004	24-W016	24-W008	24-W022	24-W010	24-W024	24-W014	24-W028	-	-	24-W012	24-W026	24-W007	24-W021	24-W009	24-W023	24-W011	24-W025	24-W006	24-W020	24-W002	24-W017	24-W005	24-W019			
Parameter	Units	R.L.	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	2024-05-23	2024-08-21	Value	Type	
Alkalinity	as CaCO3 (mg/L)	5	237	279	308	309	397	393	376	448	dry conditions	dry conditions	238	273	690	789	708	610	716	732	826	828	325	348	530	481	30-500	OG	
Ammonia-N	mg/L	0.05	0.08	0.08	0.27	0.20	0.72	0.59	4.93	5.44			0.09	<	22.6	24.2	42.4	18.0	34.0	35.5	47.6	36.2	0.09	0.08	0.61	0.51			
Ammonia, un-ionized (field)	mg/L	0.001	0.001	<	0.003	0.001	0.005	0.002	0.082	0.016			0.001	<	0.074	0.059	0.189	0.062	0.088	0.051	0.144	0.049	0.001	<	0.002	0.001			0.020
Barium	mg/L	0.001	0.028	0.044	0.027	0.028	0.110	0.115	0.070	0.159			0.033	0.045	0.323	0.321	0.404	0.299	0.445	0.689	0.513	0.474	0.083	0.095	0.208	0.186	1.0		
Boron	mg/L	0.005	0.082	0.079	0.165	0.148	0.152	0.138	1.93	0.976			0.009	<	0.517	0.471	0.638	0.321	0.490	0.504	0.767	0.744	0.053	0.038	0.217	0.163	5.0		0.200 (interim)
Calcium	mg/L	0.02	67.6	95	94.2	102	129	138	90.0	143			88.8	112	202	208	163	158	174	186	217	190	103	119	185	167			
Chemical Oxygen Demand	mg/L	5	42	8	<	5	<	<	150	35			37	<	46	48	66	36	38	39	63	81	7	<	11	20			
Chloride	mg/L	0.5	32.6	32.2	40.5	38.6	63.1	62.8	93.4	72.7			28.2	19.0	153	158	108	82.8	95.2	114	287	187	48.6	52.8	90.6	86.0	250	AO	
Conductivity	µmho/cm	1	599	664	770	749	976	951	1060	1070			603	615	1850	1950	1710	1370	1670	1700	2550	2100	772	800	1290	1180			
Dissolved Organic Carbon	mg/L	0.2	2.7	2.4	2.9	3.9	5.3	9.4	4.3	4.4			3.2	2.6	12.5	8.2	11.4	8.3	13.2	9.1	11.8	9.1	2.4	2.8	5.3	4.5	5	AO	
Hardness	mg/L	-	254	322	339	355	441	459	310	449			274	340	663	677	573	523	592	622	749	661	344	385	588	524	80-100	OG	
Iron	mg/L	0.005	<	<	<	0.524	<	2.53	0.036	57.7			<	0.399	0.354	0.031	0.068	0.017	0.341	27.1	0.364	0.087	<	<	<	0.107	0.3	AO	0.3
Magnesium	mg/L	0.02	20.7	20.4	25.2	24.4	28.9	27.8	20.6	22.4			12.7	14.7	38.6	38.3	40.4	31.2	38.3	38.2	50.2	45.2	21.0	21.4	30.5	25.9			
Nitrate-N	mg/L	0.05	0.06	<	<	<	<	<	<	<			5.54	4.00	<	<	0.06	<	0.07	<	<0.40	<	<	<	<	<	10.0		
pH	pH units	-	7.90	7.54	7.84	7.69	7.61	7.46	7.89	7.33			7.59	7.37	7.24	7.15	7.29	7.35	7.31	7.10	7.13	7.05	7.75	7.51	7.34	7.27	6.5 - 8.5	OG	6.5 - 8.5
Sodium	mg/L	0.2	23.4	20.5	38.0	32.4	41.5	36.1	112	73.1			16.0	13.5	136	133	104	66.9	105	99.6	220	152	31.6	29.8	67.0	51.7	200	AO	
Sulphate	mg/L	1	20	27	27	27	18	19	23	<			10	8	15	20	1	<	2	3	8	<	7	6	15	20	500	AO	
Total Dissolved Solids	mg/L	3	311	345	403	391	520	506	568	571			313	319	1020	1070	937	745	913	931	1420	1160	404	420	698	635	500	AO	
Acetone	µg/L	30	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Benzene	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	0.5	-	-	-	0.9	-	-	-	-	-	-	1		100 (interim)
Bromodichloromethane	µg/L	2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			200 (interim)
Bromoform	µg/L	5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			60 (interim)
Bromomethane	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			0.9 (interim)
Carbon Tetrachloride	µg/L	0.2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	2		
Chloroethane	µg/L	3	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Chloroform	µg/L	1	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Chloromethane	µg/L	2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			700 (interim)
Dibromochloromethane	µg/L	2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			5 (interim)
Dichlorobenzene,1,2-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	200		2.5
Dichlorobenzene,1,3-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			2.5
Dichlorobenzene,1,4-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	1.0	-	-	-	2.4	-	-	-	-	-	-	5		4
Dichlorodifluoromethane	µg/L	2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Dichloroethane,1,1-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			200 (interim)
Dichloroethane,1,2-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	5		100 (interim)
Dichloroethylene, 1,1-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	14		40 (interim)
Dichloroethene, 1-2- (total)	µg/L	0.7	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Dichloropropane,1,2-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			0.7 (interim)
Dichloropropene, cis-1,3-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Dichloropropene, trans-1,3-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			7 (interim)
Ethylbenzene	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	140		8 (interim)
Hexane	µg/L	5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Methyl Butyl Ketone	µg/L	5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Methyl Ethyl Ketone	µg/L	2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			400 (interim)
Methyl Isobutyl Ketone	µg/L	20	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Methyl-t-butyl Ether	µg/L	2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			200 (interim)
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	4.7	-	-	-	13.1	-	-	-	-	-	-	80		15
Styrene	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			4 (interim)
Tetrachloroethane,1,1,1,2-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			20 (interim)
Tetrachloroethane,1,1,2,2-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			70 (interim)
Tetrachloroethylene	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	10		50 (interim)
Toluene	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	60		0.8 (interim)
Trichlorobenzene,1,2,4-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			0.5
Trichloroethane,1,1,1-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			10 (interim)
Trichloroethane,1,1,2-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			800 (interim)
Trichloroethylene	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	5		20 (interim)
Trichlorofluoromethane	µg/L	5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			
Trimethylbenzene,1,3,5-	µg/L	0.1	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			3 (interim)
Vinyl Chloride	µg/L	0.2	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-	1		600 (interim)
Xylene, m,p-	µg/L	1.0	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			32* (interim)
Xylene, o-	µg/L	0.5	-	-	-	-	-	-	-	-			-	-	-	<	-	-	-	<	-	-	-	-	-	-			40 (interim)
Temperature (Field)	°C	-	11.21	11.57	12.36	12.28	12.75	13.24	15.13	12.59			11.41	12.77	12.38	14.11	11.21	13.36	11.29	12.33	12.42	12.29	10.18	13.92	10.65	10.84	15	AO	
Dissolved Oxygen (Field)	mg/L	-	2.48	0.89	2.67	7.28	6.22	1.14	3.11	1.25			3.13	2.26	4.31	2.15	3.54	2.38	1.77	0.43	8.47	1.62	3.05	1.76	2.45	1.12			
pH (Field)	pH units	-	7.78	6.97	7.72	7.12	7.44	7.24	7.79	7.12			7.64	7.10	7.17	6.98	7.34	7.16	7.10	6.81	7.13	6.79	7.62	7.14	7.20	7.08	6.5-8.5	OG	6.5 - 8.5

Data Input: JMP
Data Check: RF

Notes:

"-" denotes not analyzed
"R.L." denotes reporting limit
"<" denotes results below reporting limit
"<#" denotes elevated reporting limits
"MW-###" denotes groundwater monitoring well (### indicates groundwater monitor ID)
(#) denotes installation depth: 1 -shallow, 2 -intermediate
PWQOs are not appropriately comparable to analyses of groundwater
*standard for combined analytes
AO indicates aesthetic objective OG indicates operational guidelines
groundwater samples analyzed for metals were field filtered using 0.45 micron filters
Hardness is calculated from concentrations of calcium and mangesium
shading indicates parameters exceeding Ontario Drinking Water Standards, Guidelines and/or Objectives (2003).
shading indicates parameters exceeding 1994 Provincial Water Quality Objectives (as updated in 1999). Monitoring wells MW-ERN-104(1), MW-ERN-105(2), MW-ERN-106(2) were compared to the PWQOs given their proximity to the adjacent Wilton Creek.

Table 4
Historical Groundwater Chemistry Summary

		Bedrock Wells																						Background							
		MW-ERN-001						MW-ERN-003						MW-ERN-005						MW-ERN-006						MW-ERN-102							
Parameter	Units	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	PWQO Interim Values	Ontario Drinking Water Standards (MOE, 2003)
Alkalinity	mg/L	269.5	380	1996-05-15	54.7	1989-10-20	70	307	515	1991-08-22	74.5	1989-10-20	69	364	1040	2009-06-02	268	1991-12-03	72	433	637	2017-06-07	138	2001-08-23	50	264	334	2021-08-31	203	1992-08-18	64		30-500[OG]
Aluminum	mg/L	<	2.3	2005-08-30	<	-	39	<	0.14	2004-08-31	<	-	37	<	0.12	2004-08-31	<	-	40	0.020	0.23	2004-08-31	<	-	20	0.015	1.6	2005-08-30	<	-	34	0.075		0.1[OG]
Ammonia-N	mg/L	0.140	0.500	1995-05-19	<	-	70	0.300	1.05	1996-05-15	0.100	1990-03-02	69	0.99	32.9	2009-06-02	<	-	72	4.99	13.3	2017-06-07	0.920	2001-08-23	50	0.030	1.21	1992-08-18	<	-	64			
Ammonia, un-ionized	mg/L	0.000986	0.01	2010-05-25	<	-	26	0.001	0.01	2010-05-25	<	-	25	0.01	0.03	2010-05-25	<	-	21	0.0217701	0.1	2010-05-25	<	-	28	<	0.002	2019-09-19	<	-	24	0.020		
Boron	mg/L	0.0870	0.226	2011-09-07	0.0380	2024-08-21	32	0.146	0.222	2013-08-09	0.113	2016-05-12	32	0.108	0.737	2009-06-02	0.0740	2018-08-22	33	0.27	1.93	2024-05-23	0.0580	2009-08-26	31	0.00850	0.0500	2009-06-02	0.005	2015-08-27	30		0.2	5[CS]
Cadmium	mg/L	<	0.039	1993-08-27	<	-	41	<	0.0040	1995-10-13	<	-	39	<	0.17	1993-08-27	<	-	42	<	<	-	<	-	21	<	0.047	1993-08-27	<	-	36	0.0002		0.005[CS]
Calcium	mg/L	73.8	119	2024-08-21	6.77	1989-10-20	70	90.8	149	1991-08-22	35.2	1991-06-05	69	118	192	2009-06-02	52.2	2012-08-09	72	132.5	199	2011-05-25	32.0	2001-08-23	50	98.2	123	2018-08-22	50.4	2012-05-10	64			
Chemical Oxygen Demand	mg/L	15	177	2023-05-10	<	-	70	4.5	47	1992-08-18	<	-	68	5	94	1992-06-04	<	-	71	28.5	661	2018-08-22	<	-	50	8	270	1991-01-03	<	-	63			
Chloride	mg/L	44	75	2009-08-26	6.47	1993-04-19	70	45.7	109.0	1999-08-23	25.4	1992-06-04	69	55.3	194	2009-06-02	35.1	2021-08-31	71	58	93.4	2024-05-23	23	2002-05-15	50	19	47	2018-08-22	10	1997-09-10	64			250[AO]
Colour	TCU	2	178	1995-05-19	<	-	41	3	582	1992-08-18	<	-	39	4	69	1997-09-10	<	-	44	4	740	1991-12-03	3	1991-08-22	22	2	442	1992-08-18	<	-	36			5[AO]
Conductivity	uS/cm	675.5	883	1994-05-03	342	1989-10-20	70	752	1320	1991-08-22	360	1991-06-05	69	899	2020	2009-06-02	698	2012-08-09	71	958.5	1430	2017-06-07	356	2001-08-23	50	611.5	746	2018-08-22	494	1996-05-22	64			
Copper	mg/L	<	0.014	1998-10-07	<	-	42	<	0.014	1998-10-07	<	-	40	<	0.019	1998-10-07	<	-	45	<	<	-	<	-	23	<	0.007	1998-10-07	<	-	37	0.005		1[AO]
Dissolved Organic Carbon	mg/L	2.10	25.1	1995-05-19	<	-	62	2.40	27.3	1995-05-19	<	-	61	3.15	48.5	1995-05-19	<	-	62	4.90	14.4	2019-06-12	<	-	47	2.60	18.2	1996-05-22	0.8	2011-09-07	56			5[AO]
Iron	mg/L	1.325	25.2	1993-04-19	<	-	70	0.66	7.55	2007-08-28	<	-	69	1.67	24.3	2009-06-02	<	-	72	23.4	74.9	2002-08-29	<	-	50	0.0055	1.62	1993-04-19	<	-	64	0.300		0.3[AO]
Lead	mg/L	<	0.015	1994-08-01	<	-	40	<	0.120	1993-04-19	<	-	38	<	0.020	1989-10-20	<	-	41	<	0.018	1989-10-20	<	-	21	<	0.006	1994-05-03	<	-	35	0.025	0.005	0.01[CS]
Magnesium	mg/L	22	30.0	1995-10-13	17.2	1993-04-19	70	23.1	39.4	1991-08-22	0.230	1993-04-19	69	24.8	53.9	1989-10-20	0.300	1993-04-19	72	20.4	43.9	1989-10-20	6.00	2001-08-23	50	13.85	18.1	1995-10-13	2.30	1990-03-02	64			
Manganese	mg/L	0.12	0.36	1998-10-07	<	-	42	0.041	0.23	1993-04-19	<	-	40	0.245	0.69	1997-06-27	<	-	45	0.26	0.81	2008-05-21	0.12	2001-08-23	23	<	1.58	1991-01-03	<	-	39			0.05[AO]
Mercury	mg/L	<	0.1	2005-08-30	<	-	39	<	<	-	<	-	37	<	0.34	2005-08-30	<	-	40	<	<	-	<	-	20	<	0.32	2005-08-30	<	-	35	0.0002		0.001[CS]
Nickel	mg/L	<	0.006	2007-08-28	<	-	39	<	0.023	2007-08-28	<	-	37	<	0.02	1994-08-01	<	-	40	<	0.006	2008-08-28	<	-	20	<	0.006	2008-05-21	<	-	34	0.025		
Nitrate-N	mg/L	<	0.500	2016-08-18	<	-	63	<	0.450	1995-10-13	<	-	63	<	2.92	1996-10-11	<	-	63	<	0.440	2020-05-27	<	-	47	4.12	9.25	1994-05-03	<	-	59			10.0[CS]
pH	pH units	7.83	9.20	1989-10-20	7.07	1995-05-19	70	7.80	8.56	2000-05-24	6.7	1990-03-02	69	7.6	8.18	2000-05-24	6.7	2009-06-02	72	7.6	8.11	2002-05-15	7.01	2009-06-02	50	7.695	8.45	2002-05-15	7.14	1996-05-22	64	6.5-8.5		6.5-8.5[OG]
Phenols	mg/L	<	0.091	1991-08-21	<	-	43	<	0.061	1991-08-22	<	-	40	<	0.036	1991-08-22	<	-	45	<	0.028	1991-08-22	<	-	24	<	0.022	1993-04-19	<	-	38	0.001		
Potassium	mg/L	3.00	6.07	1994-05-03	<	-	42	4.00	10.0	1994-08-01	0.040	1993-04-19	40	5.00	12.3	1993-04-19	1.12	1996-05-15	45	8.00	17.2	1991-12-03	6.00	2005-05-10	23	<	6.07	1994-05-03	<	-	37			
Silver	mg/L	<	0.0001	2002-08-29	<	-	38	<	0.0002	2002-08-29	<	-	36	<	<	-	<	-	39	<	<	-	<	-	20	<	<	-	<	-	33	0.0001		
Sodium	mg/L	25.6	41.8	1994-08-01	11.8	1993-04-19	70	34.6	56.0	1999-08-23	12.3	1989-10-20	69	34.8	134	2009-06-02	21.0	2009-08-26	72	39.1	112	2024-05-23	20.0	2001-08-23	50	11.6	21.8	1993-04-19	5.59	1997-09-10	64			200[AO]
Sulphate	mg/L	26	69	1991-12-03	1.5	1997-06-27	70	36.0	58.3	1992-06-04	<	-	69	26	57	1991-12-03	<	-	72	4	32	1991-12-03	<	-	50	15	29	1991-01-03	7	2019-06-12	64			500[AO]
Total Kjeldahl Nitrogen-N	mg/L	0.460	12.8	1995-10-13	0.120	2005-08-30	39	0.685	4.50	1994-05-03	0.310	2008-05-21	37	2.25	19.5	1993-08-27	<	-	40	5.28	11.4	2002-08-29	1.44	2001-08-23	20	0.270	7.50	1992-08-18	<	-	36			
Turbidity	NTU	115.5	3700	1995-10-13	3.7	2008-05-21	42	10.1	239	1993-04-19	<	-	40	16.05	187	2002-08-29	0.4	1991-08-22	45	27.8	969	2002-08-29	5.9	2001-08-23	23	95.5	10700	1992-08-18	<	-	37			5[AO]
Zinc	mg/L	<	0.19	2000-09-21	<	-	43	0.03	27.8	1993-04-19	<	-	41	0.008	0.17	2002-08-29	<	-	46	<	0.02	1991-12-03	<	-	24	<	0.17	2000-09-21	<	-	38	0.03	0.02	5[AO]
Benzene	µg/L	<	0.31	1991-08-21	<	-	13	0.0845	1.2	2001-08-23	<	-	12	<	<	-	<	-	15	0.715	0.8	2004-08-31	0.63	1991-08-22	6	<	<	-	<	-	11		100	5[CS]
Ethylbenzene	µg/L	<	<	-	<	-	14	<	<	-	<	-	12	<	<	-	<	-	16	<	<	-	<	-	6	<	<	-	<	-	12		8	2.4[AO]
Toluene	µg/L	<	<	-	<	-	13	<	<	-	<	-	12	<	<	-	<	-	15	<	<	-	<	-	6	<	<	-	<	-	12		0.8	24[CS]
Xylenes (total)	µg/L	<	<	-	<	-	10	<	<	-	<	-	9	<	<	-	<	-	12	<	<	-	<	-	4	<	<	-	<	-	10		72.000	300[AO]
Bromodichloromethane	µg/L	<	<	-	<	-	9	<	0.179	1991-08-22	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		200.0	
Bromoform	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		30.0	
Bromomethane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		0.9	
Carbon Tetrachloride	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7			5[CS]
Chlorobenzene	µg/L	<	<	-	<	-	9	<	3	2001-08-23	<	-	8	<	<	-	<	-	11	2.21	3.70	2004-08-31	0.72	1991-08-22	5	<	<	-	<	-	7	15		80[AO]
Chloroethane	µg/L	<	<	-	<	-	9	0.265	6.00	2001-08-23	<	-	8	<	7.04	1992-08-18	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7			
Chloroform	µg/L	0.114	1.50	1993-08-27	<	-	9	<	0.574	1991-08-22	<	-	8	0.130	1.40	1993-08-27	<	-	11	0.122	0.244	1991-08-22	<	-	5	<	1.80	1993-08-27	<	-	7			
Chloromethane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		700	
Dibromochloromethane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7			
1,2-Dibromoethane	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	5			
1,3-Dichlorobenzene	µg/L	<	<	-	<	-	9	<	0.5	2001-08-23	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	8	2.5		
1,2-Dichlorobenzene	µg/L	<	<	-	<	-	9	<	0.5	2001-08-23	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	8	2.5		200[CS]
1,4-Dichlorobenzene	µg/L	<	<	-	<	-	10	<	0.9	2001-08-23	<	-	9	<	<	-	<	-	12	0.356	0.400	2004-08-31	0.311	1991-08-22	6	<	<	-	<	-	9	4		5[CS]
1,1,-Dichloroethane	µg/L	<	<	-	<	-	9	<	0.467	1992-08-18	<	-	8	<	0.608	1992-08-18	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		200	
1,2-Dichloroethane	µg/L	<	<	-	<	-	9	<	0.245	1991-08-22	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		100	5[CS]
1,1-Dichloroethylene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	5		40	14[CS]
c-1,2-Dichloroethylene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	5		200	
t-1,2-Dichloroethylene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	6		200	
1,2-Dichloropropane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		0.7	
c-1,3-Dichloropropylene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	5			
t-1,3-Dichloropropylene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	6		7	
Dichloromethane	µg/L	<	<	-	<	-	4	<	<	-	<	-	3	<	<	-	<	-	6	<	<	-	<	-	4	<	<	-	<	-	4			50[CS]
Styrene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	6		4	
1,1,2,2-Tetrachloroethane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		70	
Tetrachloroethylene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	6		50	30[CS]
1,1,1-Trichloroethane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	0.12	1993-08-27	<	-	7		10	
1,1,2-Trichloroethane	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	7		800	
Trichloroethylene	µg/L	<	<	-	<	-	8	<	<	-	<	-	8	<	<	-	<	-	9	<	<	-	<	-	4	<	<	-	<	-	8		20	5[CS]
Trichlorofluoromethane	µg/L	<	<	-	<	-	8	<	<	-	<	-	8	<	<	-	<	-	9	<	<	-	<	-	4	<	<	-	<	-	8			
1,3,5-Trimethylbenzene	µg/L	<	<	-	<	-	6	<	<	-	<	-	6	<	<	-	<	-	8	<	<	-	<	-	4	<	<	-	<	-	5		3	
Vinyl Chloride	µg/L	<	<	-	<	-	9	<	<	-	<	-	8	<	<	-	<	-	11	<	<	-	<	-	5	<	<	-	<	-	8	600		2[CS]

(continued)

Notes: "-" denotes not analyzed
"<" denotes results below method detection limit
"MW-ERN ###" denotes groundwater monitoring well (### indicates groundwater monitor ID)
(#) denotes installation depth: 1 -shallow, 2 -intermediate, 3 -deep
results reported in mg/L unless indicated otherwise
PWQO denotes Provincial Water Quality Objectives
PWQO values are not appropriately comparable to analyses of groundwater
AO indicates aesthetic objective OG indicates operational guideline CO indicates chemical objective

Table 4
Historical Groundwater Chemistry Summary (continued)

		Overburden Wells																						Cross-Gradient													
		MW-ERN-104(1)						MW-ERN-105(2)						MW-ERN-106(2)						MW-ERN-112						MW-ERN-109(1)						MW-ERN-110						PWQO	Ontario Drinking Water Standards
		Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events	Median	Max	Date of Max	Min	Date of Min	# Events		
Parameter	Units																																			Interim Values	(MOE, 2003)
Alkalinity	mg/L	829	1450	2006-05-31	503	1991-12-03	69	612.5	852	1996-10-11	404	1994-08-01	68	805	1010	1995-10-13	420	1992-08-18	71	896.5	1280	2013-05-10	722	2020-08-24	36	347.5	778	1991-08-22	236	1992-08-18	70	445	604	1993-04-19	304	1991-12-03	71			30-500[OG]
Aluminum	mg/L	0.00500	0.98	2005-08-30	<	-	36	0.020	0.54	1993-04-19	<	-	37	0.020	0.090	1996-05-15	<	-	56	0.020	0.050	2007-05-30	<	-	7	<	0.91	2005-08-30	<	-	37	<	0.72	1992-06-04	<	-	39	0.075		0.1[OG]
Ammonia-N	mg/L	22.8	76.0	2012-05-10	0.370	2007-08-28	69	14.4	42.5	2023-05-10	1.62	1991-06-05	68	27	42.3	2019-09-19	1.20	1992-08-18	71	35.9	60.3	2017-08-14	17.8	2010-08-30	36	0.270	14.5	1994-08-01	0.0200	2022-08-23	70	0.415	18.3	1993-04-19	<	-	71			
Ammonia, un-ionized	mg/L	0.053	0.4	2017-08-14	0.001	2023-08-15	25	0.05	0.3	2010-05-25	0.0022	2022-08-23	26	0.05	0.2	2010-05-25	0.0013	2023-08-15	31	0.06	0.2	2018-05-31	0.006	2018-05-31	28	<	0.01	2010-05-25	<	-	26	0.001	0.01	2010-05-25	<	-	26	0.020		
Boron	mg/L	0.551	0.936	2019-09-19	0.355	2016-05-12	32	0.369	0.638	-	0.180	2015-08-27	31	0.513	0.723	2020-08-24	0.305	2015-05-07	36	0.7685	1.26	2017-08-14	0.501	2023-05-10	32	0.0515	0.194	2011-09-07	0.024	10-May-23	32	0.156	0.393	2011-09-07	0.0950	2011-05-25	32		0.2	5[CS]
Cadmium	mg/L	<	0.72	1993-08-27	<	-	38	<	0.29	2014-05-08	<	-	39	<	0.74	1993-08-27	<	-	45	<	<	-	<	-	9	<	0.21	1993-08-27	<	-	39	<	0.080	1993-08-27	<	-	41	0.0002		0.005[CS]
Calcium	mg/L	194	250	1994-08-11	128	1992-08-18	69	159	214	2024-05-23	72.0	2012-08-09	68	179	234	1994-08-01	98.9	2012-08-09	71	217.5	294	2013-08-09	128	2012-05-10	36	115	217	1991-08-22	58.5	2012-05-10	70	142	216	1990-03-02	92	2012-08-09	71			
Chemical Oxygen Demand	mg/L	62.5	215	1991-08-22	<	-	68	34	278	1991-12-03	8	2001-08-23	67	49	126	1992-06-04	<	-	71	80.5	597	2013-05-10	46	2020-08-24	36	5	147	1993-04-19	<	-	68	8.5	142	1992-06-04	<	-	70			
Chloride	mg/L	107	201	2023-08-15	43.2	1992-08-18	69	91.5	191	-	6.6	1996-10-11	68	121	342	2009-08-26	12.4	1994-05-03	71	143.5	325	2023-08-15	12.6	2016-08-18	36	43.65	121	2003-08-28	12.1	1992-06-04	70	63	169	2009-08-26	18.1	1994-05-03	71			250[AO]
Colour	TCU	21	1100	1995-10-13	<	-	39	9.5	665	2001-05-15	<	-	40	17	1220	1995-10-13	2	2008-05-21	42	10.5	33	2007-05-30	2	2008-05-30	7	3	32	1993-08-27	<	-	41	3	51	1993-08-27	<	-	42			5[AO]
Conductivity	uS/cm	1850	2560	1995-10-13	1250	2013-05-10	69	1385	2150	1993-04-19	1060	2000-09-21	68	1860	2390	1995-10-13	1144	1992-08-18	71	2030	2910	2013-05-10	1690	2011-09-07	36	829.5	1880	1991-08-22	533	1992-08-18	70	1010	1390	2012-05-10	752	1997-06-27	71			
Copper	mg/L	<	0.17	1994-05-03	<	-	41	<	0.38	1992-08-18	<	-	41	<	0.015	1991-01-03	<	-	43	<	0.001	2008-05-30	<	-	8	<	0.01	1991-06-05	<	-	43	0.0005	0.06	1991-01-03	<	-	43	0.005		1[AO]
Dissolved Organic Carbon	mg/L	14.4	79.1	1995-05-19	2.00	1991-06-05	60	8.90	51.7	-	2.00	1991-06-05	61	13.5	86.7	1995-05-19	2.00	1991-06-05	64	16.5	183	2013-05-10	5.20	2023-05-10	36	2.30	30.3	1995-05-19	0.600	2002-08-29	62	3.20	31.5	1995-05-19	<	-	63			5[AO]
Iron	mg/L	28.3	49.9	2014-08-21	0.02	1991-06-05	69	15.15	127	1995-05-19	<	-	68	23.9	34.9	2004-08-31	<	-	71	31.1	46.8	2023-05-10	0.087	2024-08-21	36	<	25.5	1993-04-19	<	-	71	<	23.8	1991-01-03	<	-	71	0.300		0.3[AO]
Lead	mg/L	<	0.039	1994-08-11	<	-	37	<	0.040	1995-10-13	<	-	38	<	0.040	1991-08-22	<	-	43	<	<	-	<	-	8	<	0.016	1994-08-01	<	-	38	<	0.012	1994-08-01	<	-	39	0.025	0.005	0.01[CS]
Magnesium	mg/L	44.0	87.2	1990-03-02	0.600	1993-04-19	69	34.2	67.8	1991-12-03	24.7	2012-08-09	68	44.5	78.9	1994-05-03	29.4	2015-05-07	71	46.4	63.9	2013-05-10	29.7	2009-08-26	36	22.1	52.6	1991-08-22	10.2	1997-05-27	70	24.9	50.0	1990-03-02	19.0	2005-08-30	71			
Manganese	mg/L	0.456	1.03	2000-09-21	<	-	40	0.5325	1.9	1993-04-19	<	-	41	0.315	3.7	1991-01-03	<	-	43	0.26	0.521	2023-05-10	0.21	2007-05-30	8	0.91	2.03	1991-06-05	<	-	42	0.785	4.52	1991-01-03	<	-	43			0.05[AO]
Mercury	mg/L	<	0.0005	1996-10-11	<	-	36	<	0.32	1991-08-22	<	-	38	<	<	-	<	-	43	<	<	-	<	-	8	<	<	-	<	-	38	<	0.34	2005-08-30	<	-	39	0.0002		0.001[CS]
Nickel	mg/L	<	0.31	1994-08-11	<	-	36	<	0.021	1991-12-03	<	-	37	<	0.02	1993-04-19	<	-	42	0.012	0.02	2008-05-30	0.009	2007-05-30	7	<	0.03	1991-08-22	<	-	37	<	0.02	1993-04-19	<	-	39	0.025		
Nitrate-N	mg/L	<	1.36	1995-10-13	<	-	61	<	1.31	1991-01-03	<	-	62	<	1.23	2020-05-27	<	-	67	<	1.19	2020-05-27	<	-	36	0.315	4.63	2008-05-21	<	-	62	0.430	2.71	1994-05-03	<	-	63			10.0[CS]
pH	pH units	7.2	7.76	2000-05-24	6.61	2004-08-31	69	7.315	7.82	2017-08-14	6.29	1995-10-13	68	7.13	8.09	2000-05-24	6.6	2004-08-31	71	7.135	7.46	2019-09-19	6.64	2009-06-02	36	7.695	8.23	2002-05-15	6.96	1993-04-19	70	7.44	8.14	2000-05-24	6.91	1993-04-19	71	6.5-8.5		6.5-8.5[OG]
Phenols	mg/L	0.0005	0.102	1991-08-22	<	-	41	<	0.043	-	<	-	41	<	0.0495	1991-08-22	<	-	44	<	7.13	2024-05-23	<	-	11	<	0.109	1991-08-22	<	-	41	<	0.164	1991-08-22	<	-	44	0.001		
Potassium	mg/L	33.2	55.0	2001-08-23	11.6	1991-08-22	40	18.0	41.0	1991-08-22	3.11	1993-04-19	41	34.5	52.0	2001-08-23	4.01	1992-08-18	43	37	50.0	2007-05-30	25.3	2023-05-10	8	4.00	33.5	1994-08-01	0.400	1992-08-18	42	4.00	46.3	1991-08-22	1.50	1991-01-03	43			
Silver	mg/L	<	<	-	<	-	35	<	<	2004-08-31	<	-	36	<	0.0002	2002-05-15	<	-	41	<	<	-	<	-	7	<	<	-	<	-	36	<	<	-	<	-	38	0.0001		
Sodium	mg/L	94.7	190	1991-01-03	36.6	2010-05-25	69	66.8	167	1993-04-19	27.3	1994-08-01	68	105	211	1992-06-04	64.0	2015-05-07	71	112	250	2023-08-15	43.2	2011-05-25	36	26.6	113	1991-08-22	8.00	1999-05-20	70	41.9	78.5	2012-05-10	17.7	1990-03-02	71			200[AO]
Sulphate	mg/L	12	108	2006-05-31	<	-	69	11	31	-	<	-	68	5	43	1991-12-03	<	-	71	3	122	2008-05-30	<	-	36	20	98.7	1994-08-01	<	-	70	21	89.4	1994-05-03	5	2019-09-19	71			500[AO]
Total Kjeldahl Nitrogen-N	mg/L	25.6	42.8	1994-05-03	<	-	36	15.0	285	-	2.20	1993-04-19	38	30.2	40.5	1995-10-13	7.50	1992-08-18	44	31.8	49.9	2008-05-30	26.2	2007-08-28	9	0.870	15.0	1994-08-01	<	-	38	0.960	16.5	1993-04-19	0.200	1994-08-01	39			
Turbidity	NTU	347	702	1996-10-11	<	-	40	668	3350	2001-05-15	<	-	41	286	2240	1992-08-18	<	-	43	14.3	14.3	2008-05-30	14.3	2008-05-30	8	13.55	129	1991-12-03	1.2	1999-05-20	42	60	5520	1992-06-04	2.6	2001-08-23	43			5[AO]
Zinc	mg/L	<	0.41	2000-09-21	<	-	41	<	0.49	1991-08-22	<	-	42	<	0.55	1995-05-19	<	-	44	<	0.03	2007-08-28	<	-	9	<	0.32	1995-05-19	<	-	44	<	0.48	2000-09-21	<	-	44	0.03	0.02	5[AO]
Benzene	µg/L	0.8	1.5	2004-08-31	<	-	34	0.48	2.47	1992-08-18	<	-	16	1	2.9	2007-08-28	<	-	36	-	-	-	-	-	4	<	0.435	1991-08-22	<	-	14	<	0.078	1991-08-22	<	-	13		100	5[CS]
Ethylbenzene	µg/L	<	<	-	<	-	33	<	<	-	<	-	17	<	<	-	<	-	36	-	-	-	-	-	4	<	<	-	<	-	15	<	<	-	<	-	14		8	2.4[AO]
Toluene	µg/L	<	2.5	2013-08-09	<	-	34	<	0.14	-	<	-	16	<	0.288	1991-08-22	<	-	36	-	-	-	-	-	4	<	<	-	<	-	14	<	<	-	<	-	13		0.8	24[CS]
Xylenes (total)	µg/L	<	<	-	<	-	20	<	<	-	<	-	11	<	<	-	<	-	28	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	10		72,000	300[AO]
Bromodichloromethane	µg/L	<	0.6	1994-08-11	<	-	30	<	0.4	-	<	-	12	<	0.107	1991-08-22	<	-	32	-	-	-	-	-	3	<	1.9	1996-10-11	<	-	10	<	0.184	1991-08-22	<	-	9		200.0	
Bromoform	µg/L	<	<	-	<	-	31	<	<	-	<	-	12	<	<	-	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		30.0	
Bromomethane	µg/L	<	<	-	<	-	31	<	<	1991-08-22	<	-	12	<	<	-	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		0.9	
Carbon Tetrachloride	µg/L	<	<	-	<	-	31	<	<	-	<	-	12	<	0.214	1991-08-22	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9			5[CS]
Chlorobenzene	µg/L	3.50	9.80	2001-08-23	<	-	31	1.79	6.40	1991-01-03	<	-	12	7.40	13.1	2024-08-21	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9	15		80[AO]
Chloroethane	µg/L	<	19.5	2010-08-30	<	-	29	1.07	4.69	2023-05-10	<	-	12	0.0065	37.8	1997-09-10	<	-	31	-	-	-	-	-	3	<	<	-	<	-	10	<	0.938	1991-08-22	<	-	9			
Chloroform	µg/L	<	0.800	1995-10-13	<	-	31	<	0.700	-	<	-	12	<	0.7	1993-08-27	<	-	33	-	-	-	-	-	3	<	21	1996-10-11	<	-	10	0.265	0.600	1993-08-27	<	-	9			
Chloromethane	µg/L	<	<	-	<	-	29	<	<	1991-12-03	<	-	12	<	8	1997-09-10	<	-	31	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		700	
Dibromochloromethane	µg/L	<	0.3	1994-08-11	<	-	31	<	<	2004-08-31	<	-	12	<	<	-	<	-	33	-	-	-	-	-	3	<	0.3	1996-10-11	<	-	10	<	<	-	<	-	9			
1,2-Dibromoethane	µg/L	<	<	-	<	-	24	<	<	-	<	-	7	<	<	-	<	-	29	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6			
1,3-Dichlorobenzene	µg/L	<	1.4	1993-08-27	<	-	31	<	<	1995-05-19	<	-	12	<	1.1	2010-08-30	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9	2.5		
1,2-Dichlorobenzene	µg/L	<	1.3	2001-08-23	<	-	31	<	<	-	<	-	12	<	0.3	1997-09-10	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9	2.5		200[CS]
1,4-Dichlorobenzene	µg/L	0.7	8.1	1993-08-27	<	-	33	<	0.287	-	<	-	13	0.65	2.4	2024-08-21	<	-	34	-	-	-	-	-	4	<	<	-	<	-	11	<	<	-	<	-	10	4		5[CS]
1,1,-Dichloroethane	µg/L	0.580	2.18	1993-08-27	<	-	31	0.400	1.60	-	<	-	12	0.641	2.10	2010-08-30	<	-	32	-	-	-	-	-	3	<	1.09	1991-08-22	<	-	10	0.391	0.903	1991-08-22	<	-	9		200	
1,2-Dichloroethane	µg/L	<	<	-	<	-	31	<	0.105	-	<	-	12	<	0.418	1991-08-22	<	-	32	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		100	5[CS]
1,1-Dichloroethylene	µg/L	<	<	-	<	-	23	<	<	-	<	-	7	<	<	-	<	-	28	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		40	14[CS]
c-1,2-Dichloroethylene	µg/L	<	<	-	<	-	16	<	<	1992-08-18	<	-	7	<	<	-	<	-	22	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		200	
t-1,2-Dichloroethylene	µg/L	<	<	-	<	-	16	<	<	1991-08-22	<	-	7	<	<	-	<	-	22	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		200	
1,2-Dichloropropane	µg/L	<	<	-	<	-	31	<	<	1992-08-18	<	-	12	<	<	-	<	-	32	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		0.7	
c-1,3-Dichloropropylene	µg/L	<	<	-	<	-	15	<	<	1994-08-01	<	-	7	<	<	-	<	-	21	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6			
t-1,3-Dichloropropylene	µg/L	<	<	-	<	-	15	<	<	1994-08-01	<	-	7	<	<	-	<	-	21	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		7	
Dichloromethane	µg/L	<	<	-	<	-	15	<	<	-	<	-	5	<	<	-	<	-	21	-	-	-	-	-	3	<	<	-	<	-	4	<	<	-	<	-	4			50[CS]
Styrene	µg/L	<	<	-	<	-	24	<	<	-	<	-	7	<	<	-	<	-	30	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		4	
1,1,2,2-Tetrachloroethane	µg/L	<	<	-	<	-	31	<	<	-	<	-	12	<	0.2	1997-09-10	<	-	33	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		70	
Tetrachloroethylene	µg/L	<	<	-	<	-	24	<	<	-	<	-	7	<	<	-	<	-	30	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		50	30[CS]
1,1,1-Trichloroethane	µg/L	<	<	-	<	-	31	<	<	2000-09-21	<	-	12	<	<	-	<	-	33	-	-	-	-	-	3	<	0.654	1991-08-22	<	-	10	<	<	-	<	-	9		10	
1,1,2-Trichloroethane	µg/L	<	<	-	<	-	31	<	<	2021-05-26	<	-	12	<	0.474	1991-08-22	<	-	32	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9		800	
Trichloroethylene	µg/L	<	<	-	<	-	30	<	0.136	1991-08-22	<	-	11	<	2.67	1991-08-22	<	-	33	-	-	-	-	-	2	<	<	-	<	-	9	<	<	-	<	-	8		20	5[CS]
Trichlorofluoromethane	µg/L	<	<	-	<	-	31	<	<	-	<	-	11	<	<	-	<	-	33	-	-	-	-	-	2	<	<	-	<	-	9	<	<	-	<	-	8			
1,3,5-Trimethylbenzene	µg/L	<	<	-	<	-	22	<	<	-	<	-	7	<	<	-	<	-	27	-	-	-	-	-	3	<	<	-	<	-	6	<	<	-	<	-	6		3	
Vinyl Chloride	µg/L	<	13.1	1992-08-18	<	-	33	<	0.9	1992-08-18	<	-	12	<	<	-	<	-	34	-	-	-	-	-	3	<	<	-	<	-	10	<	<	-	<	-	9	600		2[CS]

Notes:
"-" denotes not analyzed
"<" denotes results below method detection limit
"MW-ERN ###" denotes groundwater monitoring well (### indicates groundwater monitor ID)
(#) denotes installation depth: 1 -shallow, 2 -intermediate, 3 -deep
results reported in mg/L unless indicated otherwise
PWQO denotes Provincial Water Quality Objectives
PWQO values are not appropriately comparable to analyses of groundwater
AO indicates aesthetic objective OG indicates operational guideline CO indicates chemical objective

Data Input: RG
Data Check: RF

Table 5
Surface Water Program

Tasks	Location	Analyses	Frequency
i. examine water for impact (i.e. discolouration, NAPL) ii. measure pH, EC, temperature iii. sample Wilton Creek at three locations	SW-001 (upgradient of landfill SW-002 (opposite landfill) SW-003 (downgradient of landfill)	Schedule 5, Column 4 (landfill standards)[1]: alkalinity, biological oxygen demand (BOD), COD, chloride, nitrate, nitrite, conductivity, ammonia, phenols, sulphate, TKN, TDS, TSS, total phosphorous, iron, flow, and un-ionized ammonia (calc. and lab), pH (field), conductivity (field), DO (field), temperature (field)	Spring, Summer, and Fall
iv. submit samples for analyses	SW-001, SW-002, SW-003	Schedule 5, Column 3 (landfill standards)[1]: Schedule 5, Column 4 parameters plus arsenic, barium, boron, cadmium, chromium, copper, lead, mercury and zinc	Summer only

Notes: [1] Ministry of the Environment, Landfill Standards, A Guideline on the Regulatory and Approval Requirement for New or Expanding Landfilling Sites (2012)

Data Input: TV
Data Check: RF

Table 6
2024 Surface Water Chemistry Data

Parameter	Units	Location / Sample ID	SW-001 24-W013	SW-002 24-W003	SW-003 24-W001	SW-001 24-W027	SW-002 24-W018	SW-003 24-W015	SW-001 24-W031	SW-002 24-W030	SW-003 24-W029	Provincial Water Quality Objectives (MOEE, 1994)	Table A: Assessment Criteria for Waste Disposal Sites (2010)	Table B: Alternative Review Criteria - Canadian Water Quality Guidelines (CCME, 2007)
		R.L.	2024-05-23			2024-08-21			2024-10-31					
Alkalinity	mg/L	5	212	215	213	209	215	224	252	268	268	see note [8]		
BOD	mg/L	3	<	<	<	<	<	<	<	<	<			
Chemical Oxygen Demand	mg/L	5	18	20	24	28	21	16	20	19	23			
Chloride	mg/L	0.5	35.7	36.0	36.2	51.8	53.6	53.2	71.8	68.9	70.1		180	128 (proposed)
Conductivity	µS/cm	1	498	519	520	570	586	593	698	729	724			
Ammonia-N	mg/L	0.05	<	0.27	0.27	<	0.14	0.12	<	0.64	0.52			
Nitrate-N	mg/L	0.05	0.17	0.16	0.17	0.28	0.37	0.35	0.21	0.19	0.27			2.9
Nitrite-N	mg/L	0.05	<	<	<	<	<	<	<	<	<			0.06
pH	pH units	-	8.29	8.07	8.14	8.03	7.62	7.63	8.17	8.02	8.05	6.5-8.5	6.0-9.0	
Phenols	mg/L	0.001	<	<	<	<	<	<	<	<	<	0.001	0.04	0.004
Sulphate	mg/L	1	8	8	8	15	14	14	15	14	14	see note [6]	100	
Total Dissolved Solids	mg/L	3	258	269	269	296	304	308	363	380	377			
Total Kjeldahl Nitrogen-N	mg/L	0.1	0.7	0.9	0.7	0.6	0.8	0.7	0.5	1.1	1.1			
Total Phosphorus	mg/L	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03		
Total Suspended Solids	mg/L	3	5	6	6	<	4	3	4	4	<			
Arsenic	mg/L	0.0001	-	-	-	0.0003	0.0003	0.0003	-	-	-	0.1	0.150	
Barium	mg/L	0.001	-	-	-	0.069	0.077	0.076	-	-	-		2.300	
Boron	mg/L	0.005	-	-	-	0.036	0.042	0.044	-	-	-	0.2	3.550	1.50
Cadmium	mg/L	0.000015	-	-	-	<	<	<	-	-	-	0.0001 [14]	0.00021	0.000017 (interim)
Chromium	mg/L	0.001	-	-	-	<	<	<	-	-	-	see note [13]	0.064	
Copper	mg/L	0.0001	-	-	-	0.0004	0.0005	0.0007	-	-	-	0.005	0.0069	
Iron	mg/L	0.005	0.247	0.568	0.507	0.073	0.256	0.245	0.074	0.980	0.736	0.3	1.000	
Lead	mg/L	0.00002	-	-	-	0.00006	0.00007	0.00010	-	-	-	see note [9]	0.002	
Mercury	mg/L	0.00002	-	-	-	<	<	<	-	-	-	0.0002		
Zinc	mg/L	0.005	-	-	-	<	0.005	0.007	-	-	-	0.02 (interim)	0.089	0.030
Dissolved Oxygen (field)	mg/L	-	9.12	5.16	10.03	9.89	28.2	4.70	11.83	6.86	8.35	see note [10]		
pH (field)	pH units	-	8.32	7.94	8.18	8.03	7.37	7.10	8.26	7.48	7.57	6.5-8.5	6.0-9.0	
Temperature (field)	°C	-	24.45	18.49	21.72	19.49	16.98	18.10	13.51	13.31	13.61			
Ammonia, un-ionized [12]	mg/L	0.001	0.003	0.008	0.017	0.002	0.001	0.001	0.002	0.005	0.005	0.02	0.100	
Ammonia, un-ionized (Lab pH)	mg/L	0.001	0.002	0.011	0.016	0.002	0.002	0.002	0.002	0.016	0.014	0.02	0.100	

Data Input: RG
Data Check: RF

Notes

[1] "SW ###" denotes surface water station (### indicates station location)
[2] "-" denotes not analyzed/not applicable
[3] R.L. - refers to reporting limit
[4] < indicates result less than R.L.
[5] < # indicates elevated R.L.
[6] sulphate standard refers to Draft Ambient Water Quality Guidelines for Sulphates (October 2012) and are based on
Hardness: 0 to 17mg/L = 115 mg/L, 18 to 60 mg/L = 195 mg/L, 61 to 180 mg/L = 270 mg/L, 181 to 250 mg/L = 410 mg/L
Hardness was not calculated therefore the most conservative value has been applied
[7] PWQO refers to Provincial Water Quality Objectives, Ontario Ministry of Environment, July 1994, MOE, reprinted February 1999
[8] alkalinity should not be decreased by more than 25% of the natural concentration
[9] PWQO for lead dependant upon hardness: 30 mg/L = 0.001 mg/L, 30 to 80 mg/L = 0.003 mg/L, >80 mg/L= 0.005 mg/L.
Hardness was not calculated therefore the most conservative value has been applied
[10] Dissolved oxygen criteria based on temperature and cold water biota standards: 0°C - 5°C = ≥7 mg/L, 5°C - 10°C = ≥ 6 mg/L , 10°C - 20°C = ≥5 mg/L, 20°C - 25°C = ≥ 4 mg/L
[11] un-ionized ammonia calculated using laboratory reported ammonia concentrations, field pH and temperature values
[12] Malroz calculation based on field parameters
[13] chromium reported as total, published standards are for Chromium VI (0.001 mg/L) and Chromium III (0.0089 mg/L)
[14] standard is hardness dependent 0 - 100 = 0.0001 mg/L >100 = 0.0005 mg/L. Hardness was not calculated therefore the most conservative value has been applied
shading indicates parameters exceeding guideline criteria
denotes concentration exceeds the 1994 PWQO (as updated in 1999)
denotes concentration exceeds Table A: Assessment Criteria for Waste Disposal Sites (Source APV and others) from the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (2010)
denotes concentration exceeds Table B: Alternative Review Criteria (Source Canadian Water Quality Guideline) from the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (2010)
denotes parameter included in the surface water trigger mechanism (1.0 mg/L for iron, 0.02 mg/L for un-ionized ammonia at SW-003)

Table 7
Historical Surface Water Chemistry Summary

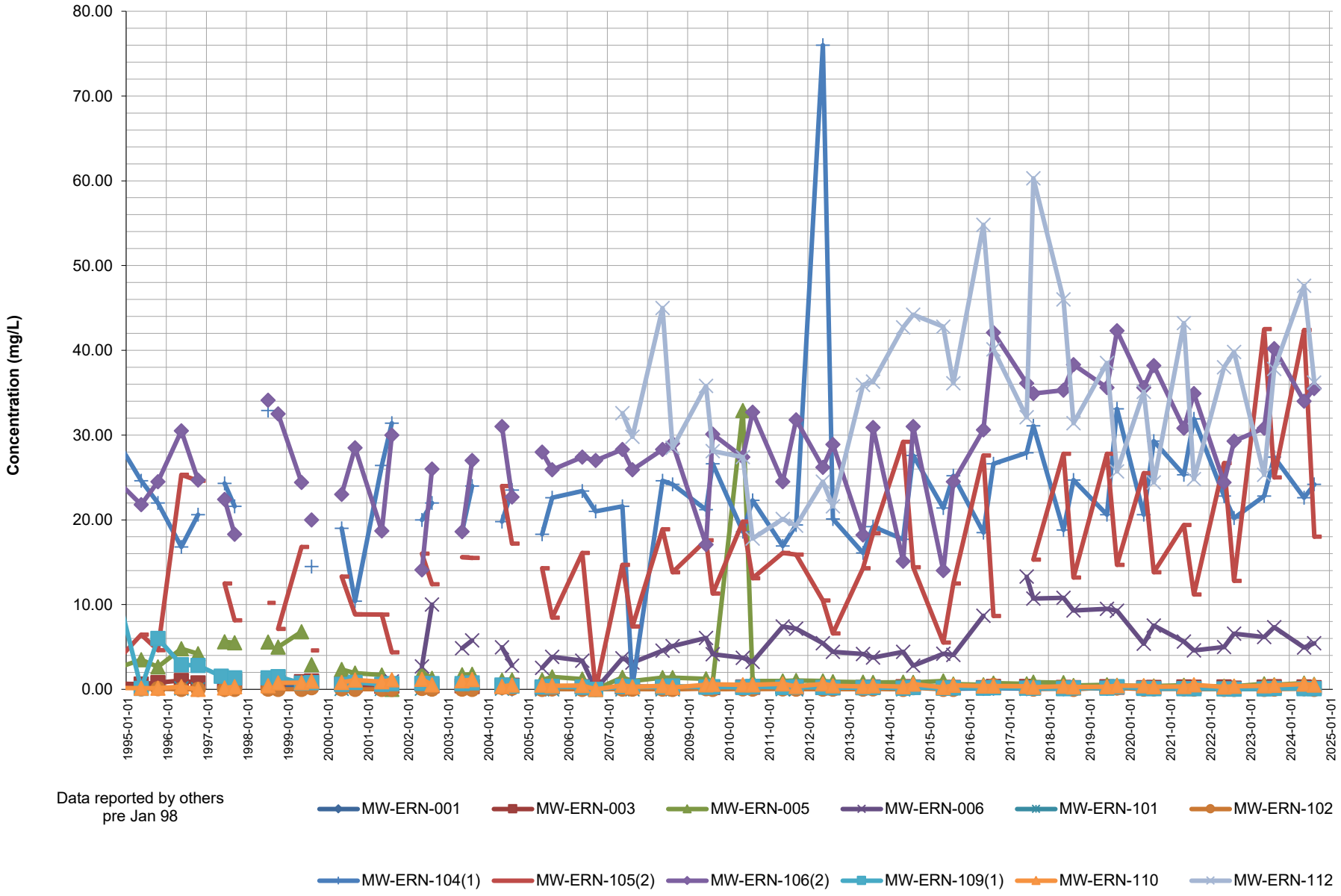
		Surface Water Stations																			
		SW-001							SW-002							SW-003							PWQO	
Parameter	Units	Median	Max	Date of Max	Min	Date of Min	75th Percentile	# Events	Median	Max	Date of Max	Min	Date of Min	75th Percentile	# Events	Median	Max	Date of Max	Min	Date of Min	75th Percentile	# Events		Interim Values
Alkalinity	mg/L	213	284	1999-01-13	138	2005-08-30	230	94	224.5	516	2001-08-23	162	2002-05-15	244	94	226.5	426	2001-08-23	163	2002-05-15	245	94		
Aluminum	mg/L	0.05	0.17	2005-08-30	<	-	0.11	41	0.05	0.75	2001-10-30	<	-	0.09	41	0.04	0.51	2001-10-30	<	-	0.08	41	0.075	
Ammonia-N	mg/L	0.04	0.52	2005-01-27	<	-	0.08	93	0.21	5.69	2001-08-23	0.01	2009-10-28	0.40	93	0.19	2.44	2005-08-30	<	-	0.34	93		
Ammonia, un-ionized	mg/L	0.001	0.017	2007-05-30	<	-	0.003	65	0.004	0.133	2005-08-30	<	-	0.009	65	0.003	0.167	2012-08-09	<	-	0.008	65	0.020	
Boron	mg/L	0.037	0.056	2016-08-18	0.021	2023-05-10	0.04	13	0.042	0.118	2020-08-24	0.022	2023-05-10	0.058	13	0.044	0.132	2020-08-24	0.022	2023-05-10	0.062	13		0.200
Cadmium	mg/L	<	<	-	<	-	-	56	<	0.0001	2009-04-14	<	-	-	56	<	0.0001	2009-04-14	<	-	-	56	0.0002	0.0001
Calcium	mg/L	75.0	107	1999-01-13	7.51	2009-03-24	81	42	80.5	143	2001-08-23	7.49	2009-03-24	86.3	42	78.0	135	2001-08-23	7.59	2009-03-24	87	42		
Chemical Oxygen Demand	mg/L	17	37	2010-05-25	<	-	21	93	16	33	2006-09-19	<	-	22	93	16	95	2015-10-22	<	-	21	93		
Chloride	mg/L	41	253	2007-10-10	12	2002-05-15	57	93	42	262	2007-10-10	12	2002-05-15	57	93	42	273	2007-10-10	13	2002-05-15	58	93		
Colour	TCU	22	66	2009-03-24	7	2007-08-28	28	42	23	59	2009-03-24	8	1999-01-13	27	42	22	60	2009-03-24	<	-	26	42		
Conductivity	uS/cm	578.5	1250	2007-10-10	367	2002-05-15	638	94	589	1290	2007-10-10	361	2002-05-15	670	94	594	1320	2007-10-10	361	2002-05-15	666	94		
Copper	mg/L	<	0.002	2002-10-23	<	-	0.0010	56	<	0.007	1998-10-07	<	-	0.0013	56	<	0.005	1998-10-07	<	-	0.001	56	0.005	
Dissolved Organic Carbon	mg/L	6.7	18.5	2009-08-26	<	-	8.5	57	6.65	13.7	1999-01-13	<	-	8.10	57	6.6	15	2009-08-26	<	-	8	57		
Iron	mg/L	0.153	0.414	2012-01-12	<	-	0.204	94	0.3515	2.56	2007-08-28	0.07	2006-01-22	0.562	94	0.342	2.09	2006-09-19	0.07	2006-01-22	0.53	94	0.300	
Lead	mg/L	<	0.0005	2009-04-14	<	-	0.0001	56	<	0.0001	2009-04-14	<	-	0.00	56	<	0.00095	2017-08-14	<	-	0.00007	56	0.0025	0.0005
Magnesium	mg/L	14	25	2001-08-23	7	2002-05-15	16	42	15	37	2001-08-23	8	2002-05-15	16	42	14	36	2001-08-23	8	2002-05-15	17	42		
Manganese	mg/L	0.020	0.25	2005-08-30	<	-	0.04	42	0.035	0.27	2001-08-23	<	-	0.060	42	0.040	0.21	2006-09-19	<	-	0.06	42		
Mercury	mg/L	<	0.03	2016-08-18	<	-	0.03	56	<	0.16	2005-10-17	<	-	-	56	<	<	-	<	-	-	56	0.0002	
Nickel	mg/L	<	0.003	2009-02-03	<	-	0.003	42	<	0.007	2007-08-28	<	-	0.01	42	<	0.56	1999-01-13	<	-	0.28	42	0.025	
Nitrate-N	mg/L	0.12	1.1	2002-01-25	<	-	0.5	94	0.2	1.17	2002-01-25	<	-	0.4	94	0.25	1.16	2002-01-25	<	-	0.50	94		
pH	pH units	8.215	8.62	2021-08-31	7.66	2009-02-03	8.31	94	8.03	9.59	2009-04-14	7.42	2010-08-30	8.19	94	8.055	8.46	2002-05-15	7.40	2009-04-14	8.19	94	6.5-8.5	
Phenols	mg/L	<	0.006	2009-07-06	<	-	0.005	92	<	0.006	2009-07-06	<	-	0.01	92	<	0.01	2017-06-07	<	-	0.01	92	0.001	
Potassium	mg/L	2	6	2007-10-10	<	-	3	42	2	20	2001-08-23	<	-	4	42	2	13	2001-08-23	<	-	4	42		
Silver	mg/L	<	0.0003	2000-05-24	<	-	-	42	<	0.0002	2000-05-24	<	-	0.0002	42	<	0.0002	2000-05-24	<	-	-	42	0.0001	
Sodium	mg/L	23.5	141	2007-10-10	10	2002-05-15	33.3	42	24	149	2007-10-10	10	2002-05-15	32	42	23.5	152	2007-10-10	10.0	2002-05-15	32	42		
Sulphate	mg/L	13	50	2001-10-30	<	-	21	94	13	49	2001-10-30	<	-	21	94	13	49	2001-10-30	<	-	20	94		
Total Kjeldahl Nitrogen-N	mg/L	0.6	252	2017-06-07	0.25	2006-11-03	0.700	93	0.700	250	2017-06-07	0.130	2006-11-03	0.99	93	0.700	3.00	2012-08-09	0.288	2009-04-14	0.90	93		
Turbidity	NTU	2.55	17.8	2004-10-21	<	-	3.75	43	3.30	17.0	2001-08-23	0.03	2017-06-07	4.78	42	3.40	9.30	2007-02-22	1.50	1999-08-23	4.85	41		
Zinc	mg/L	<	6	2017-06-07	<	-	0.05	56	<	4	2017-06-07	<	-	0.070	56	<	0.03	1998-07-15	<	-	0.02	55	0.03	0.02

Notes: "-" denotes not analyzed
"<" denotes results below method detection limit
"SW-###" denotes surface water sampling station (### indicates station ID)
results reported in mg/L unless indicated otherwise
PWQO denotes Provincial Water Quality Objectives
PWQO values are not appropriately comparable to analyses of groundwater

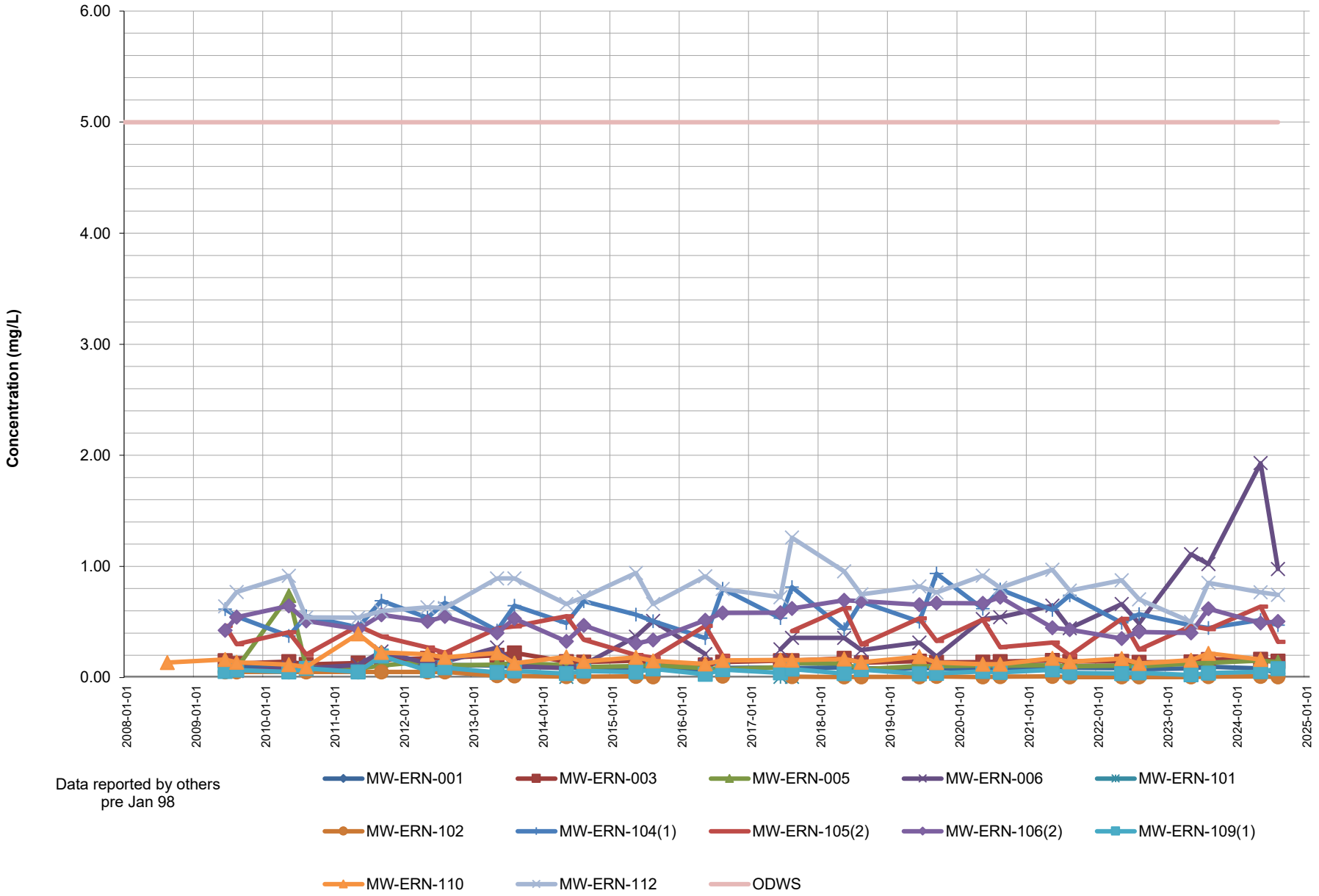
Data Input: RG
Data Check: RF

Appendix F
Groundwater and Surface Water Quality Trends

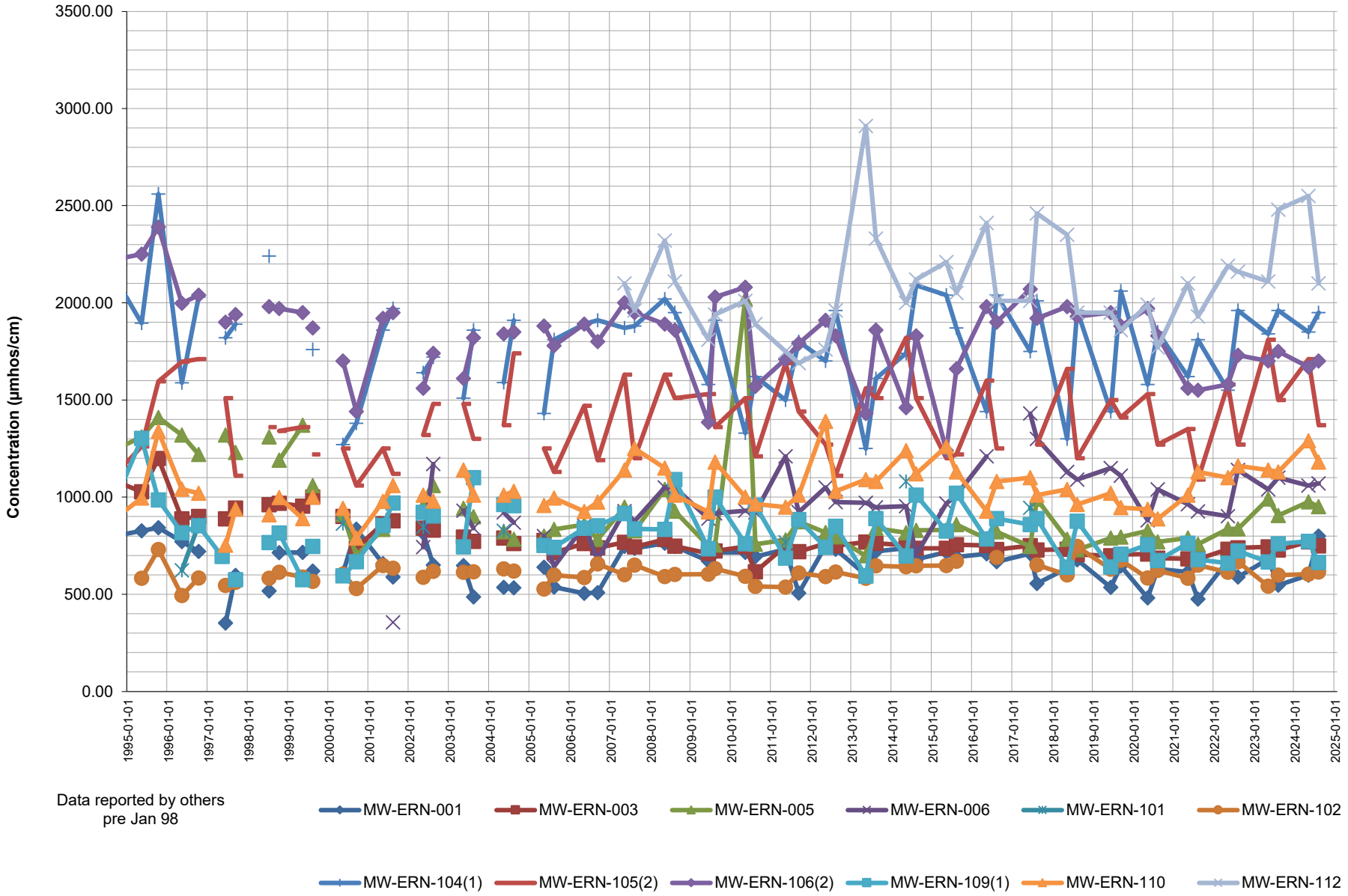
Ammonia Trends in Groundwater



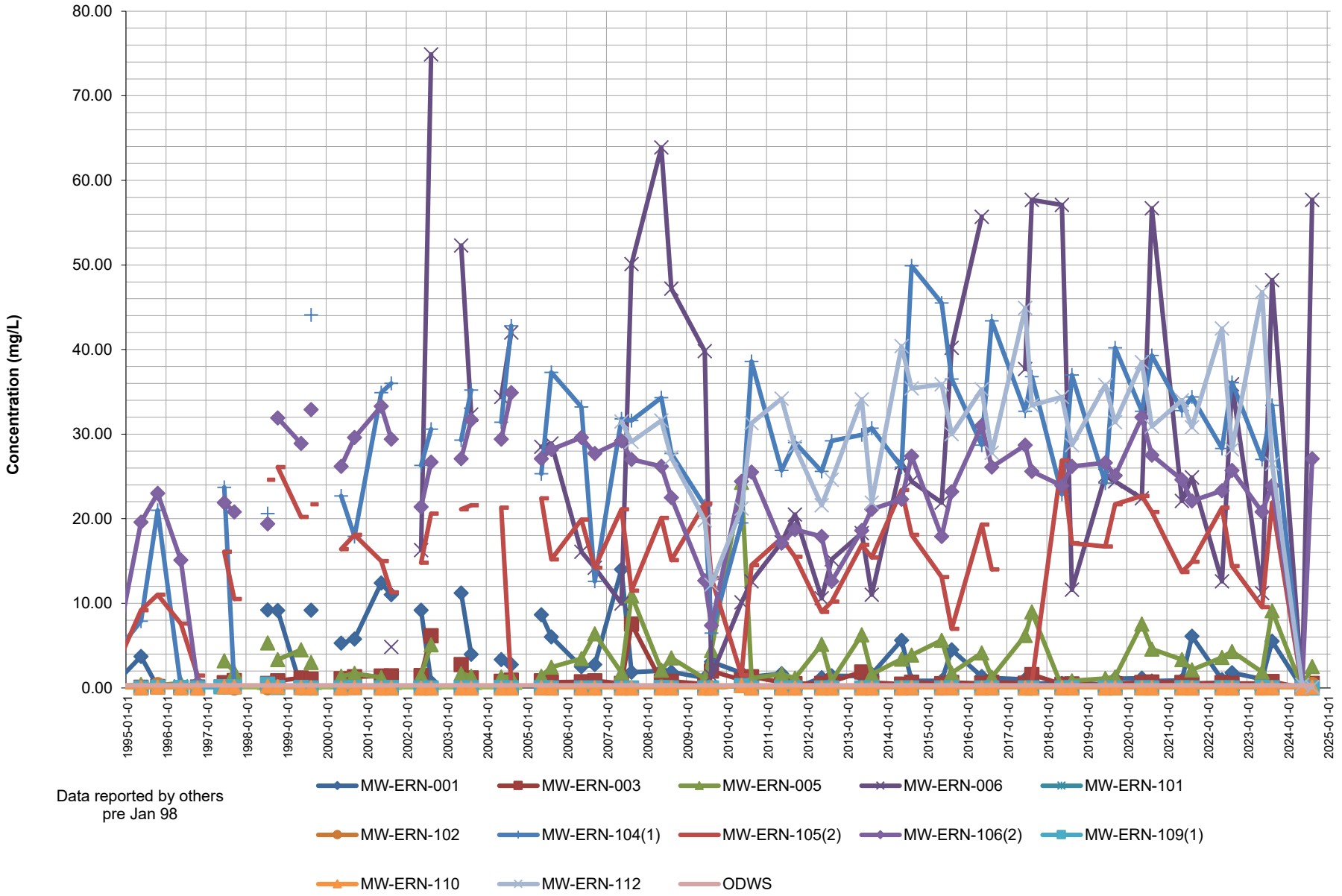
Boron Trends in Groundwater



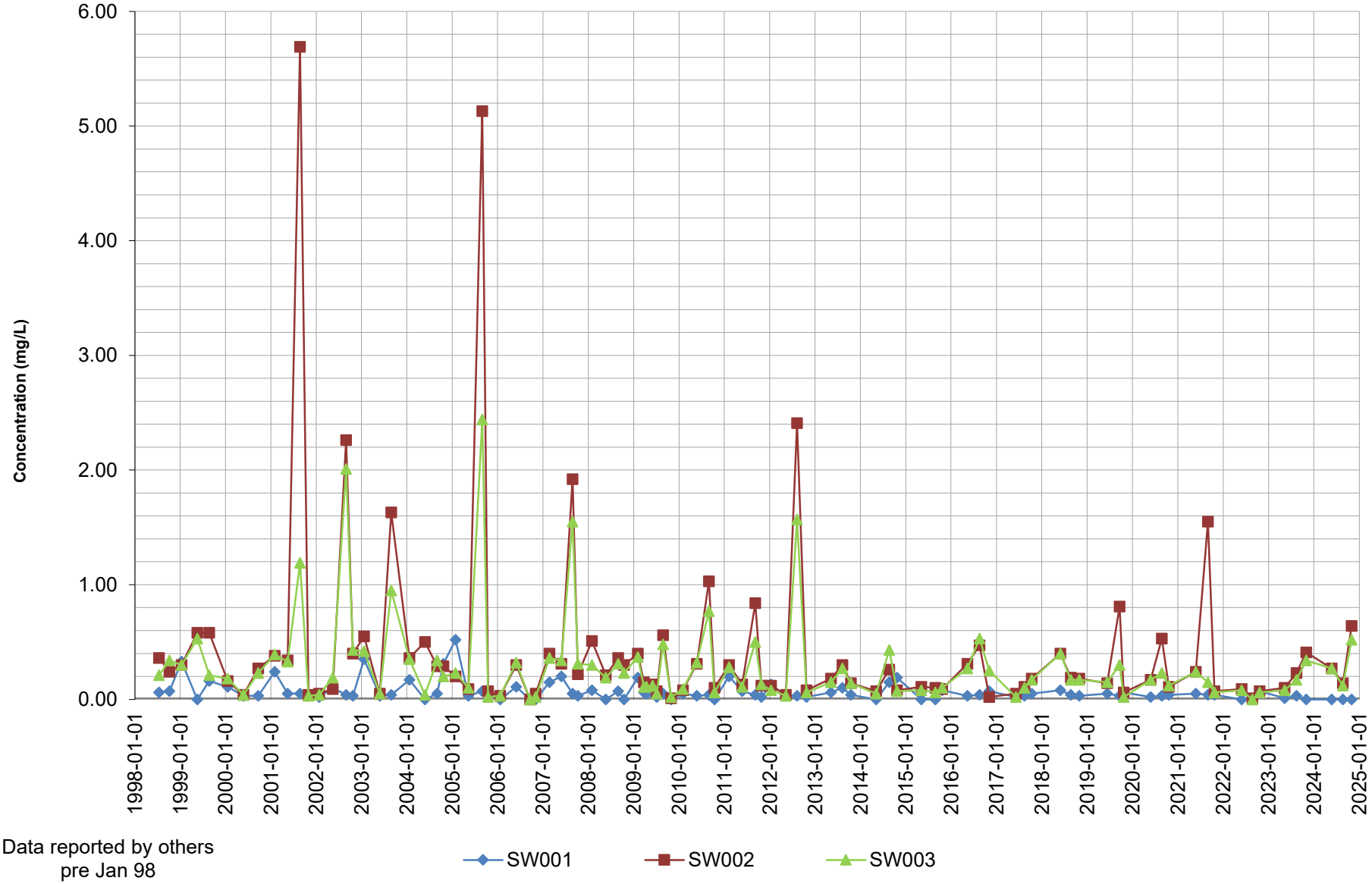
Conductivity Trends in Groundwater



Iron Trends in Groundwater

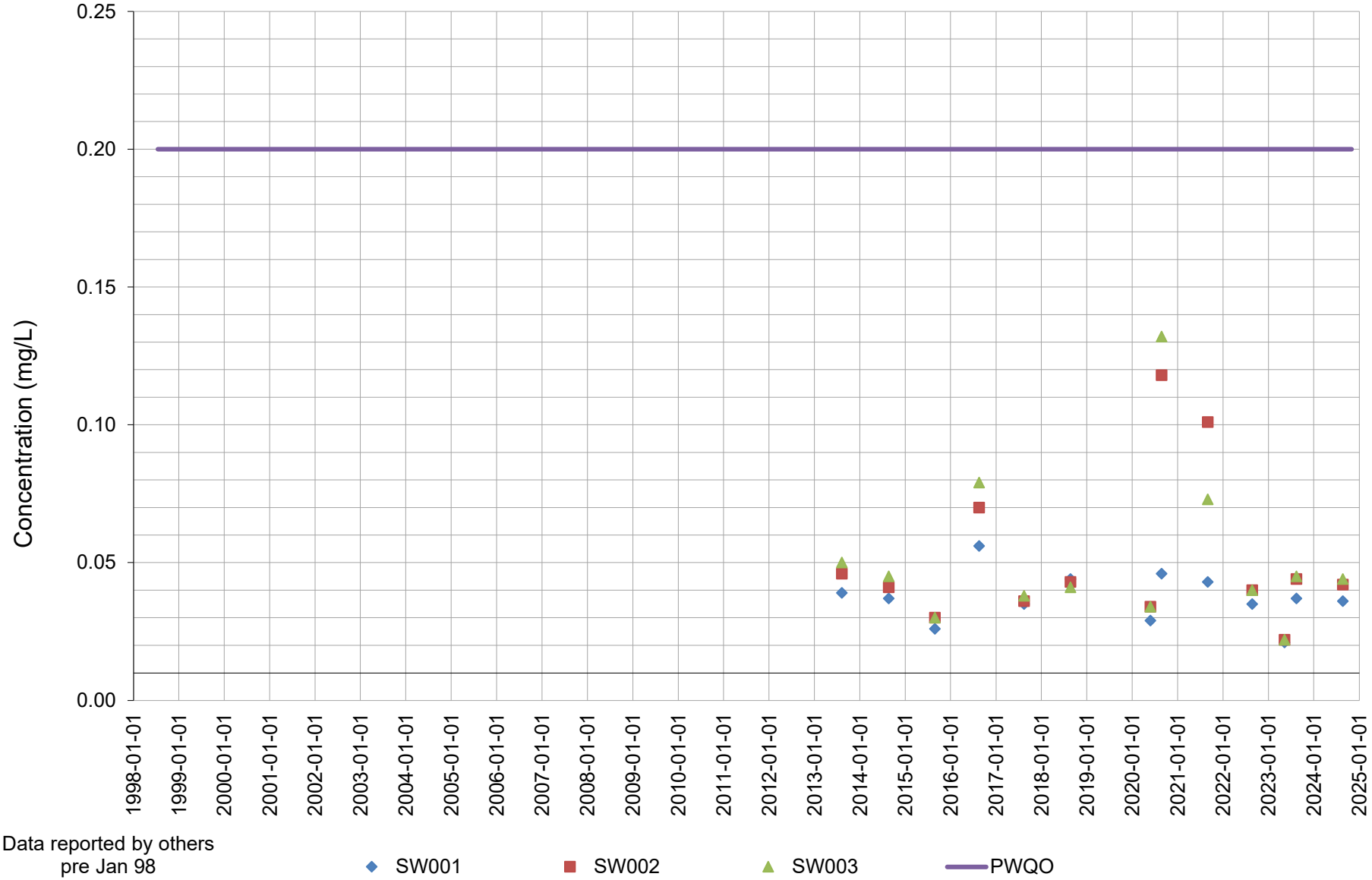


Ammonia Trends in Surface Water

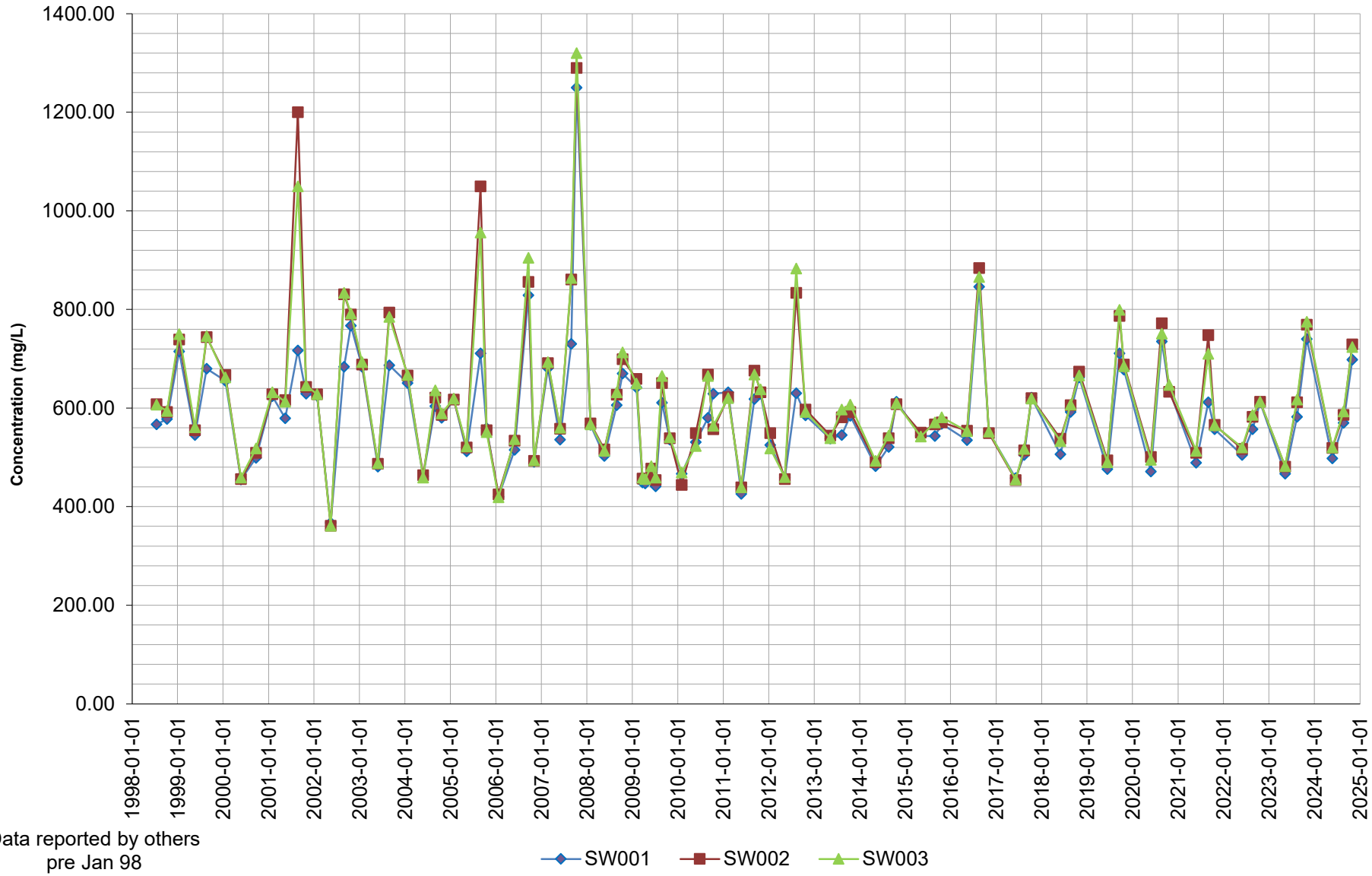


Data reported by others
pre Jan 98

Boron Trends in Surface Water

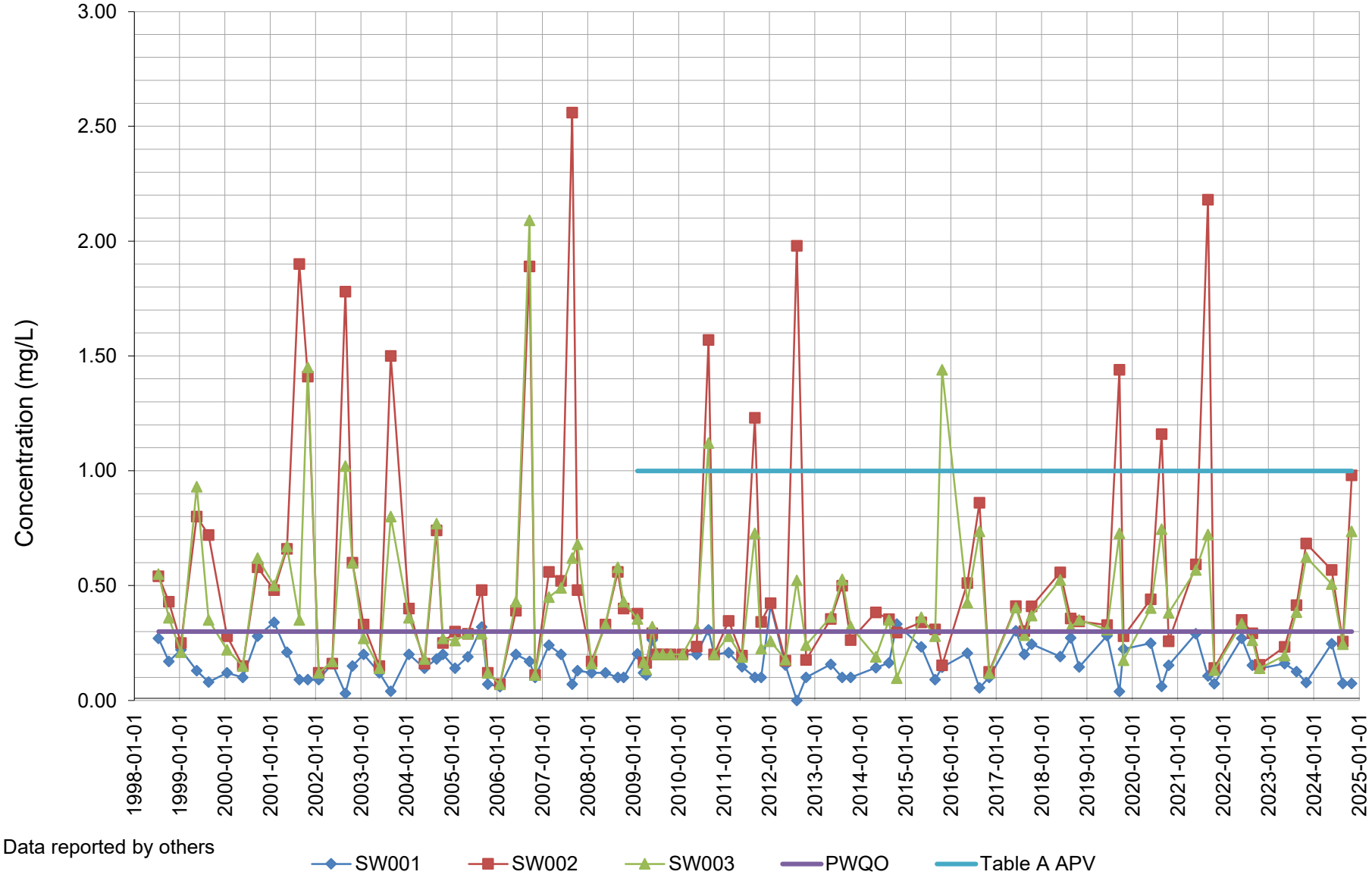


Conductivity Trends in Surface Water



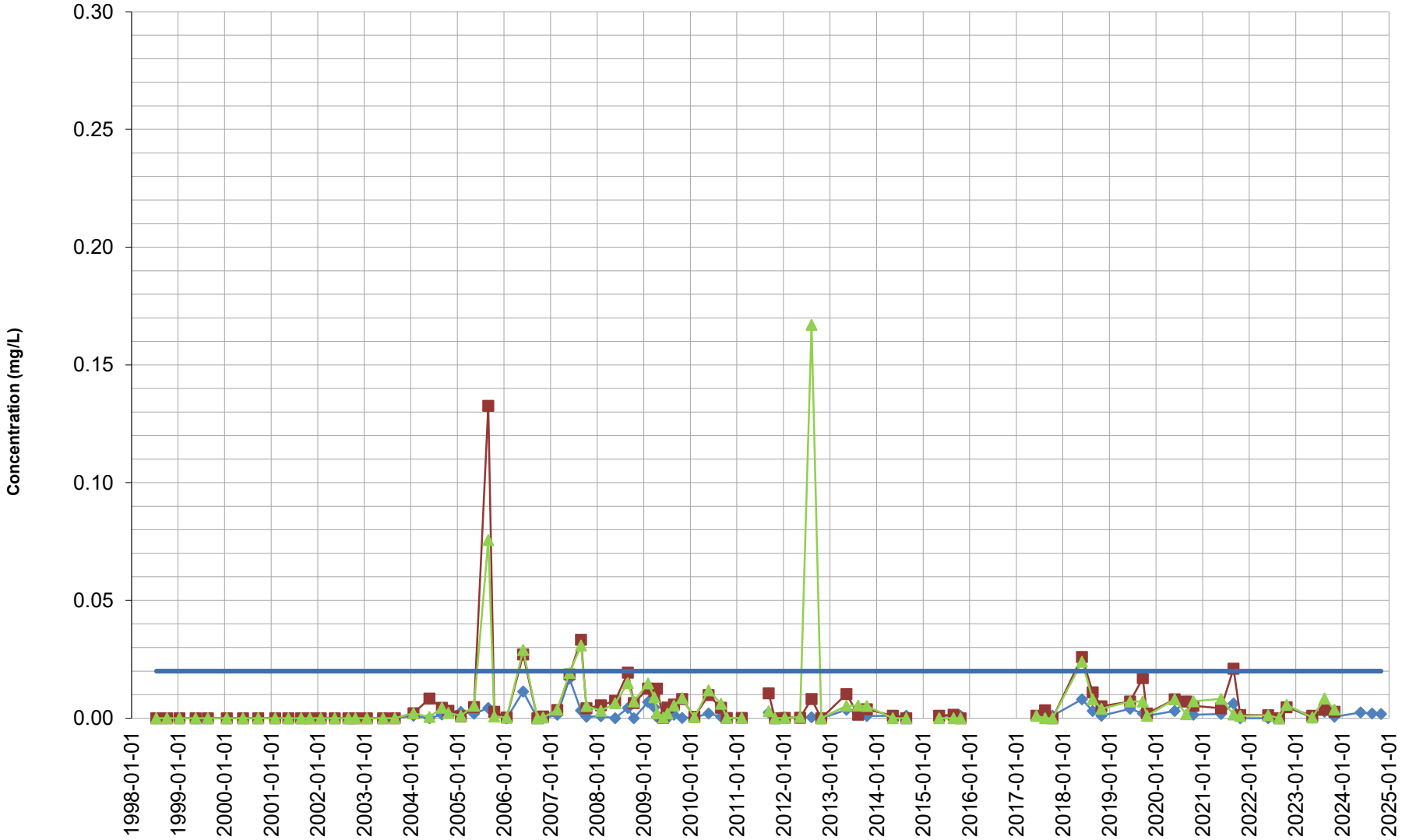
Data reported by others
pre Jan 98

Iron Trends in Surface Water



Data reported by others

Un-Ionized Ammonia* Trends in Surface Water



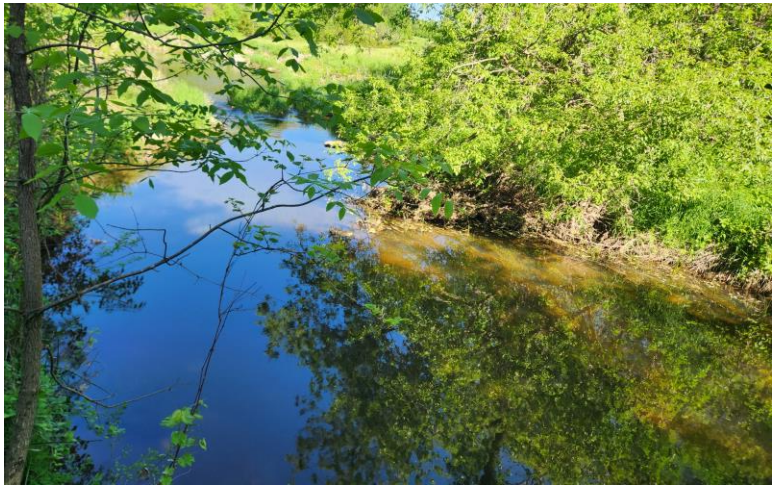
Data reported by others pre Jan 98

*un-ionized ammonia calculated using field parameters

Appendix G
Site Photos

May 23, 2024

Surface Water Sample Station SW-001.



Surface Water Sample Station SW-002.

Surface Water Sample Station SW-003.

August 21, 2024

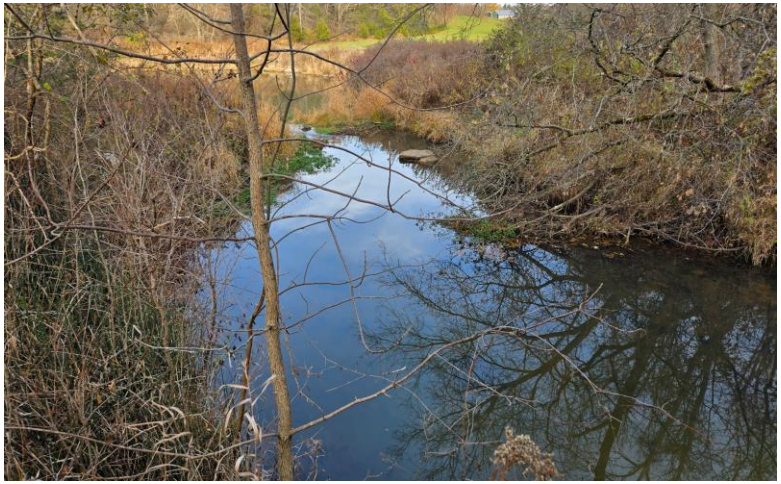
Surface Water Sample Station SW-001.

Surface Water Sample Station SW-002.

Surface Water Sample Station SW-003.

October 31, 2024

Surface Water Sample Station SW-001.



Surface Water Sample Station SW-002.

Surface Water Sample Station SW-003.

View of recycling bins.

View of active fill area during May 2024 sampling event.

View of attendants shed and weight scales.

View of entrance to the landfill and sign.