TOWN OF ST. MARYS

ST. MARYS LANDFILL
STATUS REPORT (2024)

VOLUME I – REPORT

BMROSS
engineering better communities

TOWN OF ST. MARYS

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VOLUME I – REPORT

March 31, 2025

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street
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File No. 23273

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1.0 INTRODUCTION

1.1 General

The St. Marys Landfill is located southwest of the Town of St. Marys on parts of Lots 35 and 36, Thames Concession, Town of St. Marys, County of Perth. The address of the site is 1221 Water Street South. The landfill property is approximately 37 ha in size with an approved Fill Area of approximately 8 ha. Figure 1.1 shows the general location of the waste disposal area.

The landfill site provides for municipal waste disposal for the Town of St. Marys. The 2021 population and dwelling count details from Statistics Canada notes a service population of 7,386 for the Town.

Please note that all references to directions as noted on drawings or in this report are based on "concession north".

General site details are summarized in Tables 1.1 and 1.2.

TABLE 1.1
Location, Ownership and Site Overview Information

Site Name	*St. Marys Landfill*					
Civic Address	*1221 Water Street South*					
Survey Address						
Lot			Concession	Part	Reference Plan	
Parts of 35 and 36			*Thames*	*N.A.*	*N.A.*	
Municipality		County	Province	Country	Postal Code	
Town of St. Marys		*Perth*	*Ontario*	*Canada*	*N4X 1B6*	
Geo Reference						
Description of location	Map Datum	Zone	Accuracy Estimate (m)	Geo-Referencing Method	UTM Easting	UTM Northing
SW corner of property	*NAD83*	*17N*	*1± m*	*2020 SWOOP*	*487200*	*4786873*
Main entrance	*NAD83*	*17N*	*1± m*	*2020 SWOOP*	*487204*	*4786894*
Monitoring stations	*N/A*					
Type of disposal	*Municipal Waste*					
Leachate controls	*Collection system and gravity sewer to Town's sanitary collection system*					
Landfill gas controls	*None*					
Other engineered controls	*Surface water management basins*					
Other permits (e.g., PTTW)	*None*					
Owner	Name: *Town of St. Marys* Address: *175 Queen Street, P.O. Box 998* *St. Marys, ON, Canada N4X 1B6* Phone: *519-284-2340* Fax: *519-284-2881* Contact: *Dave Blake* *Environmental Services Manager* Email: *dblake@town.stmarys.on.ca*					
Operator	Same as Owner					
Consulting Engineer	Name: *Andrew Garland, P. Eng.* Company: *B. M. Ross and Associates Limited* Address: 62 *North Street* *Goderich, ON, Canada N7A 2T4* Phone: *519-524-2641* Email: *agarland@bmross.net*					

TABLE 1.2
Site Description

Control document	Description
ECA No. – A150203	Waste disposal site – as amended by Notice/Amendment (See Appendix A)
PTTW – None	Not applicable
OWRA or ECA approvals	Not applicable
Site operational status	Active
Approximate start of active site operations for waste disposal	1984
Approximate volume of waste (m^3) – approved (incl. daily soil cover)	Phase I: 104,000 m^3 Phase II/III: 366,050 m^3
Approximate volume of waste (m^3) – to date (incl. daily soil cover)	Refer to Section 2.13
End of site operations for waste disposal	Refer to Section 2.13
Area	**Estimated area (ha)**
Fill Area – approved	8
Fill Area – actual used, to date	8
Total Property	37
Waste Disposal Site	37
Final cover – low permeability (min. 600 mm), to date	N/A
Final cover – topsoil (min. 150 mm), to date	N/A
Final cover – seeded/good catch of grass, to date	N/A
Max side slope of completed areas (H:V)	Approx. 4:1

1.2 Approvals

The St. Marys Landfill is acceptable for municipal waste disposal in accordance with the Ministry of Environment, Conservation and Parks (MECP) Amended Environmental Compliance Approval (ECA) No A150203, dated July 27, 2023. The original ECA No. A150203 for the site was issued dated June 24, 2010. The ECA was previously amended by Notices dated December 11, 2013, November 16, 2015, September 6, 2016, September 5, 2017, September 20, 2018, October 4, 2019, November 16, 2020, and January 10, 2022.

A copy of the ECA and amendments are included in Appendix A.

Since 2015, annual ECA amendments have been obtained to expand the approved airspace capacity of the site. Several amendments have been submitted on an annual basis to provide approval for interim operational capacity. An ECA Amendment request, dated July 2024, was submitted to the MECP regarding additional interim capacity. At the time of preparing this report, the approval remains pending. The most recently approved MECP amendment, dated July 27, 2023, states a Phase II/III site capacity of 366,050 m^3 of waste, including daily cover.

Site development and operations are to conform to the following approved documents:

- Hydrogeological Investigation, Phase II/III, St. Marys Landfill Site, St. Marys, Ontario, November 1992.
    - Addendum: Design and Operations Report Update, St. Marys Landfill Site, St. Marys, Ontario, April 2009.
- Design and Operation Report, Phase II/III, St. Marys Landfill Site, St. Marys, Ontario, November 1992.
    - Design and Operations Report: Addendum – Leaf and Yard Waste Composting Operation, St. Marys, Ontario, October 2009.
- Leachate Treatment and Disposal Alternatives, St. Marys Landfill Site, St. Marys, Ontario, November 1992.

1.3 Site History

The St. Marys Landfill began operations in December 1984. Before use as a landfill, the site operated as a clay and borrow pit until 1977.

Landfilling of wastes at the St. Marys Landfill has been carried out in phases. Above-ground filling in Phase I was completed in 1993. Landfilling of Phase II/III began following completion of Phase I. Landfilling in 2024 was caried out in above-grade air space in the Phase II/III Fill Area.

Conestoga-Rovers & Associates Limited (herein referred to as CRA) prepared a Hydrogeologic Investigation Report for the site, dated November 1982. A Plan of Operations and Development (O & D) for Phase II/III was subsequently prepared by CRA in November 1992, and revised in April and October 2009.

Routine monitoring work has been completed since 1984. Monitoring has included collecting groundwater, surface water, and leachate samples, completing groundwater elevation surveys on a semi-annual basis, and the preparation of annual status reports.

A domestic well water survey and sample program was initiated in 1985. There are currently five domestic wells as part of this program, which are sampled semi-annually.

The Town has received "Environmental Assessment Act, Section 9, Notice of Approval to Proceed with the Undertaking" dated February 15, 2024, approving the preferred alternative of landfill expansion as the solid waste management strategy for the Town. Interim filling conditions require an annual application to be submitted for additional interim capacity, as noted above, while the Environmental Assessment (EA) commitments and long-term site design and operations are developed and navigated through applicable approval agencies.

1.4 Purpose of this Report

This report has been prepared on behalf of the Town of St. Marys in fulfillment of the MECP requirement for the submission of an annual report (Condition 25 of Amended ECA No. A150203 – see Appendix A). This report covers the period of January 1 to December 31, 2024.

In our opinion, this report has been prepared in compliance with ECA conditions related to monitoring requirements. It is also our opinion that the monitoring and reporting has been carried out utilizing relevant sections of the following MECP reference documents:

- "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines" (Ref. 1)
- "Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities" (Ref. 2)
- "Water Management: Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of the Environment" (Ref. 3)

2.0 SITE DEVELOPMENT AND OPERATIONS

2.1 General

Staff of BMROSS reviewed site development and operations at the St. Marys Landfill in 2024 on the following days:

- May 13, 14, and 15
- October 15, 16, and 17

The following notes, with respect to general site development and operations, are made based on the site visits completed by staff of BMROSS and based on discussions with Town staff:

- Town staff noted that there is an ongoing trespassing issue with one neighbouring property owner. Natural trails that facilitated access around the perimeter fencing have since been made inaccessible. However, trespass events continue to be an issue, and the Town is actively working to resolve the issue.

- The site access road was in good condition.

- There is a lockable entrance gate at the County Road entrance for the site. The site is secured with a post and wire fence around the perimeter of the property.

- At the County Road entrance for the site, there is a sign to identify: the site legal description, the name of the Owner, the ECA number, the operating hours, materials that are accepted, unacceptable materials, and emergency contact information.

- The site hours are as follows:

Tuesday, Wednesday, and Friday	8am – 4:30pm
Saturday	8am – 12pm
Monday, Thursday, and Sunday	Closed

- There were sufficient signs within the site directing traffic and marking Waste Transfer Station (WTS) operations and the active fill area.

- There is a scale and scale house on site.

- There is a site attendant present each day the site is open.

- Generally, vector and vermin are not problems at the site.

- There has been satisfactory segregation of waste materials at this site, with bins in the WTS area for recycling, scrap metal, and e-waste, and designated drop-off areas for yard waste and construction materials.

- Bluewater Recycling Association (BRA) is the certified waste hauler bringing municipal wastes to the St. Marys Landfill during the period under review. 2024 curbside and commercial waste and recycling tonnage information for the Town of St. Marys is provided in Appendix G.

- Curbside waste is currently being collected weekly on Tuesdays and Fridays.

Figures 1.1 and 3.1 show the general site location, and current site conditions as of October 2024, respectively.

2.2 Waste Reduction and Diversion

a) Tipping Fee

A tipping fee is charged to all site users for wastes to be landfilled (see Appendix H, By-Law No. 122-2023, Schedule “G”).

b) Recycling/Reuse

The Town of St. Marys is currently a member of BRA, providing residents with blue box curbside pickup. Depot carts are provided and collected by BRA. The Town also provides facilities at the landfill site for the recycling. Recyclable materials are to be removed from the site every 90 days, at minimum.

The Landfill also accepts e-waste as part of the WTS operations. Greentec in Stratford, Ontario collects the e-waste bin from the site. Scrap metal is segregated and placed in a bin and removed from the site by Robson Scrap Metal.

c) Burning

Burning is not permitted at this site.

d) Other Waste Reduction Initiatives

Prohibited items, for the waste stream that is to be landfilled at this site, include tires, liquid waste, hazardous waste, and appliances with refrigerants.

Yard wastes, clean wood, and brush are accepted at the site. The Town of St. Marys has periodic curbside leaf collection days April to November. Leaf and yard waste is composted and stockpiled for use on site as topsoil material.

A summary of materials brought to the site in 2024, as provided by Town records, are summarized in Table 2.1. Blue box recycling, e-waste, and scrap metal are removed from the site by third parties. All other material is managed on-site.

Table 2.1
Materials Summary (2024)

Material Type	Quantity (tonnes)
Blue Box Recycling	7.3
Brush	35.2
Leaf and Yard Waste	454
Wood	114.6
E-Waste	7.96
Scrap Metal	1.63
Construction Material	532.8
Shingles	60.6
Total	**1,214.09**

2.3 Site Screening and Security

The perimeter of the site is maintained by post and wire fencing, except for the northwest side adjacent to St. Marys Cement and the eastern side along the adjacent agricultural field. There is a lockable steel gate at the entrance to the site at Perth Road 123.

The Town should continue to maintain the site perimeter fencing and site gate to discourage unauthorized motorized vehicle access to the site.

2.4 Litter

Based on recent site reviews, there is some windswept litter on site. It is recommended that Town staff complete periodic clearing of litter from on- and off-site areas when necessary.

2.5 Soil Cover Availability

There will be an ongoing need for imported suitable soils, for daily and final cover material, for the current Phase II/III disposal operations and once the site capacity increase identified in the EA is approved through an amended ECA.

In 2024, 3,722.70 tonnes of clean fill was imported for use as daily cover.

2.6 Site Development

Site development should generally continue to be carried out in accordance with the Design and Operations Report, and any MECP approval documents.

In July 2024, a request was submitted to the MECP for an increase in interim capacity. At the time of preparing this report, the ECA amendment remains pending.

Planning is currently underway for site expansion. Approval of the EA, completed as part of the expansion process, was received on February 15, 2024.

2.7 Waste Disposal

Landfilling of wastes at the St. Marys Landfill for 2024 has occurred in cells 5, 6, 7, and 8 of the Phase II/III fill area, in accordance with the Condition 27 (b) of the ECA.

It is noted that Condition 14.8 (a) of the ECA states wastes should be covered daily.

2.8 Closed Area Review

a) Integrity and Maintenance of Closed Areas

The Phase I fill area has been closed and capped since 1993. The mound has a good catch of grass growing.

Previously completed cells of the Phase II/III fill area have areas devoid of vegetation. It is noted that the preferred alternative from the EA, which includes both vertical and horizontal expansion of the fill area approved in the current ECA, will result in a fill area that fully encompasses the footprint of the Phase I and II/III areas. Therefore, future site operations will include a desire to strip cover soils from previously closed areas. Until such time that operations move into these areas, Town staff should annually inspect and maintain completed areas for leachate seeps, erosion, and cracking, repairing and re-seeding areas where necessary.

b) Areas to be Closed in 2025

No areas are proposed for closure in 2025.

2.9 Stormwater Management

As part of Condition 24.2 of the ECA, an "Operations and Maintenance Manual" is to be maintained, including details related to surface water/stormwater management. There are two stormwater basins on the landfill site. Surface water from Phase I is directed to stormwater Basin A through a series of swales and perimeter ditches. Stormwater from Phase II/III is directed to stormwater Basin B via corrugated steel pipe. Both basins outlet to the watercourse that traverses through the site, eventually discharging to the North Thames River.

Swales, culverts, and outlets are inspected by Town staff on a regular basis. No operational issues or maintenance activities were reported for the period under review. Based on previous status reports, the steel pipe outlet in Basin A was damaged in 2023 and should be repaired.

In 2022, following a leachate spill, Basin B was pumped dry, and sediment was removed. Since then, no sediment removal activities in the stormwater basins have been completed, or deemed necessary. No complaints were received in relation to stormwater management works for the period under review.

2.10 Leachate Management

The Phase I Fill Area is reported to have a series of perforated pipes for leachate collection. When constructed, the collection pipes drained to a leachate holding tank. In 1997, the leachate collection system was connected to a gravity sewer that drains to the Town's sanitary collection system and the holding tank was reportedly decommissioned in 2008.

The Phase II/III Fill Area leachate collection system consists of a series of perimeter collection pipes and lateral collection pipes below the Fill Area that discharge leachate via gravity to the Town's sanitary collection system. Before the leachate collection system was connected to the Town's sanitary system, the leachate collection system contained an on-site holding tank. The holding tank is now incorporated into the gravity sewer system, complete with a shut-off valve. There is no longer any on-site storage of leachate.

Maintenance in 2024 consisted of flushing the entire system in August/September and targeted flushing of specific areas of the collection system in December.

2.11 Public Concerns

The Town did not receive any complaints from the public related to the landfill site during the period under review. No unauthorized dumping was noted in 2024. As previously mentioned, there continues to be instances of trespassing. Corrective actions are being pursued by the Town.

2.12 Gas Monitoring

The current amended ECA has no requirements for landfill gas monitoring.

2.13 Landfilling Rate, Volume and Remaining Capacity

a) Landfilling Rate and Volume

The 2023 Status Report (Ref. 4) indicates the fill rate in 2023 was estimated at 11,857 m^3/year, based on topographic surveys of the Phase II/III Fill Area. Based on a comparison of October 6, 2022 to August 13, 2024 surveys, the current annual fill rate is estimated at 10,800 m^3/year.

In terms of tonnage, based on scale records 6,204 tonnes were landfilled in 2024. This is relatively similar to the 6,260 tonnes reported for 2023. These values convert to an average of 17.1 tonnes of waste landfilled per day for the 2023-2024 period. Assuming this rate applies to the October 6, 2022 to August 13, 2024 survey comparison noted above, the resulting average waste density is 0.58 tonnes/m^3.

The proposed interim contour of 327.85 mASL that was provided in the July 2024 ECA application would result in a remaining available air space of approximately 11,000 m^3 from the time of the August 13, 2024 topographical survey. The proposed interim contour plan is enclosed as Appendix I.

b) Remaining Capacity and Site Life

Since 2015, annual ECA amendments have been applied for to expand the approved airspace capacity of the site within the Phase II/III Fill Area. The most recently approved MECP amendment, dated July 27, 2023, states a Phase II/III site capacity of 366,050 m^3 of waste, including daily cover. The approved EA preferred Alternative 3A includes horizontal and vertical expansion of the fill area for an additional 708,000 m^3 of disposal capacity. This alternative was selected to meet the EA Terms of Reference (TOR) 40-year waste disposal needs target for the Town, based on a planning period of January 1, 2017 through December 31, 2056 (Ref. 5). At the current estimated landfilling rate of 10,800 m^3/year, the volume of 708,000 m^3 would not be utilized until beyond 2056, though it is recognized the annual fill rate may vary over time.

c) Curbside Waste Weight Information

The Town currently uses the services of BRA for residential curbside co-collection (of both household recyclables and bagged wastes to be landfilled), using dual-purpose co-collection trucks. The Association keeps records of the curbside waste and recyclables weights (see Appendix G for totals). In 2024, BRA provided the following for the Town of St. Marys:

Bagged Waste		1,680.26 tonnes
Recyclables		905.61 tonnes
	Total	2,585.87 tonnes

The total tonnage above represents an increase of 1.8% from the previous year.

2.14 MECP Inspection Action Items

To our knowledge, the most recent MECP inspection at the site occurred in February 2023. The inspection was focused on the WTS, and no formal inspection report was issued.

2.15 Other MECP Correspondence

No other MECP correspondence occurred in 2024.

2.16 Review of Environmental Compliance Approval Conditions

Table 2.2 identifies the status of conditions of the ECA for waste disposal, as amended. An "Action Item" column is included as part of this table, to highlight conditions that remain incomplete or conditions that should be regularly (e.g., annually) reviewed by the Operator.

Work that the Town should complete in 2025 includes routine site review and environmental monitoring.

TABLE 2.2
Status of Environmental Compliance Approval Conditions

Condition No.	Comments	Action Item
WASTE		
	GENERAL	
1.	Design and operate per Schedule A documents, plans, specs	*
2. – 11.	EPA requirements, MECP requirements, records, inspections, communications, ownership	-
12.	HOURS OF OPERATION	-
13.	SINAGE AND SECURITY	
	Fence and gate	*
	Sign indicating Owner, hours of operation, emergency contact	-
14.	OPERATIONS	
	Operation and maintenance reference	-
	Acceptable waste	-
	Approved volume	-
	Final contours	-
	Daily and final cover requirements	T
	Closure plan	-
	White goods	*
	Propane cylinders	*
	Tires	*
15.	WASTE TRANSFER STATION	
	Design and operate per application, Schedule A documents	*
	Acceptable waste	-
	Approved volume	-
	Materials storage	-
	Unacceptable waste	-

TABLE 2.2
Status of Environmental Compliance Approval Conditions

Condition No.	Comments	Action Item
	Security	*
	Bins	*
	E-waste	*
16.	MUNICIPAL HAZARDOUR OR SPECIAL WASTE (MHSW)	
	Design and operate per application, Schedule A documents	*
	Acceptable wastes	-
	Approved volume	-
	Storage and handling requirements	*
	Owner responsibilities	*
	Signage	*
	Unacceptable waste	-
	Emergency contact	-
17.	COMPOST	
	Approved volume	-
	Design and operate per application, Schedule A documents	*
	Waste inspection	*
	Operations	-
	Monitoring	*
	Leachate collection	*
18.	NUISANCE CONTROL	
	Vermin, vectors, birds, dust, litter, odor, noise, traffic	*
	Complaints and remedial measures	*
19.	SITE INSPECTIONS AND MAINTENANCE	
20.	ENVIRONMENTAL EMERGENCY	
	Environmental Emergency Plan	DONE
	Fire or spill notification procedures	-
	Fire or spill emergency equipment	*
21.	COMPLAINTS	*
22.	RECORD KEEPING	-
23.	MONITORING	
	Compliance	*
	Sampling	*
	Monitoring well physical integrity	*
24.	GENERAL PROVISIONS	DONE
25.	ANNUAL REPORT	T
26.	CLOSURE PLAN	-
27.	INTERIM CAPACITY	T

Legend: * Condition recommended for routine (e.g. annual) review by Town staff
T Item for action in 2025
- Condition for periodic review by Town staff

2.17 Continued Site Development and Operations

Site development and operations should be completed as outlined in the approved Design and Operations Report. Site activities should also be completed in accordance with the following recommendations:

- Monitor the effectiveness of litter control measures and clear litter from on-site areas as recurring maintenance as needed, and clear off-site litter as it is observed.
- Controlled waste segregation areas should continue to be used to reduce the amount of wastes landfilled, for at least the following:
  - Segregation of leaf and yard waste/compost
  - Scrap metal and scrap appliances (propane tanks prohibited).
  - Recycling bins for newsprint, cardboard, plastic, glass and metal containers, etc.
  - E-waste bin for electronics

  Generally, wastes should be segregated and stockpiled only if there is a routine method for off-site disposal or recycling, otherwise those wastes should be placed in the active cells and landfilled.
- Waste coverage and compaction practices should continue.

3.0 WATER RESOURCE MONITORING

3.1 Assumptions and Limitations

Many of the opinions and conclusions provided in this report have been based on information and conclusions made in previous Status Reports.

The 2020 aerial photography that was used as an underlay in some report figures includes material © 2020 of the Queen's Printer for Ontario. All rights reserved.

Annual monitoring work also relies on water quality analyses as completed by SGS Canada Inc. SGS is an accredited laboratory and the analysis is undertaken to ISO/IEC 17025:2005 (E) standards, as revised from time-to-time.

3.2 Physical Setting

a) Geology and Hydrogeology

The site geology is described as having various gravel, sand and silt units. The site overburden material is characterized as Tavistock Till, which is comprised of sandy silt to silty clay material. The regional overburden consists of glaciolacustrine deposits and glaciofluvial outwash which are characterized by silt and clay, and gravel and sand, respectively. The overburden is underlain by dolomitic limestone of the Dundee Formation.

Well records indicate that overburden materials at the site are typically clayey silt till and sand with gravel. Bedrock well records indicate grey-brown limestone which is typical of the Dundee Formation.

The site topography has been heavily influenced by industrial activity (i.e., quarry operations and more recently, cement plant operations) since the 1960s. In general, the topography in the surrounding area slopes toward the North Thames River.

The limestone bedrock functions as the primary aquifer in the region, supplying most drinking water in the area. It has been previously established that the regional bedrock water flow is east to west. Overburden groundwater flow at the site tends to be west to east, toward the on-site stream. Previous status reports have indicated that the site and surrounding area does not have overburden aquifers, and any potential overburden aquifers tend to occur along rivers and streams in alluvial sand and gravel deposits.

b) Surface Water Features

The North Thames River is located west of the site. There is a watercourse that traverses the site, entering the site generally east of the compost area, and exiting to the north, just northeast of the Phase I Fill Area. The on-site stream drains to the North Thames River west of Perth Road 123.

There are two stormwater basins on site to manage surface water/stormwater. Both basins outlet to the watercourse on the site.

3.3 Monitoring Program Overview

a) Monitoring Program Requirements and Objectives

Water resource monitoring at the St. Marys Landfill is a requirement of Amended ECA No. A150203 (refer to Appendix A). Required monitoring activities include measuring groundwater levels in existing site wells and collecting groundwater, surface water, and leachate samples from select locations.

The objective of the routine annual monitoring program is to provide data to routinely evaluate current and potential impacts to the environment, and to monitor the effectiveness of existing leachate controls.

b) Monitoring Locations

Up to eighteen monitoring wells, five residential wells, three stream locations, five surface water management basin locations, and two leachate manholes are currently being routinely monitored to evaluate the impact of the landfill site to the subsurface and stream. Figure 3.1 shows the general location of all existing monitoring locations.

It is noted that in 2024, monitoring wells OW8A-91 and OW32A-02 were found to be damaged. Field staff noted that the base of the protective casing, as well as the PVC well pipe, at OW8A-91 was filled with a thick, orange slurry. The dedicated sampling equipment (i.e., WaTerra tubing) was removed for further investigation, revealing that the slurry material extended several meters down the well pipe. The well pipe at OW32A-02 was cracked, preventing the use of the dedicated tubing to obtain a sample.

c) Monitoring Frequency

Table 3.1 provides an outline of the current monitoring program, summarizing the requirements of Term 23 of the Amended ECA.

TABLE 3.1
Current Monitoring Program

Monitoring Location	SPRING	FALL	Monitoring Location	SPRING	FALL
Groundwater Wells			***Private Wells***		
OW2-84	√-	√-	**PW1**	√	√
OW3-84	√+	√+	**PW2**	√	√
OW4-84	√+	√+	**PW3**	√	√
OW5-84	√+	√+	**PW4**	√	√
OW6-84	√+	√+	**PW5**	√	√
OW7-91	√+	√+	***Surface Water***		
OW8A-91	√+	√+	**SP1-10**	√	√
OW8B-91	√+	√+	**SP2-93**	√	√
OW9A-91	√+	√+	**SP3-93**	√	√
OW9B-91	√+	√+	**SP1B-94**	√	√
OW15-91	√-	√-	**SP2B-94**	√	√
OW21-91	√-	√-	**SP3A-94**	√	√
OW25-91	√+	√+	**SP4A-94**	√	√
OW32-96	√-	√-	**SP5A-94**	√	√
OW33-96	√+	√+	***Leachate***		
OW34-96	√-	√-	**MH1**	√+~	√+~
OW32A-02	√-	√-	**MH3**	√+~	√+~
OW36	√+	√+			
MHB	√+	√+			

Notes
√ = Standard analyses (see Table 3.4)
+ = Metals
- = BTEX
~ = VOCs

d) Field and Lab Parameters and Analysis

All water samples should continue to be analysed by a certified and accredited laboratory. Table 3.2 provides a summary of the current standard analysis parameters. Field measurements of pH,

conductivity, and temperature are normally taken at each monitoring location during each sampling event.

TABLE 3.2
List of Parameters

Groundwater		Surface Water		Leachate	
1) Standard Analysis Parameters:		**1) Standard Analysis Parameters:**		**1) Standard Analysis Parameters:**	
Chloride	Hardness	Chloride	Hardness	Chloride	Alkalinity
Phenols	DOC	Phenols	Ammonia	Phenols	Ammonia
Calcium	Magnesium	BOD	Turbidity	BOD	COD
		TDS	TSS	TSS	Nitrate
		Calcium	Magnesium	TKN	Sulphate
		Iron	Manganese	Calcium	Magnesium
		Total Phosphorus		Iron	Manganese
				Total Phosphorus	
2) Metals Parameters:		**2) Metals Parameters:**		**2) Metals Parameters:**	
Aluminum	Barium	Aluminum	Barium	Aluminum	Barium
Beryllium	Bismuth	Beryllium	Bismuth	Beryllium	Bismuth
Cadmium	Chromium	Cadmium	Chromium	Cadmium	Chromium
Cobalt	Copper	Cobalt	Copper	Cobalt	Copper
Lead	Molybdenum	Lead	Molybdenum	Lead	Molybdenum
Nickel	Potassium	Nickel	Potassium	Nickel	Potassium
Silver	Sodium	Silver	Sodium	Silver	Sodium
Strontium	Tungsten	Strontium	Tungsten	Strontium	Tungsten
Vanadium	Zinc	Vanadium	Zinc	Vanadium	Zinc

e) Monitoring Procedures, Methods, QA/QC

Groundwater samples were collected after the monitoring wells were developed. Typically, a minimum of five well casing volumes of water were being removed from the observation wells before water samples were collected. Wells were then allowed to recover prior to sampling, without further development. All groundwater samples were field filtered using 0.45-micron disposable filters. Water samples were collected in laboratory prepared sample containers specific to the analytical parameter(s) to be tested, and the samples were preserved, when required.

All leachate and surface water samples were grab samples and were not field filtered.

Calibration of the field instruments was completed before each monitoring event.

All water samples were returned to BMROSS' office at the end of each sampling day where they were packed and submitted to SGS Environmental Services laboratory in Lakefield. Water samples were stored in a cooler during transit. When necessary, water samples were stored overnight in a refrigerator at BMROSS' office before they were couriered to the laboratory on the following day.

A Quality Assurance/Quality Control (QA/QC) program was implemented which involves the collection of a duplicate sample at one groundwater and one surface water monitoring location, as well as a field blank, per each monitoring event. A relative percent difference was calculated between original and duplicate samples.

f) Overview of Monitoring Events for the Period Under Review

Laboratory analysis data for available historical data is provided in Appendix C. Table 3.3 summarizes monitoring work completed during the period under review. Results prior to the period under review were included in previous Status Reports.

For the period under review, staff of BMROSS visited the site on the following days, to collect water samples:

- May 13, 14, and 15
- October 15, 16, and 17

TABLE 3.3
Recent Sampling History

Monitoring Location	May 13-15, 2024	Oct. 15-17, 2024	Monitoring Location	May 13-15, 2024	Oct. 15-17, 2024
OW2-84	√	√	**OW36**	√	√
OW3-84	Dry	Dry	**MHB**	√	√
OW4-84	Dry	Dry	**PW1**	N.S.	N.S.
OW5-84	√	√	**PW2****	N.S.	N.S.
OW6-84	Dry	Dry	**PW3**	√	√
OW7-91	√	√	**PW4**	√	√
OW8A-91	N.S.	N.S.	**PW5**	√	√
OW8B-91	N.S.	√	**SP1-10**	√	√
OW9A-91	√	N.S.	**SP2-93**	√	Dry
OW9B-91	√	√	**SP3-93**	√	√
OW15-91	√	√-	**SP1B-94**	√	√
OW21-91	√	√	**SP2B-94**	√	√
OW25-91	√	√	**SP3A-94**	√	Dry
OW32-96	√	√	**SP4A-94**	Dry	Dry
OW33-96	√	√	**SP5A-94**	Dry	Dry
OW34-96	√	√	**MH1**	Dry	Dry
OW32A-02	N.S.	N.S.	**MH3**	√+	Dry

Notes
√ = Standard analyses (see Table 3.4)
√+ = Standard analyses + metals
√- = Standard analyses + BTEX
N.S. = Not sampled
** PW2 not tested for some time due to sampler safety concerns

3.4 Groundwater Flow Assessment

a) Results

Generally, static water levels were measured in all active monitoring wells on the same day routine semi-annual water samples were being collected, prior to well development. Table 3.4 provides a summary of the monitoring locations where groundwater elevations are currently being recorded.

Groundwater level measurements are used to evaluate horizontal and vertical groundwater flow paths through the subsurface at this site. Current and historical water level tabular and graphical summaries (time series graphs) are presented in Appendix F. Figures 3.3 and 3.4 provide water

elevation data and groundwater flow direction interpretations in the overburden layer for the period under review. As explained in later sections of this report, groundwater elevation data for the bedrock layer was not obtained in 2024. Refer to Figure No. 7 of the 2023 Status Report for the most recent bedrock groundwater flow interpretation.

The following discussion is limited primarily to a comparison of the routine spring and fall events for the current reporting period.

b) Overburden Groundwater Flow

There has historically been a 1.1 to 3.1 m seasonal difference in the water level at the western upgradient monitoring wells (i.e., OW2-84, OW9B-91, OW15-91, OW21-91, OW25-91, OW32-96, OW33-96 and OW34-96), typically with a lower fall water table level. This water level fluctuation was again observed in 2024, but to a lower degree, with water levels up to 1 m lower in the fall.

Downgradient of the fill area, overburden wells (i.e., OW4-84, OW5-84, OW8B-10 and OW36) exhibit a seasonal water level difference of 0.4 to 1.9 m, though OW4-84 and OW5-84 have been dry on many occasions. Similar to upgradient wells, the downgradient overburden wells tend to exhibit a lower fall water table level.

The overburden groundwater flow is generally in an easterly direction toward the on-site stream east of the landfill footprint.

c) Bedrock Groundwater Flow

In 2024, due to unavailable equipment to measure water levels in bedrock wells, no water level measurements were obtained. Water levels in all bedrock wells were greater than 30 m below the top of casing. Therefore, the following discussion is based on historical data and results presented in past annual reports.

The bedrock groundwater flow has been determined to flow in a west-northwest direction across the landfill site. Based on historical data, OW8A-91 has been identified as upgradient of the fill area, while OW32A-02 and OW9A-91 have been identified as downgradient of Phase I and Phase II/III, respectively.

d) Vertical Groundwater Flow

There are six pairs of nested wells, drilled to different depths, on the landfill site. The OW5-84/OW6-84 and OW32-96/OW32A-02 nests have had at least one dry well consistently in recent monitoring history, either in the spring or fall. In 2024, OW5-84, OW6-84, and OW4-84 were dry, and OW8A-91 and OW32A-02 were damaged. As stated above, the available measuring equipment could not measure depths greater than 30 m below the top of the well casing, therefore measurements could not be obtained for bedrock wells OW7-91 and OW9A-91.

Based on historical hydraulic monitoring results, the monitored well nests exhibit a downward gradient. It has been previously determined that there is limited hydraulic connection between OW33-96 and OW34-96, as these wells tend to exhibit high vertical gradients. These gradients are consistent with expected gradients within low permeable till, which exists between the wells. In 2024, the spring and fall gradients at OW33-96/OW-34-96 were -1.47 and -1.29, respectively, which are consistent with previously reported values.

TABLE 3.4
Current Monitoring Program
Groundwater Elevations

Monitoring Location	SPRING	FALL
OW2-84	√	√
OW3-84	√	√
OW4-84	√	√
OW5-84	√	√
OW6-84	√	√
OW7-91	√	√
OW8A-91	√	√
OW8B-91	√	√
OW9A-91	√	√
OW9B-91	√	√
OW15-91	√	√
OW21-91	√	√
OW25-91	√	√
OW32-96	√	√
OW33-96	√	√
OW34-96	√	√
OW32A-02	√	√
OW36	√	√
MHB	√	√

NOTES: √ = Water elevation is recorded during routine spring and fall monitoring events.

3.5 Water Quality Criteria

a) General

The MECP has established objectives for the level of impact that a (landfill) site can have on groundwater and surface water resources. MECP objectives are presented in the Appendix B tables.

b) Background Groundwater Quality

Background concentrations are required to establish, quantitatively, allowable landfill-related impact on groundwater quality. OW2-84 and OW25-91 are representative of overburden background quality, and OW8A-91 is representative of bedrock background quality. Background groundwater chemistry was estimated in previous annual reports based on a 10-year average concentration. Background concentrations for specific parameters have been updated for the purposes of this report and can be found in Tables 3.5A and 3.5B.

c) Objectives for Groundwater Quality

Maximum Acceptable Concentrations (MAC), Interim Maximum Acceptable Concentrations (IMAC), Aesthetic Objectives (AO) and Operational Guidelines (OG) are outlined in the MECP "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines" (ODWS), published in June 2003 (Revised June 2006). MAC limits are based on known or suspected adverse health effects. Water quality that continuously exceeds MAC limits must be rejected for domestic consumption. IMAC limits are health-related objectives established for substances where there is insufficient toxicological data to establish a MAC. AO and OG limits are not health-related. AO limits (for domestic use) should not be exceeded whenever a more cost-effective water supply or treatment process is, or can be made, available.

The Reasonable Use of the local groundwater has been assumed to be for domestic consumption. Therefore, the ODWS must be used in accordance with the method as outlined in MECP. Guideline B7 (Ref. 2) was used to establish the allowable impact of the landfill site to existing and potential groundwater uses. Allowable site boundary well concentrations (i.e. Cm), as identified in Appendix B tables, were calculated based on formulae from MECP Guideline B-7. These formulae limit the impact of a specific contaminant to a certain value between the estimated background concentration and, in this case, the ODWS.

The formulae used were as follows:

1) $Cm = Cb + x\,(Cr - Cb)$

Where Cm = maximum allowable concentration in the groundwater below the Adjacent Property (i.e. at a site boundary monitoring well being considered)
Cb = background concentration
Cr = ODWS concentration (based on the previous discussion)
x = 0.5, for non-health related parameters (i.e. AO or OG objectives), or 0.25, for health-related parameters (i.e. MAC or IMAC objectives)

2) Cw = Cm – Cp – Co

Where Cw = maximum contaminant increment concentration originating from the Waste Disposal Site that can be permitted and still not cause Cm to be exceeded.

Cp = present concentration, at the time of the assessment.

Co = contaminant increase from other sources (assumed to be zero for the assessments completed in this report).

A comparison of the background groundwater chemistry, the ODWS, and the allowable boundary well chemistry, for some of the tested parameters, is provided as Tables 3.5A and 3.5B.

TABLE 3.5A
Overburden Groundwater Quality Objectives (a)

Some Definitions:

MAC = Maximum Acceptable Concentration
IMAC = Interim Maximum Acceptable Concentration
AO = Aesthetic Objective
OG = Operational Guideline

Parameter	Estimated Average Background Chemistry (d)	Ontario Drinking Water Standard (ODWS)		Allowable Limit (Cm)
Hardness	235	100 (b)	OG	167.5
Alkalinity as CaCO3	215	30-500	OG	124-359
Chloride as Cl	8.21	250	AO	129
Sulphate as SO4	44.8	500	OG	272
Sodium as Na	17.5	200	AO	109
Iron as Fe	0.194	0.3	AO	0.247
Manganese as Mn	0.024	0.02	AO	0.022
Boron as B	0.092	5.0	IMAC	1.3
Nitrate as N	0.17	10.0 (c)	MAC	2.6
Nitrite as N	0.09	1.0 (c)	MAC	0.32
TKN	0.31	-	-	-
DOC as C	1.6	5.0	AO	3.3

Notes:
(a) All results reported as mg/L, unless otherwise noted.
(b) Hardness up to 500 mg/L can usually be tolerated for domestic consumption. The actual aesthetic objective is 80 to 100 mg/L as $CaCO_3$.
(c) The total nitrite and nitrate concentration must not exceed 10.0 mg/L as N.
(d) Overburden groundwater background concentration is established as the average concentration from 2014-2024. Background bedrock groundwater concentration is established as the average concentration from 2012-2022.

TABLE 3.5B
Bedrock Groundwater Quality Objectives (a)

Parameter	Estimated Average Background Chemistry (d)	Ontario Drinking Water Standard (ODWS)		Allowable Limit (Cm)
Hardness	449	100 (b)	OG	274.5
Alkalinity as CaCO3	349	30-500	OG	190-425
Chloride as Cl	20	250	AO	135
Sodium as Na	28	200	AO	114
Nitrate as N	0.14	10.0 (c)	MAC	2.6
Nitrite as N	0.10	1.0 (c)	MAC	0.33
DOC as C	6.4	5.0	AO	6.1

Notes:
(a) All results reported as mg/L, unless otherwise noted.
(b) Hardness up to 500 mg/L can usually be tolerated for domestic consumption. The actual aesthetic objective is 80 to 100 mg/L as $CaCO_3$.
(c) The total nitrite and nitrate concentration must not exceed 10.0 mg/L as N.
(d) Overburden groundwater background concentration is established as the average concentration from 2014-2024. Background bedrock groundwater concentration is established as the average concentration from 2012-2022.

TABLE 3.6
Surface Water Quality Objectives

Parameter	PWQO
pH	6.5-8.5 (pH units)
Ammonia	(a)
Phenols	1.0 µg/L
Iron	300 µg/L
Phosphorus (total)	30 µg/L (b)

Notes:
(a) The PWQO of un-ionized ammonia (NH_3) is 20 µg/L. The PWQO for unionized ammonia varies based on the temperature and pH of the surface water (see Ref.3).
(b) The 30 µg/L limit for total phosphorus is a guideline set to protect rivers and streams. More stringent criteria are set for lakes, etc.

d) Objectives for Surface Water Quality

Surface water in Ontario is protected by the "Provincial Water Quality Objectives" (PWQO) established by the MECP (Ref. 3). The goal of these objectives is to protect surface water resources in the Province for both aquatic life and recreational uses. Surface water quality should be maintained at or above the objectives. There are no target maximum concentrations (i.e., PWQO) for most of the general chemistry parameters summarized in the Appendix B tables at this time. However, surface water used as drinking water supply or for agricultural uses (livestock watering or irrigation waters) must meet the objectives established for these specific

uses (see Ref. 3 for more details). The PWQO for some of the tested general chemistry parameters (listed in the Appendix B and Appendix C tables) are identified in Table 3.6.

3.6 Groundwater Quality

a) Results

Chemistry results for each water sample collection event, for the period under review, are presented in Appendix B. Appendix C provides a time series tabular summary of available chemistry results for each monitored location. Appendix D presents time series graphs for chloride, conductivity, and hardness. Figure 3.2 presents chloride concentrations for the period under review.

b) Interpretation Considerations

Interpretation of the groundwater analytical results must be made with an understanding of site conditions and sampling techniques, at the time samples were collected. Therefore, the following comments are provided.

1) There are two primary water bearing zones being monitored at this site (overburden and bedrock), with the bedrock aquifer being the primary source of drinking water in the area. The region generally does not have overburden aquifers.

2) The land south of the Fill Area is cultivated agricultural land. The lands to the north and northeast are used for St. Marys Cement Plant operations.

3) The North Thames River is adjacent to the landfill site, generally west of the fill area, on the west side of Perth Road 123. There is a tributary to the North Thames River that traverses the landfill site, east and north of the landfill footprint.

4) At the time of the May 13-15, 2024, sample collection event, the following observations were made (Note: groundwater appearance is based on the final unfiltered water appearance unless otherwise noted):

    - Only about 0-60% of the calculated required five well casing volumes were purged from the following wells before they ran dry: OW2-84, OW7-91, OW9A-91, OW21-91, OW32-96, OW33-96, OW34-96 and MHB.
    - The water from OW2-84, OW5-84, OW9A-91, OW15-91, OW21-91, OW25-91 and MHB was “clear”.
    - The water from OW7-91 and OW9B-91 was “slightly turbid”.
    - The water from OW32-96 and OW34-96 was “very turbid”.
    - The water from OW33-96 was “turbid grey”.
    - The water from OW36 was “turbid with black particulate”.

5) At the time of the October 15-17, 2024, sample collection event, the following observations were made (Note: groundwater appearance is based on the final unfiltered water appearance unless otherwise noted):

- Only about 0-73% of the calculated required five well casing volumes were purged from the following wells before they ran dry: OW2-84, OW7-91, OW8B-91, OW9B-91, OW15-91, OW21-91, OW32-96, OW33-96, OW34-96, OW36 and MHB.
- The water from OW9B-91, OW15-91 and OW25-91 was “clear”.
- The water from OW2-84 was “clear with particulate”.
- The water from OW5-84, OW7-91 and MHB was “clear with black particulate”.
- The water from OW36 was “turbid”.
- The water from OW34-96 was “very turbid”.
- The water from OW33-96 was “turbid grey”.
- The water from OW32-96 was “turbid with black particulate”.
- The water from OWB-10 was “turbid orange with fine sediment”.
- The water from OW5-84, OW9B-91 and MHB were also described as having a “sulfur smell”.

c) Data Quality Evaluation

The Appendix B summaries include calculated ion balance results. All solutions are neutral, so an imbalance in charge results from faulty analysis or failure to analyse for an important ion (Ref. 6). The water sample ion balance results, for the period under review, indicate the following:

1) In May 2024, the sample ion balance at OW5-84, OW7-91, OW9A-91, OW21-91 and OW25-91 was 7.88%, 13.6%, 12.5%, -6.08% and 6.21%, respectively.

2) In October 2024, the sample ion balance at OW7-91 was 8.51%.

3) All other ion balances were in the range of ±5%.

4) The laboratory did not report any QA/QC issues or discrepancies.

In most cases, the conductivity measured in the field was proportionally varied from the conductivity measured in the laboratory (i.e., in the spring, typically up to 16% lower; in the fall, typically up to 19% lower).

In spring 2024, a duplicate sample was collected and analyzed for OW9B-91. The duplicate results for most parameters were within about 18% of the other sample value, except for DOC and the ion balance.

In fall 2024, duplicate samples were collected and analyzed for OW25-91. The duplicate results were within 10% of the other sample value.

In general, the ion balances and duplicate sample analyses appear to confirm that the sample data is reliable for the purposes of site evaluation.

d) Leachate Chemistry

The leachate generated at this site within the Phase I Fill Area (MH1) and Phase II/III Fill Area (MH3) are compared to typical municipal landfill leachate parameter concentrations in Table 3.7. Time series graphs for three key indicating parameters (chloride, conductivity & hardness) are included in Appendix D.

The leachate generated within the landfill footprint appears to be a low to medium strength municipal landfill leachate.

Leachate generated at the site is conveyed to the St. Marys wastewater treatment facility via gravity sewer to the Town's sanitary collection system.

TABLE 3.7
Comparison of Tested Leachate Quality
To Typical Municipal Landfill Leachate Quality

Parameter	MH1 (b)	MH3 (b)	Typical Municipal Landfill Leachate (c)
Calcium as Ca	32.8-548	43.9-587	100-3,000
Magnesium as Mg	11.2-338	33.3-470	100-1,500
Hardness as CaCO3	710-1,340	1,200-1,442	700-14,000
Iron as Fe	0.085-694	0.219-290	1-1,000
Chloride as Cl	13.5-760	13-3,050	300-3,000
pH (pH units) – field	6.18-9.49	6.29-12.95	4.0-8.0
DOC as C	23-1,110	n/a	200-30,000
Nitrate as N	< 0.1-3.84	< 0.1-1.79	0.1-10
COD	23-1,110	20-4,695	1,000-90,000
Manganese as Mn	0.029-1.15	0.36-20	0.01-100
Sodium as Na	20-1,410	172-1,720	200-1,200
Potassium as K	7.4-561	65.5-1,510	200-1,000
Sulphate as SO4	22.4-157	4.7-435	10-1,000
Alkalinity as CaCO3	280-2,781	690-6,110	500-10,000

Notes: (a) All above results reported as mg/L, unless otherwise noted.
(b) MH1 (Phase I) results 1991 to 2024 (32 samples) and MH3 (Phase II/III) results 1993 to 2024 (24 samples).
(c) From Ref. 7.

e) Upgradient Overburden Groundwater Chemistry

Groundwater chemistry within the overburden material upgradient of the Phase I and Phase II/III Fill Areas are being monitored by OW2-84 and OW25-91 (background), OW9B-91, OW15-91, OW21-91, OW32-96, OW33-96 and OW34-96. Current and past results indicate the following with respect to landfill leachate impacts to the upgradient overburden water bearing zone at the site.

Upgradient of Phase I Fill Area (OW2-84, OW32-96, OW33-96, OW34-96)

It has been established through previous monitoring reports that there is no apparent landfill related impact to OW32-96, OW33-96 and OW34-96. Chloride concentrations at these monitors appear to have a minor increasing trend since 2007, with concentrations at OW32-96 highest at 210 mg/L in 2024. Alkalinity and hardness have remained stable at these monitors with concentrations typically less than 300 mg/L and 250 mg/L, respectively, though hardness is elevated relative to background concentrations. It has been previously established that the elevated chloride and hardness concentrations observed at these monitors are due to road salting activities on the adjacent Perth Road 123.

Iron and manganese concentrations at these monitors are typically below or slightly above detection limits. In 2024, iron and manganese concentrations ranged from < 0.007 to 0.022 mg/L and 0.00163 to 0.0205 mg/L, respectively, which remain below the allowable limits.

Upgradient of Phase II/III Fill Area (OW9B-91, OW15-91, OW21-91)

As with OW32-96, OW33-96, and OW34-96, historical data has established that there is no apparent landfill related impact to OW9B-91, OW15-91, and OW21-91, but rather an impact from adjacent road salting activity.

Past status reports have indicated that an evaluation specific to these monitoring wells (OW9B-91, OW15-91, and OW21-91) was completed in 2018. Findings from this evaluation and past monitoring reports are summarized below:

- Overburden groundwater flow is west to east across the site. These wells are hydraulically upgradient of the Phase II/III Fill Area and outside the bounds of the leachate collection system.
- These wells are immediately downgradient of the site access road and hydraulically downgradient of Perth Road 123.
- The topography in the vicinity of these wells is generally sloping downward from the road toward the landfill site.
- The County Road (Perth Road 123) and the site access road are salted in the winter months. A calcium chloride brine has also been applied to site access roads as a dust suppressant in the past. A magnesium chloride brine has also been reported to have been applied on the County Road.

The following discussion is based on historical data trends.

- At OW9B-91, calcium concentrations increased sharply in December 2011. The average concentration from 1991-2011 was 20 mg/L. From 2012 to 2024, the average concentration was 108 mg/L, with a maximum concentration of 518 mg/L in 2013. A similar trend is observed for chloride with pre-2011 concentrations averaging 7 mg/L and 2012-2024 concentrations averaging 189 mg/L, with a maximum concentration of 426 mg/L in 2015. Alkalinity has been monitored since 2015 and has remained relatively stable, with an average concentration of 290 mg/L. Alkalinity increased dramatically in spring 2023 to 630 mg/L but has since declined to typical concentrations.

- At OW15-91, calcium and chloride concentrations have exhibited a similar trend, but to a lesser extent. Chloride concentrations slowly increased from 2007 to 2017, with a single-event peak in 2012 (131 mg/L), before declining again from 2018 to 2024. Calcium and chloride concentrations from 1991-2017 averaged 26 mg/L and 27 mg/L, respectively. The average concentrations increased to 31 mg/L and 40 mg/L, respectively, from 2018-2024. Alkalinity has remained stable over the monitoring period with an overall average of 222 mg/L.

- OW21-91 appears to have the largest calcium and chloride impact. Chloride exhibits a generally increasing trend with the two peak concentrations occurring in 2007 (556 mg/L) and 2015 (578 mg/L). Calcium concentrations at this monitor demonstrate a similar trend with peak concentrations in 2007 (185 mg/L) and 2012 (202 mg/L). Both parameters have shown a general decline since 2015 and 2012, respectively. Similar to OW9B-91 and OW15-91, alkalinity has remained stable at this monitor.

The Town is reported to have applied a calcium chloride brine on the site access road around 2011-2012 for a short duration. Based on the evaluation completed in 2018, as well as a review of historical data trends, it appears that the impacts observed at OW9B-91, OW15-91, and OW21-91 are not related to landfilling activities but rather road maintenance activities.

f) Downgradient Overburden Groundwater Quality

Groundwater chemistry within the overburden material downgradient of the Phase I and Phase II/III Fill Areas are being monitored by OW4-84, OW5-84, OW8B-10, OW36, and MHB. Current and past results indicate the following with respect to landfill leachate impacts.

Downgradient of Phase I (OW4-84, OW5-84)

OW4-84 has been monitored since 1984 but has been dry on many occasions. Available data from the past 10 years (4 samples) indicates that most parameters are at or below background concentrations.

Chloride at OW5-84 appears to have a slight increasing trend since 2009, with regular seasonal fluctuations (i.e., higher chloride in the spring). In 2024, chloride at OW5-84 was 60 mg/L in the spring and 53 mg/L in the fall, which are elevated compared to background (8.21 mg/L).

Downgradient of Phase II/III (OW8B-10, OW36, MHB)

OW8B-10 was installed in 2010 to replace OW8B-91. Most parameters are at or below background concentration, such as iron (< 0.007 mg/L in 2024; background 0.194 mg/L) and manganese (0.0142 mg/L in 2024; background 0.024 mg/L). Hardness (412 mg/L in 2024; background 235 mg/L), alkalinity (239 mg/L in 2024, background 235 mg/L), and chloride (10 mg/L in 2024; background 8.21 mg/L) were marginally elevated above background in 2024 but remained consistent with historical concentrations.

Most parameters (i.e., chloride, alkalinity, sodium) at OW36 are elevated above background but remain below the allowable limit. Hardness concentrations are also elevated at OW36, with an average concentration between 2017 and 2024 of 595 mg/L. Hardness values in 2024 were 253-258 mg/L. Sulphate concentrations in 2024 were 470-480 mg/L, which is elevated above background but consistent with historical values. Past status reports have attributed elevated hardness and sulphate values at these monitors to sulphur mineralization due to the presence of elevated sulphate and calcium in conjunction with the absence of elevated concentrations of other leachate indicator parameters.

MHB is a groundwater manhole located on the northeast corner of the Phase II/III Fill Area. This monitor was added to the program in 2016 to monitor groundwater chemistry in the sand layer below the clay liner of the Phase II/III Fill Area. Groundwater within this sand layer is conveyed to the stream that traverses the site. Therefore, MHB chemistry results are better compared to PWQO values, rather than ODWS values.

Table 3.8 compares historical groundwater chemistry at MHB to MH3 and background concentrations. Chloride at MHB appears to have an increasing trend, with the highest concentration occurring in 2024 (170 mg/L). Conductivity, hardness, and alkalinity are slightly elevated compared to background, but significantly lower than leachate concentrations at MH3. Sulphate also appears to be elevated compared to background but has remained stable throughout sampling history.

In spring 2024, iron (1.82 mg/L) was greater than the PWQO of 0.30 mg/L. All other parameters were below the PWQO for the period under review.

TABLE 3.8
Comparison of Manhole Groundwater Quality
to Tested Leachate Quality

Parameter	Background Concentration (b)	MH3(c)	MHB(c)
Hardness as CaCO3	235	788-1,200	287-570
Iron as Fe	0.194	0.219-118	< 0.01-1.82
Chloride as Cl	8.21	68-1,750	97.4-170
pH (pH units) – field	7.40	6.42-7.25	6.92-7.70
Conductivity (us/cm) – field	587	1,670-10,861	564-1,284
DOC as C	1.6	--	4.2-6.4
Nitrate as N	0.17	0.07	< 0.05-0.25
Manganese as Mn	0.024	0.692-4.28	0.013-0.12
Sodium as Na	17.5	54.8-1,300	37.7-71.4
Sulphate as SO4	44.8	4.7-186	110-159
Alkalinity as CaCO3	218	690-5,720	259-331

Notes:
(a) All above results reported as mg/L, unless otherwise noted.
(b) Background based on average concentration from 2014-2024.
(c) Results 2016 to 2024.

g) Bedrock Groundwater Chemistry

Groundwater chemistry within the bedrock unit at this site is being monitored by OW8A-91 (background), OW7-91, OW9A-91, and OW32A-02. Current and past results indicate the following with respect to landfill leachate impacts:

Upgradient to Phase I (OW7-91)

Past reports have indicated that this monitor is not impacted by landfill activities. In 2024, leachate indicator parameters (i.e., chloride, sodium, nitrate, alkalinity, DOC) were within background concentrations. Hardness in 2024 was slightly elevated (598-697 mg/L). Calcium also increased significantly in spring 2024 (i.e., 176 mg/L, relative to 89.4 mg/L in fall 2023) and remained elevated in the fall (148 mg/L). Elevated hardness and calcium, but normal alkalinity values, are attributable to the nature of the limestone bedrock in the region and groundwater mineralization.

Downgradient to Phase II/III (OW9A-91, OW32A-02)

OW32A-02 was damaged in 2024, and no samples were obtained. Recent historical data has indicated that groundwater chemistry at OW32A-02 is similar to background well OW8A-91.

In 2024, many parameters (e.g., calcium, hardness, and chloride) at OW9A-91 were elevated compared to recent years. Due to low water levels, minimal water was purged before obtaining a

sample. Elevated concentrations in 2024 are likely due to the stagnant nature of the water and natural groundwater mineralization processes. Future monitoring results at this location should be carefully evaluated.

h) Private Well Groundwater Quality

Private well groundwater quality is being monitored at five properties adjacent to the landfill site. PW1, PW3, PW4, and PW5 are screened in the bedrock and PW2 is screened in the overburden material. PW2 has not been sampled since 2019 due to sampler safety concerns. It is noted that in recent years, the property occupant/owner at PW2 has been given the opportunity to submit a water sample to the Town to then be submitted to the laboratory. However, no samples have been received from the occupant/owner to date.

Historically, PW1 was screened approximately 4.3 m into the overburden material. In 2011, PW1 was replaced by a bedrock well. Historic chloride levels were elevated, averaging 636 mg/L from 1984 to 2011. It was previously concluded that this well was heavily influenced by road salting activities on the adjacent Perth Road 123. Since construction of the bedrock well, chloride at PW1 has averaged 4 mg/L, which is at the lower end of the historical range for background well OW8A-91. PW1 was not sampled in 2024 due to the homeowner not being present during sample attempts.

PW3 has been sampled periodically in recent history as the property is used as a seasonal dwelling. Seven samples have been collected since 2018, including two samples in 2024. Results since 2018 have indicated chloride, hardness, and DOC are within historical ranges and are similar to OW8A-91.

Water quality at PW4 is similar to background and has remained stable throughout monitoring history. Of note, chloride levels are similar to PW1 and remain below background, generally ranging from 1 mg/L to 8 mg/L. Chloride levels in 2024 were 2 mg/L. In 2024, calcium and hardness concentrations were elevated above typical concentrations but remained within background chemistry range.

i) Comparison to Groundwater Quality Criteria

The tables in Appendix B provide summaries of laboratory sample analyses for the period under review. Where results exceed allowable limits or boundary criteria, the values in the tables have been highlighted accordingly.

A comparison of the allowable limits to the 2014-2024 background and the 2024 sample results is presented as Tables 3.9 and 3.10. Tables 3.9 and 3.10 indicates the following **with respect to water chemistry results for 2024**:

- Hardness at most overburden boundary wells was above the allowable limit of 167.5 mg/L in the spring and fall. As previously mentioned, the groundwater in this area has naturally elevated hardness due to mineralization of groundwater.

- Iron was above the allowable limit of 0.247 mg/L and the ODWS value of 0.3 mg/L at OW5-84, OW9B-91, OW15-91 and OW25-91. Manganese was also above the allowable limit of 0.022 mg/L at OW5-84, OW9B-91 and OW25-91. DOC was above the allowable limit of 3.3 mg/L at OW15-91 and OW21-91 in the spring.

- Sulphate was above the allowable limit of 272 mg/L but below the ODWS value of 500 mg/L at OW36 in the spring and fall.

- Chloride at OW21-91 and OW32-96 was above the trigger limit of 100 mg/L in the spring and fall. It is known that these wells are impacted by road salting activities.

- Hardness at bedrock wells OW7-91 and OW9A-91 was above the allowable limit of 275 mg/L, but is naturally elevated due to mineralization.

- Chloride at OW9A-91 was above the trigger limit of 100 mg/L and marginally above the allowable limit of 135 mg/L.

Table 3.9
Groundwater Boundary Monitoring Wells (Overburden)
Comparison to Estimated Allowable Chemistry (2024)

Parameter	Chloride as Cl	Sodium as Na	Hardness as CaCO3	Iron as Fe	Manganese as Mn	DOC as C	Alkalinity as CaCO3	Nitrate as N	Sulphate as SO4	Boron as B
Allowable Limit (mg/L)	129	109	167.5	0.247	0.022	3.3	359	2.6	272	1.3
Trigger Criteria (mg/L)	100	Not Applicable								
Observation Well	**EXCEEDANCES OF THE ALLOWABLE LIMIT (mg/L)[1]**									
OW2-84	None None	None None	None None	None None	None None	None None	None None	None None	None None	None None
OW3-84	Dry (May) Dry (Oct)									
OW4-84	Dry (May) Dry (Oct)									
OW5-84	None None	None None	483 (May) 378 (Oct)	0.99 (May) 0.792 (Oct)	0.0231 (May) 0.0231 (Oct)	None None	None None	None None	None None	None None
OW6-84	Dry (May) Dry (Oct)									
OW8B-10	No Sample (May) None	None	412 (Oct)	None	None	None	None	None	None	None
OW9B-91	None None	None None	407 (May) 346 (Oct)	None 1.48 (Oct)	None 0.0609 (Oct)	None None	None None	None None	None None	Not tested Not tested
OW15-91	None None	None None	244 (May) 234 (Oct)	None 0.310 (Oct)	None None	14 (May) None	None None	None None	None None	None None
OW21-91	**150 (May)** **160 (Oct)**	None None	355 (May) 366 (Oct)	None None	None None	4 (May) None	None None	None None	None None	None None
OW25-91	None None	None None	385 (May) 315 (Oct)	0.568 (May) 0.430 (Oct)	0.0435 (May) 0.0363 (Oct)	None None	None None	None None	None None	Not tested Not tested
OW32-96	**210 (May)** **200 (Oct)**	None None	369 (May) 384 (Oct)	None None	None None	None None	None None	None None	None None	None None
OW33-96	None None	None None	201 (May) 197 (Oct)	None None	None None	None None	None None	None None	None None	Not tested Not tested
OW34-96	None None	None None	273 (May) 227 (Oct)	None None	None None	None None	None None	None None	None None	None None
OW36	None None	None None	708 (May) 656 (Oct)	None None	None None	None None	None None	None None	470 (May) 480 (Oct)	None None

Notes:
1. Bold results indicate exceedances of the Trigger Criteria for chloride.

Table 3.10
Groundwater Boundary Monitoring Wells (Bedrock)
Comparison to Estimated Allowable Chemistry (2024)

Parameter	Chloride as Cl	Sodium as Na	Hardness as CaCO3	DOC as C	Alkalinity as CaCO3	Nitrate as N	Nitrite as N
Allowable Limit (mg/L)	135	114	275	6	425	2.6	0.325
Trigger Criteria (mg/L)	100	Not Applicable					

Observation Well	EXCEEDANCES OF THE ALLOWABLE LIMIT (mg/L)[1]						
OW7-91	None None	None None	697 (May) 598 (Oct)	None None	None None	None None	None None
OW8A-91	Damaged - Not Sampled						
OW9A-91	**140 (May)**	None	444 (May)	None	None	None	None
	Insufficient Levels - Not Sampled in Oct						
OW32A-02	Damaged - Not Sampled						

Notes:
1. Bold results indicate exceedances of the Trigger Criteria for chloride.

3.7 Surface Water Quality Results

a) Results

Surface water analytical summaries, for the period under review, are presented in Appendix B. Appendix C compares these results to historical results for each individual sampling station. Appendix D graphically summarizes the chloride, conductivity and hardness historical results (time series graphs).

b) Interpretation Considerations

Interpretation of the surface water analytical results must be made with an understanding of site conditions and sampling techniques at the time samples were collected. Therefore, the following comments are provided.

1) All surface water samples were unfiltered grab samples.

2) There is an on-site stream that flows from the east boundary of the site toward Phase II/III Fill Area before meandering northwest and exiting the site along the northern boundary. The stream eventually discharges to the North Thames River, west of Perth Road 123.

3) There are two stormwater basins (Basin A and Basin B) on-site that direct surface water to the on-site stream. Surface water from Phase I and Phase II/III is directed to Basin A and Basin B, respectively.

4) The following are specific observations made at the time of the 2024 surface water monitoring events when samples were collected:

- At the time of the spring sampling event, the water from SP1-10, SP2-93, SP3-93, SP3A-94, SP1B-94, and SP2B-94 was "clear". Other surface water monitors were "dry". Green algae was noted at SP2-93, SP3A-94 and SP1B-94. The water levels and flow were generally very low at all monitoring locations.

- At the time of the fall sampling event, the water from SP1-10 was "clear with green tint"; the water from SP3-93 was "clear with yellow tint"; the water from SP1B-94 was "clear with brown tint"; and the water from SP2B-94 was "clear". All other monitoring locations were "dry". Water levels and flow were generally very low to almost stagnant.

- In the fall, heavy, fine particulate matter was noted settled on the creek banks/bottom at SP1-10. A dust-like essence was also observed at this monitoring location.

5) Historically, SP1-10 had been sampled at an alternate upstream location (SP1-93). SP1-93 was replaced with SP1-10 to reflect new property boundaries following a property transfer with St. Marys Cement in 2009.

6) In 2023, the steel corrugated Basin A outlet pipe (i.e., SP4A-94) was found to be damaged. It was reported that outlet water was discharging under the riprap to the stream in 2023. No outlet water was observed discharging to the stream during the 2024 sample events.

c) Data Quality Evaluation

See Section 3.6c.

d) Discussion

<u>On-Site Stream</u>

Upstream monitor SP1-10 represents background quality of the on-site stream. Past reports identified the following as leachate indicator parameters for surface water: chloride, iron, and total phosphorus. Table 3.11 compares upstream, mid-stream, and down-stream quality to PWQO values.

TABLE 3.11
On-Site Stream Water Comparison to PWQO Values

Parameter	SP1-10 Historical Range(b)	PWQO	April 2024			October 2024		
			SP1-10	SP2-93	SP3-93	SP1-10	SP2-93	SP3-93
Chloride	10.9-633	-	86	84	85	1,500	Dry	2,500
Phosphorus	< 0.02 – 3.4	0.03	**0.034**	**0.042**	**0.036**	**0.14**		**0.81**
Iron	< 0.01-21.8	0.3	0.202	**0.306**	0.262	0.098		0.609
TSS	< 10-482	-	23	7	8	-		-

Notes:
(a) All results are in mg/L.
(b) Historical range from 2013-2023.
(c) Bold results exceed the PWQO.

In the spring, phosphorus was above the PWQO at all stream monitors but remained relatively stable from upstream to downstream, and was within the historical range. Iron was slightly above the PWQO at SP2-93 in the spring but remained below the PWQO up- and down-stream. In general, stream water quality remained similar across the site in the spring.

In the fall, chloride increased significantly from historical concentrations at SP1-10 and SP3-10. Total dissolved solids and pH were also elevated. The cause is unknown but is likely due to an upstream source as SP1-10, the most upstream monitor, had elevated parameters. It is also worth noting that water levels were very low in the stream in the fall, if not dry, and stream flow was very slow to almost stagnant. Heavy, very fine sediment was also observed along the stream bank/bottom at, and upstream of, SP1-10.

Historically, elevated chloride and phosphorus were attributed to upstream land uses and anthropogenic sources (i.e., road salting and agriculture). Future monitoring should continue to carefully assess whether the elevated parameters in fall 2024 was a single event caused by upstream land uses or the beginning of a trend in on-site stream water quality.

Basin A

Basin A collects surface water from the Phase I Fill Area via perimeter ditches. Surface water is conveyed to the south (inlet; SP3A-94) and north (inlet; SP5A-94) ends of the basin. Water is discharged to the on-site stream through a corrugated steel pipe (outlet; SP4A-94).

At the time of the 2024 sampling events, there was no flow observed at the outlet of Basin A. As mentioned above, the outlet pipe is damaged and should be repaired. Additionally, the north end of the basin was dry during the spring and fall and no sample was obtained at SP5A-93.

One sample was obtained at SP3A-94 in spring 2024. Results for most parameters were within the historical range.

Basin B

Basin B collects surface water from the Phase II/III Fill Area by way of a corrugated steel pipe under the access road (inlet; SP1B-94). There is also a perimeter swale on the south side of the Phase II/III Fill Area that directs surface runoff, primarily agricultural overland flow, toward Basin B. Similar to Basin A, water is discharged from Basin B to the on-site stream through a corrugated steel pipe (outlet; SP2B-94).

Historically, chloride concentrations at SP1B-94 are typically elevated compared to concentrations at SP2B-91, indicating a level of attenuation in the basin. In fall 2024, chloride was similar at the inlet and outlet with concentrations of 33 mg/L at SP1B-94 and 32 mg/L at SP2-B94. In the spring, chloride was higher at SP2B-94 but within historical ranges.

In 2024, iron, manganese and total phosphorus were elevated at SP1B-94 in the fall relative to recent history. However, concentrations of these parameters were lower at SP2B-94 indicating some level of attenuation within the basin.

e) Comparison to Surface Water Quality Criteria

Appendix B analytical summaries include comparisons of the on-site stream and surface water basins results to the PWQO.

These comparisons indicate that the on-site stream water chemistry in the spring and fall 2024, for the tested parameters, was generally in conformance with the PWQO. In the spring and fall, total phosphorus was above the PWQO at SP1-10, SP2-93 (sampled only in the spring) and SP3-93. Iron was above the PWQO limit at SP2-93 in the spring and SP3-93 in the fall. In the fall, pH values at SP1-10 and SP3-93 were elevated above the PWQO range.

Water quality in the surface water basins was also generally in conformance with PWQO limits in 2024. Iron was above the PWQO at SP2B-94 in the spring and fall, and SP1B-94 in the fall. Total phosphorus was also above the PWQO at SP2B-94 in the spring, and SP1B-94 in the fall.

Although total phosphorus and iron was elevated at most surface water monitoring stations, the concentrations were similar to what has historically been observed. Elevated chloride and total phosphorus in the on-site stream have historically been attributed to upstream sources (i.e., road salting and agriculture). Stream water quality was generally the same from upstream to downstream monitoring locations in 2024. Based on this observation, and historical data trends, the landfill does not appear to be unacceptably impacting surface water quality.

3.8 Routine Monitoring Program Review

a) Current Monitoring Program

The existing monitoring program includes the following:

- The semi-annual collection of groundwater samples from eighteen monitoring wells, five residential wells, three stream locations, five surface water management basin locations, and two leachate manholes.
- The protocol followed was previously identified (see Section 3.3e).
- Water samples were tested for a general chemistry list of parameters (Table 3.2). Unionized ammonia is calculated based on the laboratory ammonia test results and field measurements of surface water pH and temperature.
- All water samples are analysed by an accredited laboratory.
- Static groundwater levels were measured at all active monitoring wells, at the same time as the routine semi-annual sample collection events.
- A minimum of two site operational and development reviews, by the Town's Consultant, each year.

The next Status Report should be submitted to the MECP by March 31, 2026.

b) Proposed Monitoring Program

It is proposed that no further attempts be made to sample PW2 while the property is owned by the current owner, as to eliminate sampler safety concerns. It is also proposed that the recent practice of informing the owner of sample events to allow for voluntary participation in the monitoring program should continue. In the event of a future ownership change at this property, the consultant should make attempts to collect samples again.

No other changes to the monitoring program are requested at this time.

4.0 CONCLUSIONS

4.1 Site Development and Operations

The following conclusions, with respect to site development and operations, are presented based on our 2024 site visits and comments provided by the Town.

1) The St. Marys Landfill is approved for waste disposal for the Town of St. Marys.

2) The Town operates a WTS at the landfill site to divert recyclables, scrap metal and e-waste. Materials are segregated into bins and removed from site by third parties when full. The site also has a compost facility for brush and leaf and yard waste.

3) There was some windblown litter around the Phase II/III Fill Area and site perimeter, primarily on the south and west property boundaries.

4) There are currently stockpiles of clean fill at the site for use as daily/final soil cover. Brush and construction wood waste is also chipped and used as daily cover in the winter.

5) In February 2024, the Town received MECP authorization to proceed with the solid waste disposal EA preferred Alternative 3A, namely horizontal and vertical expansion for an additional 708,000 m^3 of disposal capacity.

6) There are some areas of bare soil over some of the older completed areas of the Phase II/III Fill Area.

7) There was no evidence of erosion of the soil cover. There were no leachate seeps observed on the completed Phase I Fill Area or completed areas of the Phase II/III Fill Area.

8) Landfilling for the period under review consisted of above-grade landfilling within Cells 5, 6, 7 and 8 of the Phase II/III Fill Area.

9) Based on a comparison of the most recent two landfill mound surveys, the annual landfilling rate was estimated to be 10,800 m^3/year.

10) An ECA application was submitted in July 2024 for approval of proposed interim fill contours in the Phase II/III area.

11) The site is open to the public every Tuesday, Wednesday, and Friday 8:00am to 4:30pm, and Saturday 8:00am to 12:00pm. Wastes are being covered on a daily basis using imported fill and/or chipped leaf and yard waste.

12) Trespassing has been, and continues to be, an issue at this site. It is suspected that the number of trespassers is limited, perhaps to only one individual repeatedly trespassing.

4.2 Environmental Impact

a) Groundwater

The following conclusions, with respect to groundwater impacts at the St. Marys Landfill, are presented based on a review of 2024 and past monitoring results:

1) Overburden groundwater flow is generally west to east across the site toward the on-site stream. Bedrock groundwater flow is generally east to west, toward the North Thames River.

2) Most wells at this site have elevated hardness due to groundwater mineralization and the nature of the limestone bedrock, rather than landfill related impacts. Alkalinity is relatively low at each monitor and has remained stable over the monitoring history. Elevated sulphate at some monitors has been attributed to sulfur mineralization.

3) Historical chemistry results for overburden wells indicate a level of impact at OW9A-91, OW15-91, OW21-91, OW32-96, OW33-96, and OW34-96. However, the impacts have been attributed to road salting activities along Perth Road 123 and site access roads.

4) Downgradient overburden wells show no evidence of landfill-related impacts. Hardness concentrations at OW8B-10 and OW36, as well as sulphate at OW36, were elevated in 2024 but remained within historical ranges. Elevated hardness and sulfur are attributed to groundwater mineralization (see (2) above).

5) In 2024, iron and manganese were above the allowable limit at downgradient overburden well OW5-84 in the spring and fall, but within historical range.

6) Based on historic analytical results, bedrock wells show no evidence of landfill-related impacts. The allowable limit for chloride was marginally exceeded at OW9A-91 in the spring. Except for hardness (see (2) above), no other leachate indicator parameters exceeded the allowable limit at bedrock wells in 2024.

b) Surface Water

The following conclusions, with respect to surface water impacts to the on-site stream are presented based on a review of 2024 and past monitoring results.

1) Weather conditions in the area were generally dry in 2024. Although total cumulative annual precipitation in the area was reportedly greater than other recent years, rainfall generally occurred during significant intensity, but short-duration events. These conditions were reflected in the on-site stream during the 2024 sample events as many monitors were dry, or reported as very low flow.

2) Upstream (SP1-10) and downstream (SP2-93 and SP3-93) chemistries were generally similar for many tested parameters at the time of the spring 2024 monitoring event. In the fall, many parameters (i.e., chloride, pH, TSS) were significantly elevated upstream and remained similar at downstream monitors. The impacts are attributable to upstream land uses. Stream water quality should be carefully monitored in the future.

3) Total phosphorus was above the PWQO at all on-site stream monitors in the spring and fall. Iron marginally exceeded the PWQO at SP2-93 in the spring.

4) Water quality in Basin A and B generally conformed to PWQO values. Iron and total phosphorus were above the PWQO value in 2024. The on-site stream chemistry was generally similar to or improved compared to the basin water quality indicating no adverse impacts to the on-site stream from the surface water basins.

5.0 RECOMMENDATIONS

The following key recommendations apply to continued development, operations and monitoring of the St. Marys Landfill, based on recent monitoring results as presented in this report.

1) Continue Phase II/III landfilling operations in accordance with the amended ECA and Operations and Maintenance Manual. Grade wastes to match proposed interim contours as applicable.

2) Continue with efforts related to design and approvals of the approved horizontal and vertical expansion alternative as identified in the approved EA.

3) The Town should source and import suitable soils for daily cover and final capping.

4) Wastes should be spread, compacted and covered with a minimum 150 mm layer of soil on a daily basis, as required by the amended ECA. Wastes should be covered on all exposed sides as much as possible.

5) The site operator(s) should routinely (i.e., weekly) clear litter from affected on-site and off-site areas.

6) Town staff should complete monthly inspections of the Fill Area surface and perimeter ditches and swales for the presence of leachate seeps and, where present, immediately cover those areas with a layer of clean soil. Other key areas to inspect include stormwater basins and outlet structures.

7) Continue with proper segregation of leaf and yard waste and clean wood waste material in the on-site compost area.

8) Bedrock wells OW32A-02 and OW8A-91 should be repaired or replaced.

9) The Basin A outlet (SP4A-94) should be repaired to ensure proper drainage of Basin A and avoid further damage.

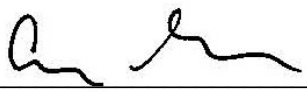
10) Regular inspection and maintenance of the leachate collection system should be conducted by Town staff to ensure proper functioning and flow within the system.

11) Should the owners of the private wells be interested in sample results, the Town should continue to notify the owners on an annual basis.

All of which is respectfully submitted.

B. M. ROSS AND ASSOCIATES LIMITED

Per 
Sarah Upshall, Environmental Technician

Per 
Andrew Garland, P. Eng.

:sd

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