AGENDA
A meeting of the Council of the Corporation
of the Town of Northeastern Manitoulin and the Islands
to be held on Tuesday, March 7th, 2023
at 7:00 p.m.

1. **Call to Order**

2. **Approval of Agenda**

3. **Disclosure of Pecuniary Interest & General Nature Thereof**

4. **Minutes of Previous Meeting**
   i. Confirming By-Law 2023-06

5. **New Business**
   i. Manitoulin East Municipal Airport Tender
   ii. Donation Request – Bay of Islands, Patrick Thoburn
   iii. Biosphere request – signage placement

6. **Minutes and Other Reports**
   i. GM BluePlan – 2022 Monitoring Report, Little Current Closed Landfill Site
   ii. GM BluePlan – 2022 Monitoring Report, Green Bay Closed Landfill Site
   iii. OCWA Sheguiandah Water Treatment Plant Annual Report
   iv. OCWA Little Current Water Treatment Plant Annual Report
   v. Letter of Resignation – Marjorie Collie, Museum Advisory Committee
   vi. Library Minutes – December 2022 and January 2023

7. **Correspondence**
   i. Ministry of Natural Resources and Forestry- Floating Accommodations

8. **Adjournment**

THE CORPORATION OF THE TOWN OF NORTHEASTERN MANITOULIN AND THE ISLANDS

BY-LAW NO. 2023-06

Being a by-law of the Corporation of the Town of Northeastern Manitoulin and the Islands to adopt the minutes of Council for the term commencing December 4, 2018 and authorizing the taking of any action authorized therein and thereby.

WHEREAS the Municipal Act, S.O. 2001, c. 25. s. 5 (3) requires a Municipal Council to exercise its powers by by-law, except where otherwise provided;

AND WHEREAS in many cases, action which is taken or authorized to be taken by a Council or a Committee of Council does not lend itself to an individual by-law;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF NORTHEASTERN MANITOULIN AND THE ISLANDS ENACTS AS FOLLOWS:

1. THAT the minutes of the meetings of the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands for the term commencing November 15th, 2022 and held on:

   February 21, 2023
   February 23, 2023

   are hereby adopted.

2. THAT the taking of any action authorized in or by the minutes mentioned in Section 1 hereof and the exercise of any powers by the Council or Committees by the said minutes are hereby ratified, authorized and confirmed.

3. THAT, where no individual by-law has been or is passed with respect to the taking of any action authorized in or by the minutes mentioned in Section 1 hereof or with respect to the exercise of any powers by the Council or Committees in the above-mentioned minutes, then this by-law shall be deemed for all purposes to be the by-law required for approving and authorizing the taking of any action authorized therein or thereby or required for the exercise of any power therein by the Council or Committees.

4. THAT the Mayor and proper Officers of the Corporation of the Town of Northeastern Manitoulin and the Islands are hereby authorized and directed to do all things necessary to give effect to the recommendations, motions, resolutions, reports, action and other decisions of the Council or Committees as evidenced by the above-mentioned minutes in Section 1 and the Mayor and Clerk are hereby authorized and directed to execute all necessary documents in the name of the Corporation of the Town of Northeastern Manitoulin and the Islands and to affix the seal of the Corporation thereto.

READ A FIRST, SECOND AND THIRD TIME AND FINALLY PASSED THIS 7th[t] day of March, 2023.

Al MacNevin	Mayor	Pam Myers	Clerk

The Corporation of the Town of Northeastern Manitoulin and the Islands
Minutes of a Regular Council meeting held Tuesday, February 21, 2023

PRESENT: Mayor Al MacNevin, Councillors: Patti Aelick, Al Boyd, Laurie Cook, Mike Erskine, William Koehler, Dawn Orr, George Williamson, and Bruce Wood.

STAFF PRESENT: David Williamson, CAO
Pam Myers, Clerk

Mayor MacNevin called the meeting to order at 7:00 p.m.

Disclosure of pecuniary interest and the general nature thereof – none.

Resolution No. 25-02-2023
Moved by: M. Erskine
Seconded by: A. Boyd
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands approves agenda.

Carried

Deputation cancelled by the Georgian Bay Association

Councillor Erskine declared a conflict with item 6i) and refrained from conversation or voting.

Resolution No. 26-02-2023
Moved by: W. Koehler
Seconded by: G. Williamson
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands now reads a first, second and third time and finally passes By-law 2023-05. Being a by-law to adopt the minutes of Council for the term commencing November 15, 2022 and authorizing the taking of any action therein and thereby.

Carried

Resolution No. 27-02-2023
Moved by: M. Erskine
Seconded by: D. Orr
RESOLVED THAT the Planning Authority for the Corporation of the Town of Northeastern Manitoulin and the Islands conditional approves the application for consent as applied for by Albert, Stephen and Paul Rolston, File #2023-01, subject to the following conditions.

1. The newly created lot will be registered
2. Registered covenant on title to ensure all future owner(s) of the new lot can not hold the municipality or Rolston's Quarry liable for any operational issue with the Quarry
3. Transfer of land form prepared by a solicitor and a schedule to the transfer of land form on which is set out the entire legal description of the parcel,
4. The applicant must deposit a Reference Plan of Survey in the Land Registry Office clearly delineating the parcels of land approved by The Town of Northeastern Manitoulin and the Islands in this decision and provide the Town Office with a copy.
5. Prior to final approval by the Town of Northeastern Manitoulin and the Islands, the owner provide confirmation of payment of all outstanding taxes.
6. All outstanding fees associated with this application including a fee of $100 for each transfer of land and advertising cost.

Carried

Resolution No. 28-02-2023
Moved by: W. Koehler
Seconded by: L. Cook
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands awards the tender for the Sand/Salt Shed Tender to Sheppard Custom Building Limited in the amount of $630 000 plus HST.

Carried

Resolution No. 29-02-2023
Moved by: W. Koehler
Seconded by: A. Boyd
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands supports the Little Current Fish and Game's request and donates $200 towards their school programs.

Carried

Resolution No. 30-02-2023
Moved by: M. Erskine
Seconded by: A. Boyd
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands supports AMO's Housing and Homelessness Campaign and their motion put forward seeking the Provincial Government to urgently address this issue and forwards this motion to the Ministry of Municipal Affairs and Housing; Minister of Children, Community and Social Services; Minister of Health; and the Association of Municipalities of Ontario (AMO) and the Federation of Northern Ontario Municipalities (FONOM).

Carried

Resolution No. 31-02-2023
Moved by: B. Wood
Seconded by: D. Orr
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands does now adjourn at 7:26 p.m.

Carried

Al MacNevin, Mayor — Pam Myers, Clerk

The Corporation of the Town of Northeastern Manitoulin and the Islands
Minutes of a Regular Council meeting held Thursday, February 23, 2023

PRESENT: Mayor Al MacNevin, Councillors: Patti Aelick, Al Boyd, Laurie Cook, Mike Erskine, William Koehler, Dawn Orr, George Williamson, and Bruce Wood.

STAFF PRESENT: David Williamson, CAO
Pam Myers, Clerk

Mayor MacNevin called the meeting to order at 7:00 p.m.

Disclosure of pecuniary interest and the general nature thereof – none.

Resolution No. 30-03-2023
Moved by: M. Erskine
Seconded by: G. Williamson
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands approves agenda.

Carried

Resolution No. 31-03-2023
Moved by: G. Williamson
Seconded by: A. Boyd
BE IT RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands approves the Spider Bay Marina, Downtown Docks and Cruise ship rates for the 2023 season as attached.

Carried

Resolution No. 32-03-2023
Moved by: A. Boyd
Seconded by: B. Wood
RESOLVED THAT the Council of the Corporation of the Town of Northeastern Manitoulin and the Islands does now adjourn at 7:49 pm.

Carried

Al MacNevin, Mayor

Pam Myers, Clerk

Bay of Islands Community Association

www.bayofislands.ca

February 5, 2023

Mr. Dave Williamson
Chief Administrative Officer
Town of NEMI

Dear Mr. Williamson,

I am writing on behalf of the Bay of Islands Community Association in Ward One.

Our community has benefited from NEMI's past subsidy of fire pump purchases by our residents. NEMI helped our community purchase ten pumps several years ago, and we have witnessed those pumps prevent significant damage to property and nature on several occasions where a fire has broken out in our community. The pumps have proven to be indispensable given the remote, island geography of our residents' properties.

Still, our community has assessed that we have significant gaps in our fire pump coverage, and working with residents, we would like to fill those gaps by having more of our residents purchase fire pumps. To help our residents make this considerable investment, we are hereby requesting the subsidy of up to ten more pumps by NEMI. We are requesting a subsidy of $500 per pump system, up to ten pumps, for a total of $5,000, from NEMI's MNR Fire Response reserve. We already have seven residents who have expressed a commitment to purchasing a pump and hose should NEMI offer to subsidize the purchase.

We believe that the savings to government emergency fire services, not to mention the prevention of destruction to nature and personal property in NEMI, through a reinforced community fire pump system will more than make up for the subsidy.

We look forward to hearing back from you. Please don't hesitate to contact me with any questions at patrickthoburn@gmail.com.

Sincerely

Patrick Thoburn, President

CC Laurie Cook, David Gallup, Trevor Marshall

Dave Williamson

From: Sean O'Hare <sohare1@gmail.com>
Sent: February 27, 2023 2:05 PM
To: Dave Williamson
Subject: Hiking Trails Sign
Attachments: Trails of Mnidoo Mnis-Manitoulin Island View.pdf

Hello Dave,

I hope my email finds you well. I am volunteering for the Escarpment Biosphere Conservancy (EBC) here on Manitoulin and we have been given a grant to help with post COVID19 economic recovery in the North. One of the initiatives is to try and get tourists to decide to spend an extra day or two on the Island instead of moving on. One way we are trying to do this is with the attached sign which shows all the different hiking trails/walking trail Manitoulin has to offer. Bridal Veil Falls and the Cup and Saucer are both fairly well known, but there are many other trails available to people to explore. The EBC feels the most appropriate location would be to have one of these signs at the tourist information booth in Little Current, as so many people stop there to look for information to help plan their stay. The sign is completely funded including installation. I spoke with Lisa and she is very interested in having the sign, which is approximately 43x84. As per the towns wishes the EBC can install the sign in a designated location or, if the town prefers to install themselves, a bill can be sent to the EBC for the cost of the installation.

If you have any questions or require any additional information please let me know.

Thank you for your time,

Sean O'Hare

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Sean P. O'Hare, M.Sc., P.Geo.
Geologist
Email: sohare1@gmail.com
Mobile: (705) 618-3389


Trails of
Mnidoo Mnis / Manitoulin Island
N
North Channel
Lake Huron
Georgian Bay
Cockburn Island
Meldrum Bay
Zhiibaahaasing
Sheshegwaning
Barrie Island
Silver Water
Burnt Island
Evansville
Gore Bay
Kagawong
Aundeck Omni Kaning
Honora
M'Chigeeng
Little Current
Sheguiandah
Ten Mile Pt.
Whitefish Falls
Willisville
Birch Island
Killarney
Wiikwemkoong
Manitowaning
Sandfield
Mindemoya
Spring Bay
Providence Bay
Tehkummah
South Baymouth
Great Duck Island
Fitzwilliam Island
LEGEND
TRAIL NAME / Trailhead Coordinates
a Meldrum Bay 45.9256N / 83.1149W
b 45.9306N / 82.8339W
c Misery Bay 45.8020N / 82.7249W
d 45.8051N / 82.4810W
e 46.9267N / 82.6759W
f Ice Lake 45.8749N / 82.4066W
g 45.9147N / 82.4560W
h Bridal Veil Falls 45.9013N / 82.2561W
i M'Chigeeng Trail 45.8139N / 82.1542W
j Wagg's Wood 45.7323N / 82.1594W
k McLean's Park 45.7019N / 81.9095W
l Cup & Saucer 45.8532N / 82.1148W
m Bidwell Bog 45.8756N / 82.1041W
n 45.9463N / 82.0823W
o Manitou River Preserve
p McLean's Mountain
q Twin Peaks
r Ten Mile Point
t Fossil Hill
u South Baymouth Trails
v Providence Bay Boardwalk
w Timber Bay
x Willisville Mountain
y Heaven's Gate
z Little Current Recreational Trail
Tourism Northern Ontario
Ontario

Closed

Prepared By:

GM BluePlan ENGINEERING

Annual Monitoring Report (2022)

Little Current Landfill Site
Town of Northeastern Manitoulin and the Islands (NEMI)
MECP Environmental Compliance Approval No. A551002

GMBP File: M-1593

February 2023

NEMI
NORTHEASTERN MANITOULIN AND THE ISLANDS
PORT OF LITTLE CURRENT

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA

1260-2ND AVE. E., UNIT 1, OWEN SOUND ON N4K 2J3 P: 519-376-1805
WWW.GMBLUEPLAN.CA

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LITTLE CURRENT LANDFILL SITE

ANNUAL MONITORING REPORT (2022)

TOWN OF NORTHEASTERN MANITOULIN AND THE ISLANDS (NEMI)

FEBRUARY 2023

GMBP FILE: M-1593

1. INTRODUCTION

The closed Little Current landfill property is located approximately one kilometre southwest of Little Current on the north side of Highway 540 (Figure 1). The Site is situated on Part of Lots 4 and 5, Concession 8 and Part of Lot 5, Concession 9, in the former Township of Howland, District of Manitoulin. The Town of Little Current operated the site until it amalgamated with the Township of Howland and the unorganized Municipality of McGregor Bay to become the Town of Northeastern Manitoulin and the Islands (NEMI), District of Manitoulin (herein referred to as 'the Town') on January 1, 1998. Following amalgamation, NEMI assumed responsibility for the Site.

Operations at the site were conducted under the Ministry of the Environment, Conservation and Parks (MECP) Provisional Certificate of Approval for a Waste Disposal Site No. A551002 (now referred to as an Environmental Compliance Approval or ECA), which was originally issued on March 19, 1980, and was replaced with the ECA dated September 9, 1986. The ECA was further amended in March 2003, October 2004, and June 2005. Copies of the Approval for the site, as amended, are provided in Appendix A.

The MECP approved a useable area of approximately 1.6 hectares (4 acres) for landfilling within the 3.69 ha (9.1 acre) waste disposal site. A Site Plan is provided in Figure 2. Landfilling of domestic and commercial wastes at the site reportedly began before 1942 and was suspended in October of 2002. The site was formally closed and capped at that time. Waste generated in Little Current, and the surrounding area has since been redirected to the NEMI Landfill Site, located at 9571 Highway 6, located approximately two kilometers south of the community of Little Current.

Condition 16 of the ECA requires that an annual monitoring report be submitted by February 28th of each year to summarize the previous year's monitoring results. This monitoring report is submitted to meet the monitoring requirements specified under Condition 16 of the ECA.

2. GENERAL SITE OPERATIONS

The Little Current Landfill Site closed in October 2002, at which time the site operations ceased. Site access is restricted by a locking gate at the entrance and the perimeter of the site is fenced with post and wire fencing. Condition 16(e) of the ECA requires that the monitoring report include "*inspection results and maintenance required for the final cover system*". Inspection of the ground cover system involves a visual assessment of the cover for areas of ponding, eroding ground cover, and/or dead or dying ground cover, trees and brush. The ground cover inspections are conducted twice annually in conjunction with the annual sampling programs. Based on the most recent inspections, the ground cover system continues to be adequate with no areas showing signs of apparent stress or deficiencies. Condition 16(f) requires the inclusion of "*a copy of all complaints received during the reporting period, including the Town's response and mitigative actions taken to address these complaints*". The Town reports that no complaints related to the closed Little Current Landfill site were received during the reporting period.

3. SUMMARY OF SITE SETTING

A detailed description of the geologic and hydrogeologic conditions at the Little Current landfill site were presented in the previous hydrogeologic study for the site prepared by Proctor and Redfern Limited (August 1992). Key findings, as provided in previous annual reports and the report outlining the Closure and Post-Closure Care of the Little Current Landfill Site (prepared by Burnside Environmental, May 2001) are summarized below. A summary of the monitoring locations and borehole details are provided in Table 1. Geological properties are summarized in the borehole logs provided in Appendix C.

3.1 Geologic Conditions

Manitoulin Island is part of the Niagara Escarpment and forms a flat tableland area, which is characterized by shallow soil cover overlying flat-lying limestone, dolostone and shale. The overburden on the tablelands consists of lacustrine silty clay to fine sandy silt deposits from glacial Lake Algonquin. The Ontario Geological Survey (OGS) (Map P2670, 1985) describes the bedrock beneath the site as a sequence of shales, limestones and dolostones belonging to the Middle to Upper Ordovician Lindsay Formation. Adjacent and south of the landfill is a contact between the Lindsay Formation and the blue-grey shale of the more recently deposited Upper Ordovician Blue Mountain Formation.

As defined by Russell and Telford (1983) and summarized in the Hydrogeologic Study for the Site (Proctor and Redfern Limited, August 1992), the Lindsay Formation has two members. The Lower Member consists of 15.25 meters of thick grey to grey-brown, finely crystalline to sub-lithographic limestone and dolostone. This member has moderate amounts of interbedded shale and has a characteristic "mottling" or nodular appearance. The Upper, or Collingwood Member, is a black calcareous, petroliferous shale that measures approximately 7.5 meters in thickness.

Based on the borehole and test hole logs, the overburden to the south of the landfill, as noted in BH1, consists of approximately 2 meters of unsaturated sand (with gravel interbeds) underlain by approximately 5 meters of silt till. To the north and east of the landfill footprint, the overburden consists of 2 to 3 meters of clay underlain by 0.3 to 0.6 meters of silt till. To the north of the landfill footprint, the silt till unit grades into a coarser grained till with fine sand and gravel, as observed in BH3 and BH5. It is noted that the borehole identified in the appended borehole logs were completed with monitoring wells as presented on the attached figures (i.e., BH3 is representative of MW-3).

The bedrock encountered at the site consists of the black shale of the Upper Member and the underlying limestone/dolostone of the Lower Member of the Lindsay Formation. As indicated by the borehole logs, the black petroliferous shale appears to be thickest to the south of the landfill in the vicinity of BH1 and gradually thins to the north towards BH3, BH4 and BH5. The limestone/dolostone of the Lower Member was encountered north of the landfill, in boreholes BH3, BH4 and BH5, and at the locations of the more recent monitoring well- couplets MW-6A/B, MW-7A/B and MW-8A/B installed by GM BluePlan Engineering Limited (GMBP, formerly Gamsby and Mannerow). As part of the subsurface investigations, the thinly laminated fossiliferous shale was reported to have a petroliferous or sulphurous odour when split. Further, thin zones of pyrite mineralization were visible on parting planes. Some interbedding of the shale with thin layers of the limestone/dolostone was also evident in the borehole core samples.

3.2 Hydrogeologic Conditions

The information presented herein summarizes information provided within the Hydrogeologic Study for the Little Current Landfill prepared by Proctor and Redfern Limited (August 1992). According to the borehole logs for BH3, BH4, and BH5, and based on the 2011 drilling investigation, a relatively significant water bearing fracture zone appears to exist at the interface between the shale and limestone/dolostone units. These fractures were typically found to be weathered and infilled with silt and clay.

The water quality in the area is typically considered to be poor. Poor water quality has been attributed to the brines associated within the upper bedrock unit (i.e., derived from the black petroliferous shale unit). According to the Hydrogeological Study (1992), naturally elevated concentrations of sodium, calcium, magnesium, sulphate, chloride, and TDS are typical for groundwater derived from petroliferous shales. Background water quality in the upper four meters of the bedrock around the landfill (i.e., lower shale and upper dolostone units) has been found to be very saline and alkaline, with elevated concentrations of chloride, sodium, boron, strontium, and TDS.

3.3 Groundwater Flow Direction

Groundwater level measurements are collected bi-annually in conjunction with the monitoring program. A summary of historical groundwater level measurements is provided in Table 2. A groundwater flow map, developed using the most recent water level measurements from wells screened within the overburden and/or shallow bedrock, is provided in Figure 3. Based on the available measurements, groundwater generally flows in a north to northwesterly direction. The groundwater flow pattern is consistent with those historically present.

Consistent with past measurements, the groundwater levels at monitoring well MW-1 were not used as the water levels were significantly lower than those measured in well MW-6B (i.e., a difference of greater than 8 meters), which is located approximately 15 m to the southwest. This difference in water levels is inferred to be from a lack of recharge due to the location of the well screen in MW-1 within a low permeability unit of bedrock that may potentially have a lack of 'active' fractures (i.e., fractures that are interconnected). Therefore, it appears that MW-1 is screened within a zone of the Upper Member that is not hydraulically active, as supported anecdotally by a lack of observed recharge during purging. Based on the lack of recharge experienced at this monitoring location and the installation of a replacement well couplet (i.e., MW-6A/B), it is recommended that this well be decommissioned in accordance with O.Reg.903.

Groundwater levels measured at well couplets MW-6A/B, located upgradient of the landfill, and MW-7A/B, located to the northwest of the closed landfill, suggest that while a downwards gradient exists to the south of the landfill, groundwater level measurements obtained from MW-7A/B indicate that the area downgradient of the landfill contains vertical gradients that vary between slightly upwards and downwards between the overburden and shallow bedrock unit. Further evidence of upwards gradients between the overburden/shallow bedrock in the area is provided by water levels from bedrock well MW-2 in which water levels are, at times, reported to be measured within less than 0.1 meters of the top of the pipe (i.e., above ground surface).

4. MONITORING

4.1 Monitoring Locations

4.1.1 Groundwater

The Little Current landfill site is currently monitored through the collection of samples at a network of nine (9) groundwater monitoring wells installed throughout the landfill site and the adjacent property to the east, where shown on Figure 2.

Monitoring wells MW-1 through MW-5 (previously referred to as BH1 through BH5) were installed by Proctor and Redfern Limited in September 1991. Due to the reported observation of stained oily soil around MW-4 by a representative of Burnside Environmental in 1998, soil clean-up and monitoring well decommissioning was reportedly recommended and completed in 1998. Further, as previously discussed, since MW-1 has little to no yield, it is no longer considered to be part of the monitoring program.

Condition 12 of the amended ECA (March 2003) for the Little Current landfill required that the Town install, for the purpose of post-closure care and groundwater monitoring, several wells in addition to the initial five monitoring wells that were installed in 1991. These wells were to aid in the assessment of site compliance and to assist in the evaluation of the potential need to acquire downgradient lands for registration as a contaminant attenuation zone (CAZ). To satisfy the requirements of the ECA, Northland Engineering recommended the installation of six additional monitoring wells and one gas monitor. In January 2006, Northland Engineering installed two of the planned wells and MW-9, which is situated in the unsaturated zone within the refuse and is used as a gas monitor. The four remaining recommended monitoring locations were installed in July 2011 by GMBP.

The additional recommended monitoring wells were installed at three different locations surrounding the closed landfill and include a new upgradient background monitoring well couplet (i.e., MW-6A/B), intended to replace MW-1 and to better characterize the background water quality associated with the overburden and bedrock unit; and two overburden/shallow bedrock well couplets situated downgradient of the landfill to aid in the assessment of site compliance (i.e., MW-7A/B and MW-8A/B).

4.1.2 Surface Water

Currently, surface water quality monitoring is completed twice annually at two (2) locations to support the requirements of the Approval. The surface water sampling locations, as shown on Figure 2, include the following:

SW-1: Located within a seasonal highly localized ponded area located to the north of the landfill footprint.

SW-2: Engineered surface water collection pond located centrally and to the north of the landfill footprint. This engineered stormwater management system was designed to collect non-contact surface water originated from the closed and capped landfill pile.

4.1.3 Methane Monitoring

Methane monitoring is completed to satisfy Condition 16(b) of the ECA, which states that '*monitoring results and details of maintenance required for the landfill gas venting*' be provided in the annual report. The ECA require that measurements of the lower explosive limit (LEL) be obtained once annually. The landfill gas vents on the top of the refuse pile are inspected annually and gas measurements are collected using a gas detector calibrated to methane. Historical gas monitoring results are summarized in Table 3.

4.2 Monitoring Program

Based on MECP concurrence with recommendations provided by GMBP in the 2008 Annual Report, as outlined in correspondence dated February 11, 2010 (Appendix B), the annual monitoring program for the Site, as amended, is as follows:

SAMPLING LOCATIONS		ANALYTICAL PARAMETERS
GROUNDWATER (Summer and Fall)		
Overburden	MW-6B MW-7A MW-8A	Conductivity, Total Dissolved Solids (TDS), pH, Alkalinity, Hardness, Ammonia, DOC Bromide, Chloride and Sulphate **Metals:** arsenic, barium, boron, chromium, cobalt, copper, selenium, strontium, calcium, magnesium, manganese, iron, potassium, and sodium
Bedrock	MW-2 MW-3 MW-5 MW-6A MW-7B MW-8B	
SURFACE WATER (Summer and Fall)		
SW-1 SW-2		Conductivity, Total Dissolved Solids (TDS), pH, Alkalinity, Hardness, Ammonia, DOC, BOD, COD Bromide, Chloride and Sulphate **Metals:** arsenic, barium, boron, chromium, cobalt, copper, selenium, strontium, calcium, magnesium, manganese, iron, potassium, and sodium **Field Parameters:** Temperature and water level

Summaries of the historical groundwater quality analytical results and surface water quality results are provided in Appendix D and Appendix E, respectively.

4.3 Sampling Procedures

For completion of the groundwater sampling program, the static groundwater level and well depth are measured in each monitoring well prior to purging three casing volumes of stagnant water from each well. GMBP personnel also check to ensure that all monitoring wells are properly secured and in compliance with Ontario Regulation 903. After purging, monitoring wells are allowed to recharge with fresh groundwater before sampling occurs. Groundwater purging and sampling is conducted using dedicated Waterra™ tubing and inertial-type pumps. Samples are collected in laboratory supplied containers. Under the site-specific program, samples collected for the indicator metals are placed in unpreserved containers and are filtered and preserved by Bureau Veritas Laboratories (an accredited laboratory) in accordance with the applicable protocols. The laboratory analytical reports for the current monitoring period are included in Appendix F.

Surface water samples are collected by submerging the appropriate sample container into the water body and removing the container when a sufficient volume of sample has been collected. During collection, contact with the bottom sediment is avoided to prevent stirring-up sediment. When collecting surface water samples, direct dipping of the sample bottle is acceptable unless the bottle contains preservative. For those samples requiring preservative, a clean unpreserved bottle is used to obtain the sample, which is then transferred into the appropriate preserved bottle. The surface water temperature is measured and recorded at the time of sampling.

The groundwater and surface water samples are kept chilled following completion of the sampling program and are submitted within 24 hours of the sampling event to an accredited laboratory for analysis. Copies of the laboratory analytical reports for the current monitoring period are provided in Appendix F.

5. DETERMINATION OF REASONABLE USE CRITERIA FOR THE SITE

5.1 Determination of Action Levels

MECP Guideline B-7 establishes the basis for determining what constitutes the reasonable use of groundwater on properties adjacent to landfill sites. This approach uses both the provincial maximum concentrations identified in the Ontario Drinking Water Standards (ODWS), revised June 2006, and the site-specific background values, to calculate acceptable concentrations at the Site Boundary. By applying the RUC, the potential use of groundwater for domestic consumption will almost always provide the lowest allowable concentration limits, referred to as the objective levels. MECP Procedure B-7-1 provides technical details for the application of the reasonable use approach. A change in the quality of groundwater on an adjacent property, where the reasonable use is determined to be for drinking water, will be acceptable only where:

i) Quality is not degraded by more than 50% of the difference between background concentrations and the Ontario Drinking Water Standards for non-health related parameters, and

ii) Quality is not degraded by more than 25% of the difference between background concentrations and the Ontario Drinking Water Standards for health-related parameters.

Background concentrations are considered to be the quality of the groundwater prior to any contamination from landfill activities.

5.2 Background Water Quality

Background concentrations are the site-specific values that represent the quality of groundwater prior to any contamination from landfill activities. As previously discussed, historically water quality results obtained from MW-1 were used to determine the background water quality. However, due to the lack of recharge into this well, the inability to regularly collect samples, and the identified differing water quality characteristics associated with the overburden and bedrock units, it was recommended to replace MW-1 with an overburden/bedrock well couplet MW-6A/B.

The background water quality was determined using data from overburden monitoring well MW-6B, installed in 2006, and bedrock well MW-6A which was installed in 2011. This monitoring well couplet is located upgradient from the landfill where shown in Figure 3. All available groundwater quality, up to and including October 2022, were used to calculate the average and 95th-percentile background concentrations for each indicator parameter to aid in the determination of RUC values for groundwater in the shallow overburden and the bedrock. The 95th percentile concentration was used to reflect the RUC background concentrations for parameters with background concentrations that exceed the ODWS. The background concentration ranges, averages, and resulting RUC values (i.e., objective levels) for the indicator parameters monitored at the Site are summarized in Table 4A (overburden) and Table 4B (bedrock).

Overburden monitoring well MW-6B was installed to a depth of approximately 8.5 meters and is screened within the silt till unit overlying the bedrock and MW-6A is screened at an interval that straddles the lower shale and the upper dolostone units, which is geologically consistent with the screened intervals in the downgradient bedrock monitoring wells MW-3, MW-5, MW-7B, and MW-8B. Downward gradients are consistently noted at this well nest. It is evident that the groundwater quality within each of the units, including the overburden, petroliferous black shale and the underlying limestone/dolostone varies significantly. This variation is likely due to the different geochemical characteristics and groundwater sources associated with each unit (i.e., shallow groundwater is more likely influenced by the infiltration of precipitation versus the brines associated with the low conductivity shale unit). Consequently, background groundwater quality within each unit is evaluated separately.

Overburden

Based on the analytical data for well MW-6B, the shallow background groundwater chemistry for the Site can generally be described as having chloride concentrations in the general range of 20-65 mg/L, a slightly basic pH of approximately 8.0, and an average conductivity in the range of 715 µS/cm. The average hardness and alkalinity concentrations are approximately 350 mg/L and 250 mg/L, respectively, which is representative of a carbonate-rich groundwater system. Further, as demonstrated by the historical water quality results and trends noted at well MW-6B, the background groundwater quality shows naturally elevated, and highly variable concentrations of sulphate, iron, and manganese.

It is noted that during previous monitoring events, anomalously elevated concentrations of manganese, strontium, calcium, sulphate, hardness, alkalinity, TDS, and conductivity were reported in MW-6B. The cause of the elevated concentrations is currently unknown, however, the analytical data represents a one-time occurrence with a noticeable decrease in concentrations for these parameters in the follow-up monitoring events. The anomalous concentrations have continued to decrease to the current monitoring period. The elevated parameter concentrations are not expected to be associated with landfill leachate due to their location adjacent to the hydraulically upgradient property boundary and are more likely associated with a degree of influence from groundwater from the underlying shale bedrock unit. The assessment and evaluation of the long-term trends in MW-6B will continue to be completed on an ongoing basis.

Bedrock

Groundwater quality in the bedrock unit is generally poor, showing the natural occurrence of several parameters typically relied upon to characterize and identify landfill leachate impacts. Relative to the overburden groundwater quality, the bedrock unit is characterized by elevated concentrations of boron and strontium. In addition, average background concentrations of sodium and chloride are generally in the range of five to ten times those measured in the overburden. The concentration of TDS is also, on average, approximately two times greater in the bedrock. The average hardness and alkalinity concentrations are approximately 450 mg/L and 275 mg/L, respectively. As previously discussed, the elevated parameter concentrations in the bedrock wells are expected to be caused by the natural petroliferous-rich brines associated with the shale bedrock. Further, as noted by the reported spikes in concentrations in previous years (i.e., measured in the Fall of 2012 and 2017), concentrations can vary significantly depending on the level of influence from the upper shale bedrock unit.

In general, when compared to the overburden groundwater quality, the groundwater quality within the bedrock unit is characterized by elevated concentrations of boron, strontium, sodium, chloride, conductivity, total dissolved solids (TDS), and to a lesser degree, hardness, and potassium.

5.3 Calculation of Objective Levels (RUC)

Table 4A and Table 4B identify the concentrations of groundwater quality indicator parameters in overburden and bedrock, respectively, used for evaluating the acceptable level of contaminant concentrations at the site boundary. Background concentrations (C_b) are the site-specific values (discussed in the previous section). The provincial maximum concentrations (C_r) are identified in the Technical Support Document for the Ontario Drinking Water Standards Objectives and Guidelines (June 2006), referred to herein as the ODWS.

Acceptable concentrations at the site boundary (C_m) (herein referred to as the Reasonable Use Criteria (RUC)), are calculated from MECP Procedure B-7-1, using the following formula:

$$C_m = C_b + x(C_r - C_b)$$

Where,

C_m = maximum concentration acceptable in groundwater beneath an adjacent property
C_b = background concentration
C_r = maximum concentration that should be present in groundwater for domestic according to the ODWS
x = 0.5 for non-health related parameters (AO and OG) and 0.25 for health-related parameters (MAC and IMAC)

AO = aesthetic objective
OG = operational guideline
MAC = maximum acceptable concentration – parameters related to health
IMAC = interim maximum acceptable concentration – parameters related to health

It should be noted that if background concentrations exceed the ODWS, the objective level is to be set at the background concentration, as outlined by Procedure B-7-1. A summary of the analytical results from the current monitoring period, compared to the RUC and ODWS, is provided in Table 5A (overburden) and Table 5B (bedrock).

To determine if leachate is impacting groundwater, individual indicator parameters were evaluated in conjunction with other indicator parameters and concentration trends. Wells with elevated and stable concentrations of the identified naturally elevated constituents, that show no increases in other leachate indicator parameters, are deemed un-impacted by landfill leachate. Additionally, monitoring wells with suspected leachate impacts are compared to the groundwater chemistry at locations with naturally elevated concentrations to determine if leachate contributes to the elevated concentrations measured.

5.4 Surface Water – Provincial Water Quality Objectives

The purpose of surface water quality management at the Site is to achieve the requirements established in the Provincial Water Quality Objectives (PWQO) set out by the MECP. The PWQOs were established to ensure that surface waters are of a quality, which is satisfactory for aquatic life and recreation. Areas that have water quality surpassing the PWQO requirements are to be maintained at or above the applicable objectives. Areas that have water quality that does not presently meet the PWQO are not to be degraded any further and are to be upgraded if practical. Although the surface water locations were both either dry or too stagnant to sample during the current monitoring program, the most recent surface water results compared to the PWQO are presented in Table 6. These results include a sample from SW-2 during the Fall 2021 monitoring program.

Although surface water sampling is completed at the Site as part of the annual monitoring program, the surface water features at the site are either man-made or do not have an outflow and are representative of surface water that is designed to infiltrate. Surface water sampling location SW-1 is located within a seasonal, stagnant, organic-rich ponded area that has consistently been dry in recent years. SW-2 is located within an engineered surface water collection pond that was designed to collect non-contact surface water drainage from the closed and capped landfill pile. In essence, water quality data represents surface water that either evaporates or infiltrates via the engineered pond rather than information pertaining to surface water flowing offsite.

As such, due to the nearby monitoring wells (i.e., MW-8A and MW-3) used to monitor the shallow groundwater quality downgradient of the landfill mound, the low occurrence of sufficient volumes of water being present in these features, and the lack of water flowing offsite from the landfill property, **it is recommended that the surface water locations SW-1 and SW-2 be removed from the Summer and Fall monitoring program.**

6. GROUNDWATER MONITORING RESULTS AND DISCUSSION

6.1 Leachate Generation

Leachate is produced when surface water percolates down through refuse resulting in impacted water that has the potential to migrate along the surface or in the ground. Landfill derived leachate that enters into the surface water and/or groundwater is often attenuated by natural mechanisms along the water migration pathway. The attenuation of leachate can occur by dilution, biological activity, and geochemical mechanisms. To determine the presence of (or potential impacts from) leachate, several indicator parameters are monitored, and a trend analysis is conducted to determine changes in water quality over time.

Upon closure, landfill sites are generally considered to have a 25-year 'contaminating' lifespan during which time leachate production peaks, and then reduces. The cover material acts to limit the volume of surface water percolating down through the refuse, thereby limiting leachate production through surface water infiltration. At the Little Current landfill site, consideration should be given to the small fill area of 1.6 ha, the placement of waste above the pre-landfill development ground surface (i.e., providing for a separation distance between the bottom of waste and the water table), and the closure of the landfill site in 2002.

6.2 Leachate Characterization

Leachate generation is typically greatest directly beneath the landfill and at the perimeter of the landfilled area. Based on our assessment, monitoring well MW-8A is considered to be the well closest to providing the characteristics of leachate-impacted groundwater. It is an overburden monitoring well situated within approximately 25 meters hydraulically downgradient of the landfill footprint.

Further, it is important to recognize that the hydraulic gradients have been measured to transition from downward gradients to the south of the landfill (i.e., background well MW-6A/B) to gradients varying between slightly upwards to slightly downwards in the area to the north of the landfill. Therefore, while potential leachate impacted groundwater downgradient of the landfill footprint is generally expected to flow horizontally, primarily through the relatively thin layer (i.e., up to ±3.5 meters) of overburden soils and the shallow bedrock, it is also anticipated that some interaction between the overburden and the shallow bedrock groundwater flow systems will occur.

As would be expected due to the close proximity of well MW-8A to the closed fill area, concentrations of primary leachate indicator parameters for alkalinity, hardness, chloride, sodium, sulphate, and TDS, which typically exceed the RUC, coupled with decreasing concentration trends, specifically for chloride, sodium, TDS, and conductivity, indicates that the groundwater quality at well MW-8A was impacted by landfill leachate. However, the elevated and stable concentrations of boron and strontium, relative to that reported in the background overburden well, suggest that influence from the underlying shallow bedrock unit is also contributing to the degraded groundwater quality at this location, causing the RUC exceedances. It is noted that the RUC for overburden were established using the background concentrations derived from overburden well MW-6B, where downward hydraulic gradients are evident. This suggests that there is negligible influence on the overburden groundwater from the underlying petroliferous shale at MW-6B.

6.3 Groundwater Quality Assessment: Influencing Factors

The flow of groundwater influenced by the petroliferous shale into the overburden unit complicates the assessment of leachate impacts due to the natural occurrence of several parameters that are typically relied upon to identify leachate impacts, such as chloride, sodium, and hardness. As a result, a detailed review and assessment of the groundwater quality results was completed, and an approach to assist in distinguishing the various influencing factors on groundwater quality is outlined below.

Based on a detailed assessment and comparison of the groundwater quality in the monitoring wells throughout the Site, the following observations were drawn and are considered to be useful tools in the assessment of the relative influence of groundwater flow from the shallow bedrock into the overburden versus the potential leachate impacts to groundwater at a given location.

- The presence of boron, strontium, and to a lesser degree, potassium can be used to distinguish the relative magnitude of influence of the petroliferous shale unit on the groundwater quality. When increased concentrations of boron and strontium are reported at a given monitoring location, relative to other locations, similarly increased concentrations of chloride, sodium, hardness, and TDS are realized.

- Alkalinity concentrations are similar in background groundwater associated with the overburden and bedrock unit, consistently remaining below 400 mg/L in well couplet MW-6A/B. Alkalinity is commonly considered to be a good indicator of leachate impacts. Therefore, alkalinity concentrations that are notably elevated are indicative of potential leachate influence.

- While background sulphate concentrations are highly variable in the overburden background well (i.e., MW-6B), sulphate concentrations typically remain below 50 mg/L. Monitoring locations that consistently report elevated concentrations of sulphate, in conjunction with other indicators of leachate impacts (i.e., alkalinity), are considered to be influenced, to some degree, by landfill-derived leachate.

- Although it is evident that hardness is influenced by the bedrock unit (i.e., increased boron and strontium concentrations are correlated to increased hardness), landfill-leachate derived impacts also appear to affect notable increases in this parameter.

Due to the relative concentrations of sodium and chloride in groundwater influenced by the petroliferous shale unit, which can be up to an order of magnitude greater than that anticipated from landfill leachate, contributions of increased chloride and sodium, that can be directly attributed to landfill leachate impacts, are difficult to quantify at the majority of the monitoring locations downgradient of the landfill. However, it is noted that based on the decreasing concentration trends noted at well MW-8A, it appears that landfill-leachate impacted groundwater contributed to elevated chloride concentrations in the range of 150 to 200 mg/L and sodium concentration of up to 100 mg/L.

Therefore, when assessing the potential for leachate impacts, the relative influence of impacts from the bedrock aquifer should be considered. At locations where boron and strontium concentrations are significantly higher relative to other locations, a similar increase in chloride, sodium, TDS, and hardness is expected. As a result, the initial assessment for leachate impacts should consider alkalinity as the primary indicator of leachate, which should be evaluated in conjunction with other indicator parameters and concentration trends, such as hardness, sulphate, and to a lesser degree, sodium, chloride, and TDS.

In addition, due to the elevated concentrations of various metals measured in the background wells which are reported to be greater than concentrations that would typically be expected from landfill leachate, and in consideration of the anticipated interaction between the overburden and bedrock units downgradient of the landfill, it is thought that while the concentrations of metals can be effectively used to evaluate potential influence of bedrock groundwater on the overburden groundwater quality, specifically boron and strontium, metals alone are generally not considered to be a useful indicator of leachate influence at the Little Current landfill site.

The following sections evaluate the potential impacts on-site and the potential for off-site impacts to the area surrounding the closed Little Current Landfill Site using historical and recent water quality data available. The groundwater quality results for the monitoring period, compared to the RUC and ODWS, are summarized in Tables 5A and 5B. As previously noted, hardness consistently exceeds the ODWS operational guidelines, which is consistent with groundwater flowing through carbonate-rich soils. Further, when RUC exceedances are reported for overburden monitoring locations situated downgradient of the landfill, the influence of groundwater flow from the underlying bedrock unit should be considered (i.e., boron and strontium). Historical groundwater sampling results and graphical trends of indicator parameters, which include summaries of the average maximum, minimum and 95th percentile concentrations for each parameter, are included in Appendix D.

6.4 Boundary Conditions

6.4.1 South Boundary Condition

The southern property boundary is inferred to be hydraulically upgradient of the landfill footprint and is situated adjacent to Highway 540. The approximate limit of the existing landfill is approximately 35 m from the property boundary at its closest point. Due to the north to north-westerly groundwater flow direction, the south side of the landfill is considered low risk for leachate impact. Monitoring well couplet MW-6A/B is situated to the south and upgradient of the landfill footprint and is considered to represent the background groundwater quality in the overburden and shallow bedrock units. Groundwater quality at these locations was discussed in detail in Section 5.2 of this report.

6.4.2 East Boundary Condition

The eastern property boundary is located hydraulically cross-gradient from the landfill footprint, which is situated approximately 35 meters from the property boundary at its closest point. There are no monitoring wells situated between the landfill footprint and the property line. However, the area to the east of the landfill is considered low risk for leachate impact due to the north to north-westerly groundwater flow direction.

Monitoring well MW-2 is located approximately 105 metres east of the landfill footprint, at its closest point, and is separated from the landfill property by a low-lying swampy area. The swampy area appears to have been created by the damming of a small creek which resulted in the minor flooding of a vegetated, treed area. Similar to MW-6A, well MW-2 is screened within the shallow bedrock. Based on the separation distance between MW-2 and the landfill, its cross-gradient location, and the historical analytical results, no impacts related to landfill leachate are evident at this location. Therefore, this monitoring location can also be considered to reflect background conditions.

Historical groundwater quality suggests that the groundwater quality is geochemically similar to that reported for background bedrock well MW-6A, although concentrations are typically greater. The reported concentrations from the most recently collected samples are consistent with previous monitoring years and with the geochemical signature at other bedrock monitoring locations.

The groundwater quality at MW-2 is characterized by elevated concentrations of boron, strontium, hardness, chloride, conductivity, and TDS. Concentrations of TDS and chloride are shown to exceed ODWS criteria while only boron and chloride are shown to exceed the RUC.

Based on the location of MW-2 (cross-gradient and outside of the area of potential influence from landfilling), the elevated concentrations of boron, relative to background, coupled with the typically elevated concentrations of chloride and hardness, in the groundwater appears to be influenced by the petroliferous shale. Further, the significantly higher concentrations of parameters identified that signify greater influence from petroliferous shale unit, along with the concentration spikes in the background well, support the concept that concentrations in groundwater derived from the shale unit can be highly variable.

6.4.3 North Boundary Condition

The north property boundary is considered to be hydraulically downgradient of the landfill and is situated approximately 25 to 40 meters from the existing landfill limit. The groundwater monitoring network includes six monitoring wells situated at four different locations, downgradient from the landfill including overburden monitoring wells MW-7A and MW-8A, and bedrock wells MW-3, MW-5, MW-7B, and MW-8B. These wells, which are located approximately 5 to 10 meters from the northern property boundary, are used to monitor groundwater quality and Site compliance.

As previously noted, several parameter concentrations within the bedrock wells appear to be naturally elevated and in contrast to the downwards vertical gradients noted to the south of the landfill (i.e., background wells MW-6A/B), the vertical gradients to the north of the landfill footprint appear to fluctuate over time between slightly upwards to slightly downwards. Therefore, the vertical gradients noted to the north suggest that there is the potential for interaction between the overburden and bedrock groundwater flow systems. Consequently, it is somewhat difficult to differentiate the relative influence from landfill leachate and the influence from the petroliferous shale bedrock unit and associated brines. The ensuing discussion provides, an assessment of the groundwater quality results and trends for the monitoring wells located at, or near, the north property boundary and presents and interpretation of the findings.

Overburden Groundwater Quality

Monitoring well MW-8A is considered the most likely location to be influenced by landfill leachate due to its downgradient location within the shallow overburden. As previously discussed, MW-8A has been used to characterize leachate impacts associated with the Little Current landfill (refer to Section 6.2). The presence of leachate impacts from the closed landfill at this location is primarily supported by the generally decreasing concentration trends for sodium and chloride that have been observed, coupled with the elevated concentrations of sulphate and alkalinity. Based on the analytical data from the current monitoring year, the observed decreasing sodium and chloride trends at MW-8A continue to be evident.

However, the presence of higher concentrations of boron and strontium, relative to the background overburden well MW-6B, suggest that groundwater quality at this location is also influenced by the interactions between the overburden and bedrock groundwater flow systems.

Monitoring well MW-7A is situated in the northwest corner of the site. Groundwater quality at this monitoring location has shown stable concentration trends since the inception of monitoring in 2011 with decreasing analytical trends since 2015. RUC exceedances for hardness, alkalinity, manganese, and TDS are typically reported at MW-7A, however concentrations of other leachate indicator parameters as well as parameters that are indicative of influence from the underlying bedrock unit, such as boron and strontium, are consistently similar to the background (overburden). Based on the overall groundwater quality characteristics and trends, and the location of this monitoring well generally cross-gradient to groundwater flow from the landfill, landfill-leachate derived impacts are considered to be negligible at this location. Elevated alkalinity and hardness may be due to the natural mineralization of groundwater within the shallow overburden at this monitoring location.

Bedrock Groundwater Quality

Bedrock groundwater quality in proximity to the north property boundary is monitored (from east to west) at monitoring locations MW-5, MW-8B, MW-3, and MW-7B. The bedrock groundwater quality is discussed in detail below.

Monitoring Well MW-8B

Leachate impacts were identified in overburden monitoring well MW-8A, consequently landfill-leachate derived impacts, if present, would likely be noted in the corresponding bedrock well MW-8B. MW-8B was installed in 2011 to satisfy previous MECP recommendations for an additional bedrock monitoring well located directly north and hydraulically downgradient of the landfill footprint. The monitoring well was installed with a screened interval that straddles the lower portion of the shale unit and the upper portion of the underlying dolostone bedrock. During advancement of the borehole and installation of this monitoring well, a strong petroliferous odour was detected throughout the fractured black shale bedrock, and the drill fluid was observed to become black in colour with evidence of naturally occurring petroleum product. After installing and developing the monitoring well, the dedicated Waterra sample tubing was observed to be coated with globules of dark brown/black bitumen. Based on the subsurface conditions and the occurrence of naturally occurring petroleum product and natural gas within the black petroliferous shale identified at MW-8B, it is reasonable to expect that the groundwater quality at this location would be significantly degraded.

It is noted that the occurrence of black shale and the associated sulfurous odour was also documented by others at the location of former shallow bedrock well MW-4, formerly situated ±100 meters north of MW-8A/B, where shown on Figure 3. However, based on a review of the previous Closure Report and the 2007 Annual Monitoring Report completed by others, it appears that these conditions were attributed to an oil spill or fuel release to the ground surface. Consequently, MW-4 was subsequently decommissioned and soil "clean-up" efforts were completed by others at that time.

According to the GIS mapping provided by the Ontario Oil, Gas, and Salt Resource Library, there are numerous oil and gas producing test/exploration wells in the vicinity of the landfill property, in the general vicinity of Little Current, and throughout Manitoulin Island. Therefore, the occurrence of petroleum product and natural gas at MW-8B appears to be related to the subsurface geology and is considered to be naturally occurring. The conditions identified at MW-8B, and those historically noted at MW-4, are due to the local geologic conditions are not considered to be associated with a spill or release.

One groundwater quality sample was collected from this monitoring location in October 2011 and the analytical results are included in Appendix D. However, due to the presence of naturally occurring petroleum product, monitoring well MW-8B has not been included in the monitoring program since that time. While the concentrations of the primary leachate indicators including alkalinity and sulphate were reported to be lower in the bedrock as compared to the overburden (i.e., MW-8A), groundwater quality results from this monitoring location included an alkalinity concentration of 615 mg/L and sulphate concentration of 340 mg/L, both in exceedance of the RUC and indicating the potential for influence from landfill leachate at this location. However, based on the significantly elevated concentrations of boron and strontium, relative to background, and the corresponding concentrations of sodium, chloride, hardness and TDS, which were also reported to exceed the RUC, and in consideration of the observed variability in groundwater quality within the shallow bedrock in the area around the site, it is apparent that the groundwater quality is also influenced by the petroliferous shale unit. Therefore, it appears that the RUC exceedances at well MW-8B are predominantly naturally occurring.

Based on the requirements of the Ontario Water Resources Act (Ontario Regulation 903/90), as amended, a monitoring well where natural gas is encountered, and where it is deemed to pose a potential hazard, is to be decommissioned as per the requirements of the Regulation. Additionally, it is anticipated that the groundwater at this location is sufficiently 'degraded' as a result of the natural geologic conditions and would not be considered potable.

Therefore, future monitoring at this location is not expected to provide significant additional information pertaining to the Site's compliance with the Reasonable Use Policy. Due to the geologic conditions encountered during drilling and the potential hazard related to the natural occurrence of bitumen and gas, the decommissioning of well MW-8B is recommended as per the requirements of Ontario Regulation 903/00.

Monitoring Wells MW-3 and MW-7B

Monitoring wells MW-3 and MW-7B monitor groundwater quality in the bedrock in the northwest portion of the property. The reported concentrations for several of the parameters are elevated above background conditions, with RUC exceedances reported for boron, hardness, alkalinity, sodium, chloride and TDS. The analytical results from the current monitoring period are consistent with historical results which display average strontium and boron concentrations at these two monitoring locations (combined) in the range of 15,000 µg/L and 6,700 µg/L, respectively, as compared to concentrations of typically less than 1000 µg/L in the background bedrock well MW-6A (refer to Appendix D). Coupled with the significantly greater boron and strontium concentrations, average concentrations of chloride and sodium are typically greater than 10X those reported in the background well, the conductivity and TDS are in the range of 5X to 10X higher, and hardness concentrations are notably elevated (i.e., typically greater than 1,400 mg/L). Based on the alkalinity concentrations which remain in the range of approximately 300 to 400 mg/L, and the geochemical signature which suggests significant influence from the petroliferous shale unit, landfill leachate derived impacts to groundwater are considered to be negligible at these monitoring locations.

Unusually high concentrations of boron and strontium along with chloride, sodium, and conductivity were noted specifically in MW-7B this past monitoring period. As mentioned, it is believed that these elevated concentrations are associated with natural geologic conditions common for the local area due to occurrence of petroleum substances. Key leachate indicators such as Alkalinity, Sulphate and Hardness are noted to be either stable or have decreased in concentration, providing a reasonable assumption that the spike in metal and chloride concentrations it not significantly related to the landfill associated leachate.

Monitoring Well MW-5 (Bedrock)

Monitoring well MW-5 is situated in the northeast portion of the Site. Relative to background well MW-6A, the average concentrations of boron and strontium suggest that there is a greater degree of influence from the petroliferous shale unit at this monitoring location. However, the magnitude of this influence is less than that interpreted for other bedrock monitoring locations situated downgradient of the landfill.

Groundwater quality trends at MW-5 indicate that while the concentrations of strontium and boron have remained relatively stable, the concentrations of some other leachate indicator parameters appear to have increased slightly in the early 2000's and have remained stable since that time. In general, concentrations of sodium, chloride and TDS remain similar to background, however alkalinity, sulphate, and hardness are higher indicating the potential for minor influence from landfill leachate at this location. RUC exceedances in the current monitoring period are noted for boron, alkalinity and chloride. With the exception of alkalinity, the exceedances can generally be attributed to natural background conditions.

6.4.4 West Boundary Condition

The west limit of the approved landfill footprint is located approximately 30 meters from, and cross-gradient to, the west property boundary at its closest point (Figure 3). Based on the groundwater flow direction and the distance between the westerly limit of the landfill footprint and the compliance limit to the west, the buffer area appears to be sufficient. Offsite impacts are generally not anticipated along the majority of the western property line, however, if present, are considered to most likely be proximal to the northern property boundary. Consequently, monitoring well couplet MW-7A/B was installed in July of 2011. As discussed above, landfill leachate derived impacts at this monitoring location are not apparent.

6.5 Groundwater Quality Summary

Groundwater quality within each of the geologic units, including the overburden and shallow bedrock, varies significantly. Due to the downwards hydraulic gradients consistently noted at the background monitoring well couplet MW-6A/6B, the water quality in each of these units could be effectively characterized. In addition, monitoring results from bedrock well MW-2, which is located greater than 100 meters to the east of the landfill footprint, could be used to verify the bedrock groundwater quality and demonstrate that a level of variability can be expected depending on the magnitude of influence from the petroliferous shale unit.

Based on a review of the water quality data, boron and strontium were identified as key indicators that could be used to measure the relative influence of the petroliferous shale unit on the water quality at a given location, including overburden monitoring locations where upwards gradients could allow for the flow of groundwater from the bedrock into the overburden. The elevated concentrations appear to be associated with the natural occurrence of petroliferous-rich salt brines within the upper shale unit. In general, increased concentrations of sodium, chloride, conductivity, TDS and, to a lesser degree, hardness, and potassium, are expected in conjunction with increased boron and strontium concentrations.

Within the bedrock groundwater, several of the parameters typically relied upon to characterize leachate are present at concentrations that would typically 'mask' potential impacts from landfill leachate, particularly from a small, closed landfill site. However, based on concentrations of alkalinity that were reported to be in the range of 300 mg/L in both the background overburden and bedrock groundwater, alkalinity was identified as a primary indicator of leachate, which should then be evaluated in conjunction with other indicator parameters and concentration trends, such as hardness, sulphate and, to a lesser degree, sodium, chloride, and TDS.

Downgradient of the landfill, the presence of leachate impacts from the closed landfill at overburden well MW-8A is indicated by the generally decreasing concentration trends for sodium and chloride that have been observed, coupled with the elevated concentrations of sulphate and alkalinity. However, the presence of higher concentrations of boron and strontium, relative to the background overburden well MW-6B, suggest that groundwater quality at this location is also influenced by the interactions between the overburden and bedrock groundwater flow systems. In the northeast portion of the Site, in the vicinity of bedrock well MW-5, the relatively stable concentrations of boron and strontium, coupled with slightly increased concentrations for some leachate indicator parameters (i.e., chloride and sodium in the early 2000's) and the continued elevated concentrations of alkalinity, sulphate and hardness is indicative of minor influence from landfill leachate. In the northwest portion of the Site, in the vicinity of well couplet MW-7A/B and bedrock well MW-3, landfill-leachate derived impacts are not evident. The long-term trend analysis for parameter concentrations reported in the monitoring wells to the north of the landfill footprint indicates a stable to slightly decreasing trend for the target analytical parameters.

Due to the north to north-westerly groundwater flow direction, and the buffer of greater than 30 meters between the landfill footprint and the compliance limits to the east, south and west of the landfill footprint, leachate impacts are not anticipated in the areas situated up-gradient to cross-gradient of the Little Current landfill site.

In summary, since the concentrations of several indicator parameters in the bedrock groundwater are elevated beyond that of typical landfill-derived leachate, even a minor influence from the bedrock unit is likely to be greater than potential impacts from the closed landfill site. As a result, the magnitude of impacts from landfill leachate and compliance with the RUC along the north property boundary is difficult to discern. However, at this time it appears that the groundwater quality downgradient of the landfill is more significantly influenced by the native petroliferous shales than by the closed landfill site.

7. SURFACE WATER QUALITY RESULTS AND DISCUSSION

Surface water quality monitoring at the site consists of water quality monitoring from two locations (i.e., SW-1 and SW-2) located to the north of the landfill footprint and includes the measurement of water levels, when possible. Surface water sampling location SW-1 is located within a seasonal, localized ponded area that has primarily been dry in recent years due to the small size (i.e., approximately 2 m in diameter) and the highly localized nature of this stagnant feature. SW-2 is located within an engineered surface water collection pond that was designed to collect surface water drainage from the closed and capped landfill. Based on our observations and the groundwater elevation noted in overburden well MW-8A, SW-1 and SW-2 may be partially groundwater fed in addition to serving as a collection system for surface water flow in the highly vegetated area to the north of the closed and capped refuse pile. It is noted that these features do not provide information pertaining to surface water flowing offsite and represent surface water that either evaporates or infiltrates.

Surface water quality results are compared to the allowable concentrations specified within the PWQO. This comparison is considered to be conservative as the two sampling locations are representative of highly localized features that have no outlets or connection to other surface water bodies (e.g., streams or rivers) and do not represent surface water flowing offsite. In the current monitoring period, the surface water sampling locations were noted to be dry during the summer monitoring period, while SW-2 was sampled during the fall monitoring period. The surface water quality results for 2013 to 2017, as well as 2021 results for SW-2, compared to the PWQO, are summarized in Table 6 and a summary of the historical surface water quality results is included in Appendix E.

Historical analytical results often report PWQO exceedances for boron, and periodically iron and cobalt (Table 6). Similar to overburden well MW-8A, boron and strontium concentrations are reported to be greater in the surface water than in the background overburden (i.e., MW-6B). In addition, the concentrations for various indicator parameters are noted to be variable, particularly at SW-2, however, generally follow a similar trend to that observed for boron and strontium, suggesting that the surface water quality is predominantly influenced by the bedrock flow system. However, based on the location of these features directly downgradient of the closed landfill, there is potential for landfill leachate derived impacts. Similar to the groundwater quality assessment, the magnitude of impacts from leachate is difficult to discern due to the natural occurrence of several indicator parameters in groundwater derived from the petroliferous shale unit.

In order to further assess whether PWQO exceedances at SW-1 and SW-2 are groundwater derived, two samples (labelled SW-3) were previously collected (in 2009) from the upper surface water pond that was designed to provide catchment for the surface water/overburden flow originating from the closed refuse pile. The analytical results from this sample are considered to be representative of the surface water flowing off the closed landfill. Based on the analytical results for SW-3, it appears that the elevated concentrations of parameters identified in all surface water features (i.e., aluminum, boron, chloride, sodium etc.) are more related to the local surficial soils at the site. The overburden at the site consists primarily of clayey soils derived from the underlying shales. These soils are known to produce elevated levels of the above-mentioned parameters. Additionally, the water quality observed at SW-1 and SW-2 is generally consistent with the water quality observed in overburden monitoring well MW-8A.

As such, due to the nearby monitoring wells (i.e., MW-8A and MW-3) used to monitor the shallow groundwater quality downgradient of the landfill mound, the expected nature and chemistry of the ponded water in these locations, the low occurrence of sufficient volumes of water being present in these features, and the lack of water flowing offsite from the landfill property, **it is recommended that the surface water locations SW-1 and SW-2 be removed from the summer and fall monitoring programs.**

8. QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

As part of the QA/QC program, surrogate recoveries, method blanks and laboratory duplicates were reviewed to ensure analytical validity. The results for surrogate recoveries and method blanks were all reported to be within the acceptable limits as presented in the laboratory reports.

For laboratory duplicates, the relative percent difference (RPD) was calculated and is presented in Table 7. A review of the duplicate analyses indicates that the RPDs were within the laboratory quality control limits which are indicative of good laboratory practices and analytical validity.

In addition, a review of the historical analytical data indicates that the analytical data from the current monitoring period are within historical norms or are consistent with historic trends. In summary, the QA/QC protocols indicate that the analytical results are valid.

9. METHANE GAS MONITOING RESULTS

Methane is a colourless and odourless gas formed by the decomposition of organic matter under oxygen poor (anaerobic) conditions and is commonly associated with landfills. It is produced by anaerobic bacteria, which become active only when the oxygen in the landfill has been completely consumed. The primary concern related to this parameter is that, under certain conditions, the mixture of methane in air can be explosive within a confined area. Methane gas is measured relative to the lower explosive limit (LEL) which corresponds to 5% of the concentration of methane in air.

There is currently a total of six landfill gas vents in the vicinity of MW-9, which are situated at the top of the refuse pile. According to the Municipal information provided, the vents were installed in November of 2004. The gas vents are generally described as areas measuring 3.5 m^2 excavated through the low permeability cover and 0.5 m into the waste. According to the Closure and Post Closure Care Report, the entire area is lined by a non-woven geotextile and filled with clear stone to promote the venting of landfill gases.

Historically, LEL measurements from the monitoring locations, with the exception of MW-9, have typically produced readings of zero (Table 3). Landfill gas measurements at MW-9 fluctuate significantly and, when concentrations have been measured, they have historically ranged between 9.8% and 100%. Although landfill gases are being produced within the landfill, the landfill gas vents were specifically designed and constructed to prevent the off-site migration of these gases. In addition, methane gas has not been historically detected at any other monitoring locations surrounding the landfill mound, indicating that methane gas is not migrating laterally off the property. Additionally, it is noted that the closest structures where the accumulation of methane may potentially occur are greater than one hundred meters from the landfill.

10. REVIEW OF MONITORING PROGRAM

Condition 13 of the revised ECA (March 2003) states that the frequency of sampling and the list of parameters shall be reviewed after two years of sampling have been completed. As per the ECA, a detailed assessment of the monitoring results was completed by GMBP in the 2008 Annual Monitoring Report. Based on this review, GMBP proposed that the previously established monitoring program be revised to better reflect the conditions of the site. The proposed revisions included reducing the sampling frequency from three times annually to twice annually and that the analytical parameters be reduced to a list that is specifically intended to provide further information regarding the Site's compliance with the Reasonable Use Criteria.

Based on MECP concurrence with recommendations provided in the 2008 Annual Report, as outlined in correspondence dated February 11, 2010 (Appendix B), the annual monitoring program for the Site, as amended, is as follows:

SAMPLING LOCATIONS		ANALYTICAL PARAMETERS
GROUNDWATER (Summer and Fall)		
Overburden	MW-6B MW-7A MW-8A	Conductivity, Total Dissolved Solids (TDS), pH, Alkalinity, Hardness, Ammonia, DOC Bromide, Chloride and Sulphate **Metals:** arsenic, barium, boron, chromium, cobalt, copper, selenium, strontium, calcium, magnesium, manganese, iron, potassium and sodium
Bedrock	MW-2 MW-3 MW-5 MW-6A MW-7B MW-8B	
SURFACE WATER (Summer and Fall)		
SW-1 SW-2		Conductivity, Total Dissolved Solids (TDS), pH, Alkalinity, Hardness, Ammonia, DOC, BOD, COD Bromide, Chloride and Sulphate **Metals:** arsenic, barium, boron, chromium, cobalt, copper, selenium, strontium, calcium, magnesium, manganese, iron, potassium and sodium **Field Parameters:** Temperature and water level

Since the Landfill has been closed and capped for a period of 21 years (i.e., since 2002), it is reasonable to expect that the primary period of leachate generation has passed. Through the past sampling program, it has been established that there are no significant seasonal fluctuations in groundwater flow direction and that the site conditions are stable (i.e., it is closed). In addition, the groundwater quality measured in the last several years of monitoring has been relatively consistent with the exception of the decreasing concentration trends for sodium and chloride observed at monitoring location MW-8A. This decreasing concentration trend is interpreted to reflect decreasing influence from landfill-leachate derived impacts at this downgradient overburden monitoring location.

Previous recommendations have been made to consider a further reduction in the sampling frequency once stabilized concentration trends were evident at the location of MW-8A over a five-year period. Therefore, **based on the generally stable concentration trends in the groundwater at MW-8A since 2016 (i.e., a period of 6 years), it is recommended that the sampling frequency be revised to once per year during the fall season.**

Due to the geologic conditions encountered during drilling and the potential hazard related to the occurrence of naturally occurring bitumen and gas, **the removal from the monitoring program and decommissioning of MW-8B is recommended as per the requirements of Ontario Regulation 903/00.**

11. CONCLUSIONS

1. As a result of the site closure in October 2002 and the subsequent placement of a low permeability cover, it is anticipated that leachate production at the site will continue to decrease over time. Therefore, it is reasonable to expect that groundwater concentrations of leachate indicator parameters will remain stable or continue to decrease.

2. To satisfy Condition 12 of the ECA, four additional monitoring wells (MW-6A, MW-7A, MW-7B, and MW-8B) were previously installed at the Site in 2011. No further monitoring well installations are required under this condition.

3. The groundwater flow direction at the site is consistently in a north to north-westerly direction. Leachate impacts are most likely to occur to the north of the landfill and along the northerly compliance limit. Further, landfill-leachate derived impacts cross-gradient to the landfill (i.e. to the east and west) are not anticipated.

4. Groundwater quality within each of the geologic units, including the overburden and shallow bedrock, varies significantly. Based on a review of the water quality data, boron and strontium were identified as key indicators that can be used to measure the relative influence of the petroliferous shale unit on the water quality at a given location, including overburden monitoring locations where upwards gradients could allow for the flow of groundwater from the bedrock into the overburden. The elevated concentrations appear to be associated with the natural occurrence of petroliferous-rich salt brines within the upper shale unit. In general, increased concentrations of sodium, chloride, conductivity, TDS and, to a lesser degree, hardness and potassium, are expected in conjunction with increased boron and strontium concentrations.

5. Downgradient of the landfill, the presence of leachate impacts from the closed landfill at overburden well MW-8A is indicated by the generally decreasing concentration trends for sodium and chloride coupled with elevated concentrations of sulphate and alkalinity. However, groundwater quality at this location is also influenced by the interactions between the overburden and bedrock groundwater flow systems. In the northeast portion of the Site, in the vicinity of bedrock well MW-5, groundwater quality results suggest minor influence from landfill leachate. In the northwest portion of the Site, in the vicinity of well couplet MW-7A/B and bedrock well MW-3, landfill-leachate derived impacts are not evident.

6. A typical leachate plume from a small Municipal Landfill has lower concentrations of characteristic indicator parameters than seen in the shallow bedrock unit. Given that the purpose of the RUC is to not permit further degradation of the groundwater on adjacent properties, a significant leachate plume would be required to further degrade the groundwater quality within the bedrock unit at the Site. Consequently, even a minor influence from the underlying shale unit on groundwater quality in the overburden effectively influences groundwater chemistry beyond that expected from landfill leachate.

7. Based on the natural occurrence of significantly elevated concentrations of various parameters typically relied upon to assess landfill leachate derived impacts, compliance with the RUC downgradient of the landfill and along the north property boundary is difficult to discern. However, at this time it appears that the groundwater quality downgradient of the landfill is more significantly influenced by the native petroliferous shales than by the closed landfill site.

8. The designed pond/wetland type features from which the surface water samples are collected are intended to promote the infiltration of surface water. Therefore, SW-1 and SW-2 are representative of localized features that have no outlets or connection to other surface water bodies (e.g. streams or rivers). Based on the groundwater elevations, the locations of the surface water features, and the similarity between the surface water quality and the groundwater quality reported in MW-8A, it appears that the seasonal localized ponded area (i.e. SW-1) and lower overflow pond (i.e. SW-2) may be influenced somewhat by groundwater discharge. At the surface water sampling locations, no exceedances of the PWQO, related directly to stormwater run-off from the landfill, are noted. As discussed, there is a low occurrence of sufficient volumes of water being present in these features.

12. RECOMMENDATIONS

1. It is recommended to continue the existing approved twice annual sampling program in the summer and fall as outlined in the Summary Table provided in Section 10 of this report. However, it was previously recommended that once the Site's compliance with the RUC is more clearly established, or establishment of stabilized concentration trends over a five-year period is evident at the location of MW-8A, that additional review of the sampling frequency take place in order to determine the applicability of further reduction to the monitoring program. Based on the generally stable to decreasing concentration trends at MW-8A since 2015/2016 (i.e., a period of 6 years), it is recommended that the annual sampling frequency be revised to once per year in the fall.

2. Considering the lack of sufficient groundwater in MW-1 for sampling and analysis, the inconsistency in the water level in this well with surrounding water level measurements, and the replacement of MW-1 with MW-6A as a background bedrock monitoring well, it is recommended that MW-1 be removed from the sampling program and decommissioned as per the requirements of Ontario Regulation 903/00.

3. Due to the geologic conditions encountered during drilling and the potential hazard related to the occurrence of naturally occurring bitumen and gas, the decommissioning of MW-8B is recommended as per the requirements of Ontario Regulation 903/00.

4. As per the recommendations outlined in the MECP correspondence dated June 27, 2016, it is recommended that monitoring well MW-2 be removed from the monitoring program and decommissioned in accordance with O.Reg.903.

5. Continued review of the analytical results and trends should be used to assist in the determination of compliance with the RUC along the northerly property boundary.

6. It is recommended that the surface water locations SW-1 and SW-2 be removed from the summer and fall monitoring programs due to the expected nature and chemistry of the ponded water in these locations (as discussed in Section 7), the low occurrence of sufficient volumes of water being present in these features for sampling, the lack of water flowing offsite from the landfill property, and the nearby monitoring wells (i.e. MW-8A and MW-3) used to monitor the shallow groundwater quality downgradient of the landfill mound.

7. Although the addition of downgradient buffer lands or a contaminant attenuation zone (CAZ) is considered to be advantageous to reducing the potential for offsite impacts, it appears that degradation of the water quality beyond the property boundary due to the landfill is not evident or discernible at this time due to the occurrence of several parameters that are naturally encountered in the petroliferous black shale /dolostone bedrock observed directly downgradient of the landfill, both on-site (i.e. MW-8B) and off-site (i.e. MW-4). The natural occurrence of significantly elevated concentrations of several parameters that are typically relied upon in the assessment of landfill leachate-derived impacts makes it difficult to discern the relative influence of groundwater derived from the shallow bedrock and potential impacts from landfill leachate.

All of which is respectfully submitted,

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GM BluePlan ENGINEERING

Howland/Green Bay Landfill

Annual Monitoring Report (2022)
Town of Northeastern Manitoulin and the Islands (NEMI)
MECP Certificate of Approval No. A551003

GMBP File: M-1592

February 2023

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HOWLAND/GREEN BAY LANDFILL - NEMI

FEBRUARY 2023

GMBP FILE: M-1592

1. INTRODUCTION

The Howland landfill site, also known as the Green Bay landfill, is located off of Green Bay Road, approximately 7.5 km west of the Village of Sheguindah and Provincial Highway No. 6. It is situated on Lot 8, Concession 11 in the Town of Northeastern Manitoulin and the Islands, District of Manitoulin, shown on Figure 1. The former Township of Howland operated the site until it amalgamated with the former Township of Little Current and the former unorganized Municipality of McGregor Bay to become the Town of Northeastern Manitoulin and the Islands (NEMI) (herein referred to as 'the Town') on January 1, 1998. Upon amalgamation, the Town assumed responsibility for the site.

Pre-closure operations at the site were conducted under the Ministry of the Environment (MOE) Provisional Certificate of Approval for a Waste Disposal Site (C of A) No. A551003 issued on March 17, 1980. The C of A was subsequently amended in March 2003 and October 2004 to include conditions for site closure and post closure care. A copy of the C of A for the site and the two amendments are provided in Appendix "A". Under the C of A, the MOE approved 2.8 hectares (7 acres) for the use and operation of a landfilling site.

Based on a review of previous annual monitoring reports, the site was developed on a former sand and gravel pit in the early 1950s and received domestic and commercial solid wastes from the former township of Howland and surrounding area from approximately 1952 to 2002. The area formerly serviced by the Howland landfill site is now serviced by the NEMI waste disposal site located on Highway 6, approximately 3 km south of the geographic town of Little Current.

Condition 7 of the C of A requires that an annual monitoring report be submitted by February 28th of each year to summarize the previous year's monitoring results. From former Ministry of Environment and Climate Change (MOECC) correspondence dated December 4th, 2013, monitoring reports have been approved to be submitted once every three (3) years and to cover the past three years of monitoring. This monitoring report for the year 2022, prepared by GM BluePlan Engineering (GMBP), is submitted to meet the monitoring requirements specified under Condition 7 of the C of A and covers the monitoring results from 2020, 2021, and 2022 monitoring programs.

2. EXISTING SITE CONDITIONS

According to MOE correspondence dated November 16, 2001, based on information presented in the Closure and Post Closure Care report (Burnside Environmental, June 2001) for the Howland landfill site, the site has a waste footprint of approximately 0.94 hectares (2.32 acres) within a 3.08 hectare (7.61 acre) site.

The perimeter of the site is currently lined with page and barbed wire fencing that has a single gated entrance point located on the south side of Green Bay Road.

The area of buried waste is located in the northern portion of the property, as shown in Figure 3. The upper portion of the property, closest to the road, is relatively flat. At approximately 35 metres south of the north property boundary, the property has a pronounced downward slope from north to south towards Pike Lake with the exception of an intermediate flat area, where the storm water management (SWM) pond is located.

An access road, containing a single switchback, extends from the site entrance to the SWM pond located in the lower (southern) portion of the property. Drainage ditches, lined with rip-rap, extend through the east and west portions of the property which lead into the SWM pond and subsequently to a low-lying area at the base (south) of the property for infiltration.

Condition 7(d) of the C of A requires that the monitoring report include *"inspection results and maintenance required for the final cover system".* Inspection of the ground cover system involves a visual assessment of the cover for areas of ponding, eroding ground cover, and/or dead or dying ground cover, trees and brush. The ground cover inspections are conducted intermittently by Town personnel and by GMBP staff in conjunction with the groundwater/surface water monitoring. During the current reporting period, the ground cover system continued to be adequate with no evidence of signs of stress.

Condition 7(e) requires the inclusion of *"a copy of all complaints received during the reporting period, including the Town's response and mitigative actions taken to address these complaints".* It is reported that no complaints related to the Howland landfill site were received by the Town during the reporting period.

3. SUMMARY OF SITE SETTING

The geologic and hydrogeologic conditions at the Howland landfill site were presented in the Site Closure Plan prepared by Marshall Macklin Monaghan Limited (March 1989). Key findings, as provided in previously completed Annual Monitoring Reports and in the closure and Post Closure Care report (completed by others) are summarized below with amended discussion. Geological properties of the site are presented in the borehole logs provided in Appendix "C".

3.1 Geologic Conditions

The site is located in the physiographic region known as Manitoulin Island (Chapman and Putnam, 1984). The island is part of the Niagara escarpment, which is the rim of a thick saucer like layer of limestone/dolostone of the Lockport formation that forms the Michigan Basin. The Lockport formation covers the southern two-thirds of the island and gradually dips towards the southwest, forming tablelands. The northern edge of the formation terminates into steep cliffs that overlie the Ordovician shales and limestone of the north portion of the island.

The entire island exhibits many erosional features caused by glacial scouring and the wave action of the glacial lake Algonquin and Nipissing. Subsequently, only a small portion of the island is covered with overburden of any significance. The Howland landfill site is located in an area of moderate overburden. According to the borehole logs by Marshall Macklin Monaghan Limited (1988/1990), the overburden at the site generally consists of 6 to 11 m of lacustrine deposits (sand and gravel, sand and silty sand) underlain by silty clay till.

Bedrock, along the ridge feature was encountered in MW-5 at depths of 9.2 metres below ground surface (mbgs) (approx. 248 metres above sea level (masl)) and was described as grey limestone. At the location of MW-7B Old, which is situated at the bottom of the ridge, fissile weathered shale was encountered at 11.9 mbgs (199 masl).

In summary, the site area consists of a pronounced ridge that is comprised of coarser grained sand and gravel to silty sand that overlies a plain of lower permeability silt till. The tills are described to fine downwards to clayey soils and overlay the shale bedrock unit.

3.2 Hydrogeologic Conditions

The shallow groundwater system is monitored from a network of monitoring wells installed in the overburden to upper bedrock of the site to a minimum elevation of 199 masl. Shallow groundwater flow at the site is expected to be most prevalent in the coarser grained soils associated with the overburden deposits that form the steep ridge.

Beneath the landfill and in the plain at the base of the ridge, the soils consist primarily of relatively lower permeability sandy silts that fine downwards to clayey soils. These underlying silt tills overlie the relatively low permeability shale unit.

Review of historical and background groundwater quality indicates that the water quality in the upper unit is primarily influenced by surface water infiltration and local groundwater flow conditions. Of significance, the deeper unit, which consists of a lower permeability (or aquitard) system, appears to be more stagnant and influenced by the natural poor water quality associated with the shale unit throughout the Niagara Escarpment, and particularly Manitoulin Island.

3.3 Groundwater Flow Direction

Groundwater level measurements are collected in conjunction with the monitoring program. A summary of historical groundwater level measurements is provided in Table 1. A groundwater flow map, developed using the most current water level measurements, is provided in Figure 5. The water level measurements indicate that shallow groundwater flow at the site is in a south-easterly direction toward Pike Lake, which is located approximately 375 m southeast of the site. This is consistent with historical (including seasonal) water level data. The groundwater flow pattern, as confirmed by the water level data, is to be expected due to the high topographic relief of the site.

4. ANNUAL MONITORING PROGRAM

4.1 Sampling Requirements

4.1.1 Groundwater

The groundwater at the site is currently monitored by a system of 15 monitoring wells that are located within and around the site. The locations of all existing monitoring wells are shown on Figure 4. Prior to closure, the site was monitored by 11 groundwater monitoring wells (MW-1 through MW-7B Old), which were installed in 1988 and 1990 under supervision of Marshall Macklin Monaghan Limited. Condition 4a of the amended C of A (March 2003) for the Howland landfill required the Town to install four additional groundwater monitoring wells in the locations specified in the Post Closure Care of the Howland Landfill Site report (Burnside Environmental, 2003) for the purpose of post-closure care and groundwater monitoring. In 2006, monitoring wells MW-6A and 6B "New", and MW-7A and 7B "New", were installed under supervision of Northland Engineering Limited to satisfy the requirements outlined in the C of A.

Two different hydraulic flow regimes are monitored, which include the shallow and deep overburden units. Groundwater of the shallow overburden hydraulic flow unit is monitored by well MW-4 and by all wells that are identified with an "A" (i.e., MW-3A). Groundwater of the deep overburden hydraulic flow unit is monitored by wells MW-2, MW-5, and by the wells that are identified with a "B" (i.e., MW-3B).

In 2010, the groundwater sampling program at the site was revised to better reflect the site conditions following MOE approval. A copy of the MOE correspondence approving the revised sampling program is provided in Appendix "B" of this report. The sampling frequency was reduced from three times annually to once annually and the sampling parameters were reduced to include the following:

> **Metals:** barium, boron, calcium, iron, manganese, magnesium, potassium, and sodium.
>
> **Non-metals:** alkalinity, ammonia, chloride, conductivity, dissolved organic carbon, hardness, nitrate, nitrite, pH, sulphate, and total dissolved solids.

A summary of the historical groundwater analytical results and trends for each well is provided in Appendix "D".

4.1.2 Surface Water

Surface water monitoring at the site consists of two sampling locations (SW-1 and SW-2). The surface water sampling frequency was previously reduced (with Ministry approval) to once annually from three times annually in conjunction with the groundwater sampling program. The surface water sampling locations, as shown on Figures 3, 4 and 5, are as follows:

> SW-1: The SWM pond located near the central portion of the landfill site. This engineered pond is designed to collect surface water runoff from a series of ditches that originate in the upper portion (north) of the landfill. Once the pond reaches capacity, water discharges via a surface inlet into a drainage ditch that leads to a low lying area at the base of the landfill. The SWM system was designed to prevent erosion and excessive surface water infiltration.
>
> SW-2: Located adjacent to the southern property boundary in a swale type feature, downgradient of the SWM pond. Monitors surface water flowing off the site.

Revisions to the surface water sampling program were proposed in the 2008, 2009, 2010, 2011, 2012, 2016, and 2019 Annual Monitoring Reports. However, at the time of this report, no comment has been received from the Surface Water Technical Support Section of the Ministry of Environment, Conservation and Parks (MECP). The proposed surface water sampling parameters are provided in Section 7.0 of this report. The surface water parameters currently sampled for are provided below:

> **Metals:** aluminium, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, magnesium, molybdenum, nickel, potassium, selenium, silicon, silver, sodium, strontium, titanium, thallium, vanadium, zinc, and zirconium.
>
> **Non-metals:** alkalinity, ammonia (un-ionized), biochemical oxygen demand, chloride, chemical oxygen demand, conductivity, dissolved organic carbon, fluoride, hardness, nitrate, nitrite, orthophosphate, pH, sulphate, total dissolved solids, and temperature (field).

A summary of the historical surface water analytical results and trends for each location is provided in Appendix "E".

4.2 Sampling Procedures

4.2.1 Groundwater

For the groundwater sampling, the static groundwater level and well depth are measured in each monitoring well. Each monitoring well is then purged of three casing volumes of groundwater or until dry, whichever is first. After purging, monitoring wells are allowed to recharge with fresh groundwater before sampling is completed. Groundwater purging and sampling is conducted using dedicated Waterra™ tubing and foot valves.

4.2.2 Surface Water

Surface water samples are collected by submerging the appropriate sample container into the water body and removing the container when a sufficient volume of sample has been collected. During collection, contact with the benthic zone is avoided to prevent suspending sediment. When collecting surface water samples, a grab sample is completed with the sample bottle unless the bottle contains preservative. For those samples requiring preservative, a clean unpreserved bottle is used to obtain the sample. The sample is then transferred into the appropriate bottle containing preservative. Required field parameter measurements, such as temperature, are measured and recorded at the time of sampling.

Groundwater and surface water samples are kept chilled following completion of the sampling program and sent within 24 hours of the sampling event to Bureau Veritas Laboratories (BVL), formerly Maxxam Analytics, of Mississauga for analysis. The Laboratory Certificates of Analysis for the current reporting period are provided in Appendix "F".

4.3 Determination of Action Levels

MOE Guideline B-7 establishes the basis for determining what constitutes the reasonable use of groundwater on properties adjacent to landfill sites. By applying the Reasonable Use Concept (RUC), the potential use of groundwater for domestic consumption will usually provide the lowest allowable concentration limits. MOE Procedure B-7-1 provides technical details for the application of the reasonable use approach. A change in the quality of groundwater on an adjacent property, where the reasonable use is determined to be for drinking water, will be acceptable only where:

i) Quality is not degraded by more than 50% of the difference between background concentrations and the Ontario Drinking Water Standards (ODWS) for non-health related parameters, and,

ii) Quality is not degraded by more than 25% of the difference between background concentrations and the ODWS for health related parameters.

Background concentrations at the site are considered to be the natural quality of the groundwater prior to any contamination from landfill activities.

4.3.1 Background Water Quality

The background water quality is determined using data from MW-5. MW-5 was selected as the background monitoring well based on groundwater elevation contours (i.e., MW-5 is hydraulically upgradient from the waste footprint and has the highest groundwater elevation). Historical data indicates that the groundwater chemistry at the location of MW-5 has remained un-impacted by landfill leachate or by road salting activities.

In general, the shallow background water chemistry for the upper ridge/slope area of the site can be described as being highly mineralized, having low levels of chloride (~3 mg/L), a slightly basic pH (~ 8), and conductivity in the range of 483 to 843 µS/cm. The average hardness and alkalinity are 386 mg/L and 331 mg/L, respectively, which is generally representative of a carbonate-rich groundwater system.

Based on a review of the historical analytical data, concentrations of hardness and TDS are generally elevated at each of the monitoring wells at the site. In particular, the hardness concentrations exceed the RUC in the majority of the monitoring wells and are above the ODWS at each monitoring well at the site. The ODWS for hardness in drinking water is 80 to 100 mg/L with levels as high as 200 mg/L being considered poor but tolerable. It should be noted that the ODWS criterion for hardness is an Operational Guideline (OG) that has been established specifically for distribution systems and not for consumption. Based on the groundwater chemistry at MW-5, the groundwater is considered to have high concentrations of hardness (around 400 mg/L), as noted above. Therefore, where similar levels of hardness concentrations are noted at other wells, they will be assumed to be representative of background conditions.

It should be noted that MW-5 is screened within coarser sandy soils that form the overburden ridge. Consequently, this background water quality is not consistent with, nor representative of that of the deeper shale unit, which is intersected at MW-7B Old.

4.3.2 Calculation of Objective Levels (RUC)

Table 2 identifies the concentrations of groundwater quality indicator parameters used for evaluating the acceptable level of contaminant concentrations at the site boundary. Background concentrations (Cb) are the site-specific values (discussed in the previous section). The Provincial maximum concentrations (Cr) are identified in the Ontario Drinking Water Standards, August 2000. Acceptable concentrations at the site boundary (Cm) are calculated from MOE Procedure B-7-1 using the following formula.

$$Cm = Cb + x(Cr - Cb)$$

Where:
Cm = Maximum concentration acceptable in groundwater beneath an adjacent property.
Cb = Background concentration.
Cr = Maximum concentration that should be present in groundwater for domestic consumption according to the Ontario Drinking Water Standards.
x = 0.5 for non-health related parameters (AO and OG) and 0.25 for health-related parameters (MAC and IMAC).

AO = Aesthetic Objective
OG = Operational Guideline
MAC = Maximum Acceptable Concentration, Parameters Related to Health
IMAC = Interim Maximum Acceptable Concentration, Parameters Related to Health

It should be noted that if background concentrations exceed the ODWS, the objective level is set at the average background concentration. A summary of the analytical results for the current reporting period compared to the RUC and ODWS is provided in Table 2.

To determine if leachate is impacting groundwater, the indicator parameters in question were evaluated in conjunction with other indicator parameters and concentration trends. Wells with elevated and stable concentrations of the identified naturally elevated parameters, that show no increases in other leachate indicator parameters, are deemed un-impacted by landfill leachate. Additionally, comparison of known leachate impacted groundwater is compared to the groundwater chemistry at locations with naturally elevated concentrations to determine if leachate contributes to the elevated concentrations measured.

4.4 Surface Water – Provincial Water Quality Objectives

The purpose of surface water quality management at the site is to achieve the requirements established in the Provincial Water Quality Objectives (PWQO) set out by the MECP for offsite water bodies. The criteria set out by the PWQO (summarized in Table 3) were established to ensure that surface waters are of a quality which is satisfactory for aquatic life and recreation. Areas that have water quality surpassing the PWQO requirements are to be maintained at or above the applicable objectives. Natural water bodies that have water quality that does not presently meet the PWQO are not to be degraded any further and are to be improved if practical.

5. LEACHATE PRODUCTION

Leachate is produced when surface water percolates into the subsurface and down through refuse resulting in impacted water that has the potential to migrate along the surface or in the ground. Landfill derived leachate that enters into the surface water and/or groundwater is often attenuated by natural mechanisms along the water migration pathway. The attenuation of leachate can occur by dilution, biologic activity, and geochemical mechanisms.

As a result of the site closure in October 2002 and the subsequent placement of a low permeability final cover, it is anticipated that leachate production would decrease over time from when the site was open. Additionally, based on the relatively low waste placement rate when the site was open, leachate production is expected to occur at a relatively low rate. The low-permeability cover acts to limit the volume of surface water infiltration through the refuse, minimizing leachate production. Therefore, it is anticipated that concentrations of leachate parameters in groundwater downgradient of the waste footprint will decrease over time.

MW-3A is located in close proximity to, and directly downgradient of the waste footprint and does not represent the quality of groundwater leaving the site. Based on the location of MW-3A and since it is screened in the upper coarser soils, this monitoring location is considered to be most representative of groundwater impacted by leachate. This is consistent with the analytical results, as groundwater at this location consistently exhibits elevated concentrations of alkalinity, conductivity, DOC, hardness, sodium, nitrate, potassium, sulphate, and TDS. As this well is most influenced by leachate, it is used as the leachate characterization well. In comparison with the groundwater quality at other wells, key leachate indicator parameters appear to be alkalinity, conductivity, DOC, hardness, nitrate, potassium, sulphate, and TDS.

A review of historical trends at MW-3A indicates that concentrations of the primary leachate indicator parameters previously exhibited some variability since sampling began at this location but have displayed a relatively stable and consistent trend since about 2009, with a decreasing trend in leachate indicator parameters since that time. Of significance, chloride concentrations have remained consistently low and stable, decreasing toward background concentrations since about 2014. Based on these trends, the period of leachate generation at the landfill site appears to have passed and the measured concentrations in the leachate characterization well remain consistently low and stable.

6. MONITORING RESULTS

To determine the presence of (or potential impacts from) leachate, several indicator parameters are monitored and a trend analysis is conducted to determine changes in water quality over time. The following sections discuss the potential impacts to groundwater and surface water, and compliance with the Reasonable Use Criteria (RUC) and PWQO. The groundwater and surface water quality results for the reporting period are summarized in Tables 2 and 3. Historical groundwater and surface water sampling results and graphical trends of indicator parameters are included in Appendices "D" and "E".

6.1 Northwest Boundary Groundwater Quality

(MW-4 & MW-5)

The north property boundary is situated hydraulically upgradient from the landfill footprint and is located approximately 10 metres from the existing landfill limit at its closest point. There are two monitoring wells situated upgradient from the landfill footprint which include MW-4 and MW-5. MW-5 is located on the north side of Green Bay Road, across the Right-Of-Way from the landfill property, approximately 35 m north of the landfill limit, and is used as the background monitoring well. Groundwater at MW-5 represents the background water chemistry at the site and is not influenced by landfill leachate. Groundwater quality at this location was previously discussed in detail in Section 4.3.1 of this report.

MW-4 is located in close proximity to the landfill footprint and is approximately 5 metres beyond the northwest limit of waste placement. Based on current and historical analytical data, the groundwater chemistry at MW-4 is similar to that of MW-5. During the sampling programs completed during the current monitoring period, there were no exceedances of the RUC at the near-source monitoring well (MW-4).

6.2 Downgradient Groundwater Quality (Onsite)

(MW-1A/B, MW-3A/B & MW-6A/B New)

MW-1A/B are screened beneath the waste footprint and MW-3A/B and MW-6A/B are located approximately 35 m and 45 m, respectively, downgradient of the waste footprint. Based on the locations of these wells, it is anticipated that leachate impacted groundwater would be evident at these locations.

MW-1A/B

During the 2020 to 2022 sampling interval, MW-1A (shallow) could not be sampled due to insufficient water at the time of the monitoring events. It should be noted that groundwater samples have only been collected at MW-1A twice (i.e., in 2014 and 2018) since 2007 due to insufficient water. The available groundwater quality results indicate that the concentrations of chloride, sulphate, TDS, nitrate, and hardness were consistently elevated in comparison to background conditions. A review of leachate indicator parameters indicates that alkalinity, chloride, and conductivity values have decreased from 1988 to 1997 and generally stabilized thereafter. The samples collected during previous monitoring events indicated periodic elevated concentrations of hardness and conductivity in MW-1A. Since this well was not sampled between 2007 and 2014 and consistently low volumes of water have historically been observed in the well, it is expected that the water in this well is stagnant and not representative of true groundwater conditions. Attempts will be made to collect representative groundwater samples from this well during future monitoring events to determine if the elevated concentrations display a notable trend for these parameters.

The groundwater chemistry for MW-1B (deep) follows a similar pattern to MW-1A, although concentrations of the various indicator parameters are typically lower and less variable than historical values from MW-1A. In general, groundwater quality displays minor influence from landfill leachate. Lower concentrations and less variability of indicator parameters may be the result of the depth of the well, being located within the relatively low permeability soils of the deeper unit. During the 2020 to 2022 monitoring interval, the analytical findings indicate RUC exceedances of manganese in the June 2020 sample and hardness in the May 2022 sample, which is also elevated in the background groundwater quality. Generally, the reported parameter concentrations for the current and historical period are consistent with background conditions and the concentrations display very stable long-term trends since the early 1990s.

MW-3A/B

Wells MW-3A/B are located approximately 35 m downgradient from MW-1A/B. MW-3A is screened in the upper overburden unit, which consists of fine to coarse grained sand. MW-3B has a longer screened interval (which overlaps with MW-3A) and is screened in the lower permeability deeper overburden units, which consist of sand and sandy silt with some clay. Historically, the highest concentrations of leachate indicator parameters for the site have been reported at MW-3A, which is to be expected based on its location. Concentrations of alkalinity, conductivity, chloride, sodium, nitrate, potassium, sulphate, and TDS are historically elevated in MW-3A compared to the background monitoring well. However, it is noted that the analytical data indicates a stable to decreasing trend since 2006/2007. Additionally, the chloride concentrations have decreased from a high of 127 mg/L in 1990 to <10mg/L in the May 2014 sample and each succeeding sample since. During the current monitoring period, RUC exceedances included alkalinity, hardness, sulphate, and TDS. As previously reported, the period of leachate generation at the landfill site appears to have passed and the measured concentrations in the leachate characterization well remain consistently low and stable (i.e., approaching background conditions).

The groundwater quality in MW-3B appears to be only slightly influenced by leachate. During the 2020 to 2022 sampling period, concentrations of chloride, conductivity, hardness, potassium, sulphate and TDS were noted to be marginally elevated relative to background groundwater quality with only slight RUC exceedances for alkalinity, hardness and TDS. Since 2008, it is noted that concentrations of leachate indicator parameters have remained relatively stable to decreasing at MW-3B.

MW-6A/B New

Wells MW-6A/B New are located approximately 30 m southwest of wells MW-3A/B. Unlike MW-3A/B, the groundwater chemistry between the shallow well (MW-6A) and the deep well (MW-6B) are relatively similar to one another. Based on the reported analytical results, groundwater at these wells appears to be slightly influenced by leachate with concentrations of alkalinity, chloride, conductivity, hardness, manganese, sodium, sulphate, and TDS being slightly elevated relative to background conditions. During the 2020 to 2022 sampling interval, exceedances of the RUC included alkalinity, hardness, manganese, and TDS.

A review of ongoing concentrations indicates that concentrations of certain parameters such as hardness, alkalinity, conductivity, sulphate, and TDS have been gradually increasing since sampling began at this location but have displayed notably stable trends since about 2014. Other parameters such as chloride, sodium, potassium, and DOC have been relatively stable or have a notable decreasing trend over the same period. Typically, it would be expected that these parameters would exhibit similar trends in groundwater influenced by leachate from a municipal landfill. However, this variation may be related to a change in redox potential and concentration of the leachate at that location.

Overall, at this point, the leachate influence being exhibited at MW-6A/B New is considered to be relatively minor. However, it is recommended that concentrations of carbonate related parameters such as hardness (calcium and magnesium) and alkalinity continue to be reviewed in comparison to typical municipal waste derived leachate parameters such as ammonia, nitrate, chloride, and DOC.

6.3 Southwest Boundary Groundwater Quality (MW-2 & MW-6A/B Old)

Wells MW-6A/B Old are located onsite within 15 m of the south property boundary and MW-2 is located offsite approximately 10 m south of the southern property boundary. These wells are considered to be hydraulically cross-gradient of the buried waste and are representative of the groundwater quality in proximity to the southwest property boundary.

MW-6A/B Old

Groundwater quality results indicate that groundwater quality at wells MW-6A Old and MW-6B Old are generally representative of background water quality. Since the inception of the monitoring program, leachate indicator parameters have remained relatively stable at MW-6B Old and MW-6A Old. During the current reporting period, RUC exceedances of boron were reported at MW-6B Old, while an anomalous spike in alkalinity was reported in the MW-6A Old June 2020 sample.

A review of historical concentrations at MW-6B Old indicates consistently elevated concentrations of boron similar to that of the current monitoring period. Due to the absence of other elevated leachate indicator parameters, the elevated concentrations of boron noted at MW-6B Old are not attributed to landfill leachate. Based on the borehole logs, it is probable that the elevated boron levels are naturally occurring and are derived from the native clayey soils and shale at this location.

MW-2

MW-2 monitors compliance for the south property boundary. Groundwater quality at this location is similar to the background well. For the current reporting period, no RUC exceedances were reported. A review of the historical analytical data at MW-2 indicates that the leachate indicator parameters have historically been, and continue to be, stable at this location. The long-term analytical trends for MW-2 continue to indicate that there have been no leachate impacts and very stable trends since the inception of sampling in the 1990s.

6.4 Downgradient Groundwater Quality (Offsite)

(MW-7A/B Old & New)

These wells monitor the downgradient groundwater quality beyond the southeast property boundary. MW-7A/B Old are located approximately 60 m beyond the southeast property boundary and MW-7A/B New are located approximately 65 m further downgradient. These wells are located at the base of the ridge/slope in a relatively flat agricultural field which extends southerly to the Pike Lake shoreline. These wells are the only wells screened below the 205 masl elevation and are screened in the deeper silt till unit that underlies the clay plain at the base of the overburden ridge.

MW-7A/B Old

MW-7A Old is screened within the coarser shallow overburden soils. Groundwater at this location appears to be exhibiting minor influence from leachate. Relative to background conditions, the concentrations of chloride, conductivity, hardness, sodium, sulphate, and TDS are slightly elevated. During the 2020 to 2022 sampling interval, exceedances of the RUC were reported for alkalinity, hardness, and TDS. A review of historical results indicates that the concentration of leachate indicator parameters have been relatively stable overall with minor seasonal fluctuations, and a notable decreasing trend for chloride since the mid 1990s.

MW-7B Old is screened in the lower permeability clay and shale bedrock at an elevation of approximately 200 masl. It is reasonable to expect that potential leachate impacts would be less likely at this location due to the preferential flow of groundwater in the shallower and relatively coarser overburden unit. However, concentrations of chloride, sodium, manganese and TDS are typically elevated at this location relative to background conditions and chloride concentrations have historically been the highest at this location relative to all the other monitoring wells at the site. However, during the 2020 to 2022 sampling interval, the concentration of chloride was observed to be lower than average and with no RUC exceedances from the current monitoring period.

A RUC exceedance of sulphate was reported during the 2014 sampling event. This concentration was higher than any historically reported value and was only observed in 2014. Samples collected between 2015 and 2022 are reported to be generally consistent with historical concentrations and are below the RUC. The source of this anomalous sulphate concentration is unknown at this time and continued monitoring of leachate indicator parameters at this location will continue to evaluate the long-term trend.

A detailed review of the geochemistry suggests that the elevated indicator parameters observed at MW-7B Old are attributed to the naturally poor groundwater within the shale unit. Key leachate indicator parameters such as alkalinity, DOC and nitrate at MW-7B Old are historically similar to that of the background well and are significantly lower than those reported at the leachate characterization well (MW-3A).

The well construction details also indicate that the primary influence on the groundwater chemistry would be from the shale unit due to the aquitard located just above the screened interval, as shown in the borehole log (Appendix "C"). It is also noted that the elevated chloride concentrations at this well are coincident with elevated water levels. The inverse of this is true for the shallower screened well MW-7A Old (which was installed in the same location) and the leachate well MW-3A. This would suggest that the groundwater in MW-7B Old is primarily influenced by groundwater from the deeper shale unit, which appears to be hydraulically separated from the shallow groundwater. The water levels measured from MW-7A Old and MW-7B Old show a hydraulic separation between the two wells, which also supports the discontinuity between the groundwater flow regimes and the difference in geochemical response to higher water levels.

In summary, the elevated leachate indicator parameters in the groundwater at MW-7B Old are attributed to the naturally poor groundwater quality of the shale unit where the well is screened. The data from MW-7B Old indicates that the groundwater in the upper shale unit has naturally elevated concentrations of chloride, sodium, sulphate, and TDS.

MW-7A/B New

MW-7A/B New are screened within the silt till and within the interval of approximately 200 to 206 masl. These wells are similar with respect to their groundwater chemistry. A review of the groundwater chemistry at MW-7A/B New indicates that leachate indicator parameters such as alkalinity, nitrate, and potassium are similar to background conditions while concentrations of conductivity, sodium, sulphate, and TDS are slightly elevated. Exceedances of the RUC in the 2020 to 2022 sampling interval include hardness, sulphate and TDS at MW-7A/B New as well as alkalinity at MW-7A New. It appears that the exceedances noted and the slightly elevated parameters listed above are likely attributable to the poor water quality associated with the lower silt till plain and the underlying shale. A review of the long-term analytical trends indicates that the concentrations of indicator parameters, particularly chloride, remain stable and are decreasing since about 2007.

6.5 Groundwater Quality Summary

Groundwater flow at the site is inferred to be in a southeasterly direction towards Pike Lake, which is approximately 375 m from the site boundary. Leachate impacted groundwater from the landfill footprint is expected to flow predominantly in the upper overburden units, which consists of relatively permeable soils consisting of sand and gravel or sand and silt according to the borehole logs. Underlying the coarser upper overburden units appears to be an aquitard of low permeable clay and silt underlain by shale bedrock.

The background water chemistry in the overburden of the ridge/slope, determined by water quality results from monitoring well MW-5, can be described as being highly mineralized with naturally elevated concentrations of hardness and TDS. Based on an assessment of the historical monitoring results from the leachate indicator wells (MW-1A/B and MW-3A/B) and comparison to background monitoring well MW-5, the most significant leachate indicator parameters are DOC, alkalinity, hardness, nitrate, potassium, and sulphate. Chloride is considered to provide a good indicator in the upper overburden within the landfill site but is not reliable in the underlying silt till plain and shale bedrock, where groundwater quality appears to be naturally elevated with chloride, sulphate and TDS.

An ongoing trend analysis and review of the leachate indicator monitoring well results indicates that the leachate production at the landfill is generally stable to decreasing. This is consistent with the nature of the relatively limited historical use of the landfill site (low fill rate) and its closure and capping in 2002.

A review of the groundwater quality at MW-6A/B, located approximately 45 m downgradient of the landfill, indicates that concentrations of certain parameters such as hardness, alkalinity, conductivity, sulphate and TDS were increasing up to about 2013/2014 and have displayed a notably stable trend since that time. Other parameters such as chloride, sodium, potassium, and DOC have been relatively stable or are decreasing over the same period. This inverse relationship may be related to a transition from reducing to oxidizing conditions. Overall, at this point, the leachate influence being exhibited at MW-6A/B New is considered to be relatively minor. However, it is recommended that concentrations of carbonate related parameters such as hardness (calcium and magnesium) and alkalinity continue to be reviewed in comparison to typical municipal waste derived leachate parameters such as ammonia, nitrate, chloride and DOC.

Downgradient of the landfill site, compliance with the RUC is monitored at MW-7A/B Old and MW-7A/B New. These monitoring wells are situated in the silt till plain overlying shale bedrock at the base of the coarser overburden ridge/slope where the landfill site is located. At these locations, hardness and TDS concentrations are consistently above the RUC and are likely a result of the natural dissolution of minerals from the soil and underlying bedrock.

At MW-7A Old, which is located 65 m downgradient of the landfill and is the closest well to the landfill footprint of the MW-7 series of wells, minor influence of landfill leachate is suspected due to the elevated concentrations of alkalinity, nitrate and sulphate relative to background conditions. At the same location, MW-7B Old, is screened in the deeper overburden unit and in contact with the shale bedrock. Groundwater quality at this location exhibits elevated concentrations of chloride, which are suspected to be attributed to the natural water quality associated with the shales.

Further downgradient at MW-7A/B New, which are located approximately 125 m beyond the southeast property boundary, the groundwater exceeds the RUC for alkalinity, hardness, TDS, manganese, and sulphate. However, these exceedances are attributed to the natural water quality in the silt till (as opposed to landfill leachate), as concentrations of other key leachate indicator parameters such as alkalinity, DOC and nitrate are similar to background conditions.

6.6 Surface Water Quality

Surface water monitoring at the site consists of monitoring from two locations (SW-1 and SW-2). SW-1 is located in the SWM pond, which is situated at the end of the access road and at the base of the landfill. SW-2 is located in a densely vegetated, swale type feature at the southern property boundary, downgradient from the SWM pond. The surface water quality results for 2020 to 2022 are summarized in Table 3 and the historical results and graphical trends of leachate indicator parameters for surface water are included in Appendix "E".

During the current reporting period, no samples were collected from SW-1 and SW-2, as the sampling locations were notably dry. It should be noted that a sample has commonly been unobtainable from SW-2 due to an absence of surface water at this location since the inclusion of this sampling location in the surface water sampling program.

It should be noted that when present, surface water quality data from SW-1 is representative of stagnant surface water specific to the engineered SWM pond, as there was no surface water inflow or discharge at the time of sampling. The site is currently closed, capped, and sufficiently seeded with vegetation and there is no exposed refuse. Therefore, the surface water entering the SWM pond is not suspected to have come into contact with the refuse or leachate and is considered to be representative of localized stagnant water quality in the SWM pond only. As a result, it is anticipated that meteorological conditions such as periods of high evaporation or high precipitation will have a greater influence on the quality of the water in the SWM pond.

The most recently completed sample from SW-2 was in 2019, after which this sampling location has been dry since its inclusion in the monitoring program in 2006, and therefore, the presence of water in 2019 is expected to have been an exception due to high levels of precipitation around the time of sampling.

6.7 Quality Assurance & Quality Control (QA/QC)

As part of the QA/QC program, surrogate recoveries, method blanks and laboratory duplicates were reviewed to ensure analytical validity. The results for surrogate recoveries and method blanks were all reported to be within the acceptable limits as presented in the laboratory reports.

For laboratory duplicates, the relative percent differences (RPDs) were calculated for the 2020, 2021 and 2022 sampling programs, which are presented in Table 4. A review of the duplicate analyses indicates that the RPDs were within the laboratory quality control limits which are indicative of good laboratory practices and analytical validity.

In addition, a review of the historical analytical data indicates that the 2020 to 2022 analytical results are generally within historical norms or are consistent with historical trends. In summary, the QA/QC protocols indicate that the analytical results are valid.

7. REVIEW OF MONITORING PROGRAM

As noted in Section 4.1.1, the groundwater sampling program at the site was revised based on recommendations from the 2008 and 2009 Annual Monitoring Reports and MOE approval. The revised program was implemented in 2010 which included sampling in the spring only and a reduction of the sampling parameters. Revisions to the surface water sampling parameters were also proposed in the 2008, 2009, 2010, and 2011 Annual Monitoring Reports, but at the time of this report no comment had been received from the Surface Water Technical Support Section of the MECP. The proposed surface water sampling parameters are provided below:

Surface Water

Metals: barium, boron, calcium, iron, manganese, magnesium, and sodium.

Non-metals: alkalinity, ammonia (un-ionized), chloride, conductivity, dissolved organic carbon, hardness, nitrate, nitrite, pH, orthophosphate, sulphate, total dissolved solids, and temperature (field).

As previously reported, only one sample (i.e., in 2019) has been collected at the location of SW-2 due to absence of sufficient water since the inclusion of SW-2 in the established monitoring program. Although surface water may collect at this location temporarily during storm events or spring melts, it appears that the storm water is contained within the highly localized swale feature and infiltrates through the overburden and into the groundwater system. Shallow groundwater quality downgradient of this location is monitored at two locations (MW-7A Old and MW-7A New). Therefore, pending acceptance by the MECP, the discontinuation of the surface water sampling program at the location of SW-2 is recommended.

Additionally, the inclusion of the analysis of orthophosphate in the surface water sampling program is not compatible with the total phosphorus concentrations that are required for comparison to the PWQO in order to determine the applicable RUC criteria for the site. In the interest of consistency and the relevance of the analytical data, it is recommended that the analysis of orthophosphate be changed to a total phosphorus analysis for the surface water sampling program.

For reporting purposes of the monitoring data, the monitoring reports for the site will be submitted every three years as per email correspondence dated December 4, 2013 from the MOECC (enclosed in Appendix "B"). Therefore, the next monitoring report covering the monitoring years 2023 through 2025 is scheduled for submission in 2026 prior to February 28th.

8. CONCLUSIONS

1. Based on the topography of the site and groundwater elevations, groundwater flow at the site is interpreted to be from the northwest to the southeast towards Pike Lake.

2. Landfill leachate impacts are most evident directly downgradient of the landfill in the upper overburden.

3. Groundwater quality data from monitoring well MW-5 indicates that the background groundwater in the upper overburden is naturally highly mineralized, with levels of TDS frequently exceeding the ODWS and hardness consistently exceeding the ODWS.

4. Based on a comparison of the monitoring results from wells MW-1A and MW-3A to the background wells, the most significant leachate indicator parameters appear to be alkalinity, nitrate, DOC, conductivity, hardness, potassium, sulphate, and TDS.

5. The historical groundwater monitoring results from the leachate indicator wells indicate that leachate production at the landfill appears to be generally stable to slightly decreasing. This is consistent with the nature of the relatively limited historical use of the landfill site and its closure and capping in 2002.

6. The groundwater quality associated with the silt till plain and underlying shale bedrock where MW-7A/B New and MW-7A/B Old are located, has elevated concentrations of chloride, hardness, sodium, and TDS, which appear to be naturally occurring.

7. Groundwater quality at monitoring well MW-2, located crossgradient and to the southwest of the property boundary are representative of background conditions and show negligible impacts from landfill leachate.

8. Groundwater at MW-6A/B New located approximately 35 m downgradient of the landfill appears to be slightly influenced by landfill leachate. A review of leachate indicator trends indicates that concentrations of certain parameters such as hardness, alkalinity, conductivity, sulphate and TDS were increasing up to about 2013/2014 and have displayed a notably stable trend since that time. Other parameters such as chloride, sodium, potassium, and DOC have been stable or are decreasing over the sample period. It is suspected that this may be due to a change in redox potential.

9. Minor influence of landfill leachate is suspected at MW-7A Old due to the elevated concentrations of alkalinity, nitrate and sulphate relative to background conditions. During the current monitoring period, exceedances of the RUC included alkalinity, hardness, manganese and TDS. Historical leachate indicator parameter concentrations indicate a relatively stable trend with minor variations that correlate to water level elevations.

10. MW-7B Old is screened in the deeper overburden unit next to MW-7A Old and is in contact with the shale bedrock. Based on a detailed review of the geochemistry, the elevated indicator parameters observed at MW-7B Old appear to be attributed to the naturally poor groundwater associated with the shale unit. Key leachate indicator parameters such as alkalinity, DOC and nitrate at MW-7B Old are historically similar to that of the background well and are significantly lower than those reported at MW-3A. The groundwater chemistry at these wells exhibits some variability depending on the water level elevations.

11. Exceedances of the RUC at wells MW-7A/B New for the current monitoring period included hardness, manganese, sulphate, and TDS. Exceedances of these parameters are consistent with historical analytical data and are attributed to the natural water quality in the silt till (as opposed to landfill leachate). A review of historical analytical data indicates that the water quality at these locations is generally considered to be stable.

9. RECOMMENDATIONS

1. It is recommended that the groundwater monitoring program be continued once annually, in the spring, and continue to include the following parameters:

   a) barium, boron, calcium, iron, manganese, magnesium, sodium, alkalinity, ammonia, chloride, conductivity, dissolved organic carbon, hardness, nitrate, nitrite, pH, potassium, sulphate, and total dissolved solids.

2. It is recommended that surface water be sampled once annually, in the spring, in conjunction with the spring groundwater sampling and that the sampling parameters be revised to include the following upon MOECC concurrence:

   a) barium, boron, calcium, iron, manganese, magnesium, sodium, alkalinity, ammonia (un-ionized), chloride, conductivity, dissolved organic carbon, hardness, nitrate, nitrite, pH, total phosphorus, sulphate, total dissolved solids, and temperature (field).

3. Since only one sample has been obtainable at the location of SW-2 from the time it was added to the surface water sampling program, it is recommended that SW-2 be removed from the annual monitoring program.

4. As per MECP correspondence, the next submitted Monitoring Report will cover monitoring years 2023 through 2025 and is scheduled for submission in 2026 prior to February 28th.

All of which is respectfully submitted,

GM BLUEPLAN ENGINEERING LIMTED
Per:

Cuirin Cantwell, M.Eng., E.I.T.

A.W. Bringleson, B.E.S, C.E.T.

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Sheguiandah Water Treatment

Small Municipal Residential Drinking Water System

January 1, 2022 – December 31, 2022

O.Reg 170/03 Schedule 22 Summary Report
O.Reg 170/03 Section 11 Annual Report
&
O.Reg 387/04 Annual Record of Water Taking

Prepared by the Ontario Clean Water Agency
For The Corporation of the Town of Northeastern Manitoulin and the Islands

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Drinking-Water System Number: *220009112*
Drinking-Water System Name: *Sheguiandah Drinking Water System*
Drinking-Water System Owner: *The Corporation of the Town of Northeastern Manitoulin and the Islands*
Drinking-Water System Category: *Small Municipal Residential*

SECTION 1: INTRODUCTION

This document is prepared in accordance with Section 11 and Schedule 22 of O.Reg.170/03 under the Safe Drinking Water Act and with Section 9 of O.Reg.387/04 under the Ontario Water Resources Act. The reports are prepared by the Ontario Clean Water Agency. Acronyms and definitions can be found at the end of the report.

A copy of the Summary Report must be provided to the members of the municipal council by March 31, 2023.

SECTION 2: REQUIREMENTS OF THE REPORTS

Schedule 22 Report

The report must list the requirements of the Act, the regulations, the system's approval and any order that the system **failed to meet** at any time during the period covered by the report. It must also specify the duration of the failure, and for each failure referred to, describe the measures that were taken to correct the failure.
For the purpose of enabling the owner of the system to assess the rated capability of their system to meet existing and future planned water uses, the following information is required to be included in this report:

- A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows.
- A comparison of the summary to the rated capacity and flow rates approved in the systems approval.

Section 11 Report

The annual report must contain the following:

- A brief description of the drinking water system and a list of chemicals used by the system.
- A description of any major expenses incurred during the period covered by the report to install, repair or replace required equipment.
- A summary of all adverse water quality incidents (AWQI) reported to the Ministry
- A summary of corrective actions taken in response all AWQIs
- A summary of all test results required under the regulation, under an approval, municipal drinking water licence or order, including an OWRA order.
- A statement of where a Schedule 22 report will be available for inspection.

The report must be prepared not later than February 28 of the following year.

Regulation 387 Report

On or before March 31 in every year, every holder of a permit to take water (PTTW) shall submit to a Director the data collected and recorded for the previous year.

A record of annual water taking can be found in Appendix A.

SECTION 3: SCHEDULE 22 REPORT

Flows - Treated

In accordance with the Municipal Drinking Water License (MDWL), the Sheguiandah WTP shall not be operated to exceed a maximum flow of 546 m3/d to the distribution system.

The daily treated water maximum flow was 114.6 m3 and represents 21% of capacity. In 2022, the total volume of water sent to the distribution system was 19,825.4m3

The quantity of treated water supplied during the reporting period **did not** exceed the rated maximum capacity.

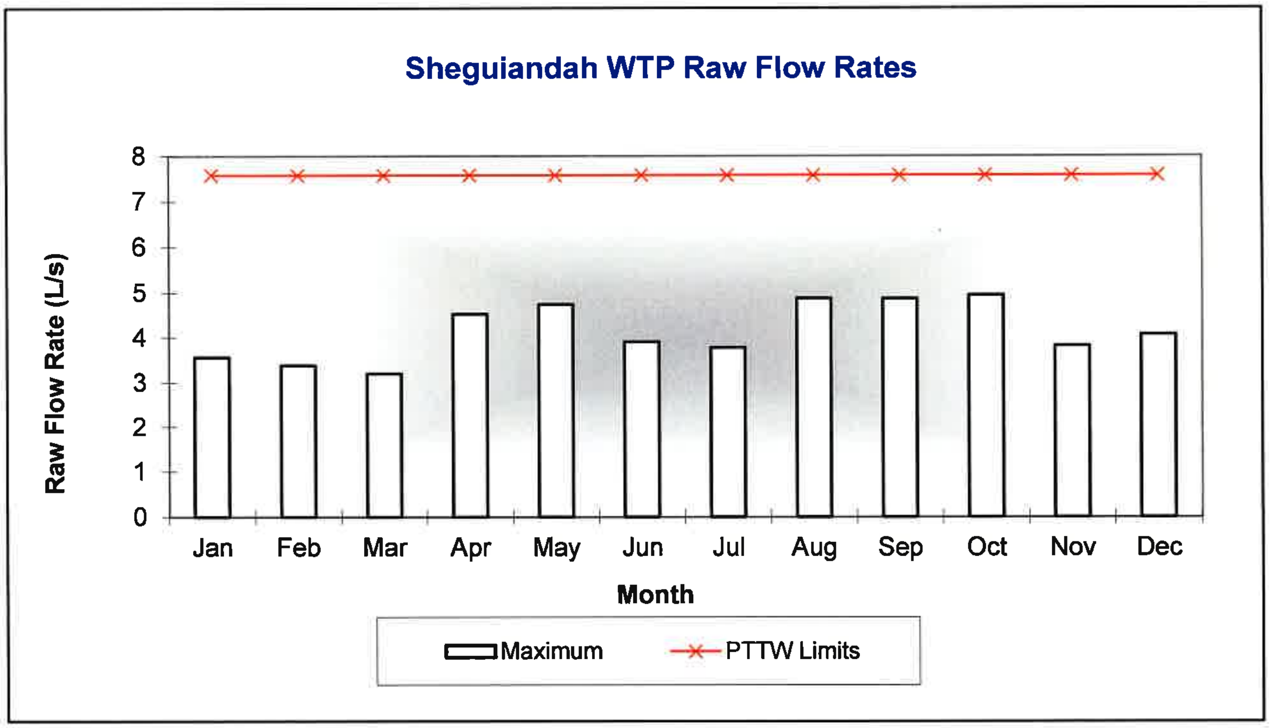
Flows – Raw

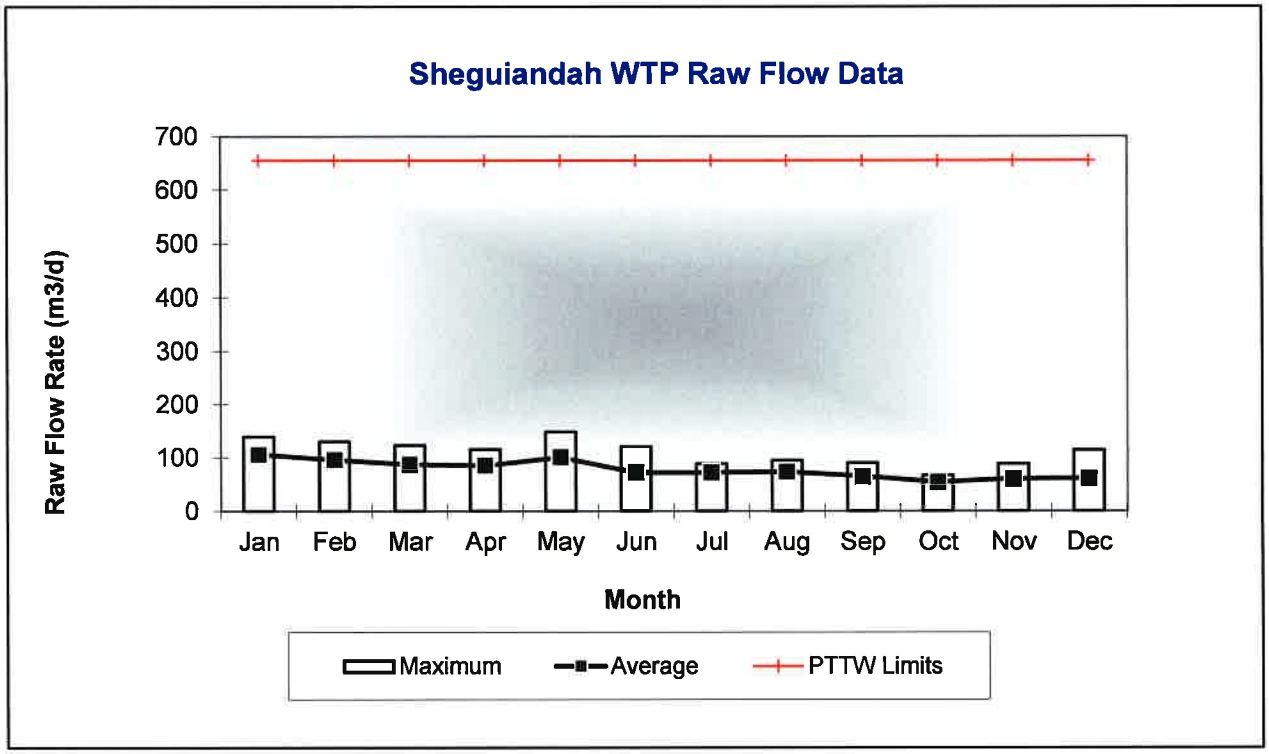
Daily raw maximum instantaneous flow is stated in the PTTW at a maximum rate of flow of 7.6 L/s and a maximum daily volume of 654.624 m^3/d.

The average monthly raw water flow for this reporting period was 77.37 m^3/d. The maximum daily flow was 148.3 m^3/d representing 23% of water taking limits. In 2022, the total volume of water sent to the distribution system was 28,239 m3

The quantity of raw water taken **did not** exceed limits stipulated within the PTTW.

	RAW WATER FLOW DATA - TOTAL ALL SOURCES					
Month	**Total Monthly Flow (m3)**	**Average Flow (m3/d)**	**Maximum Flow (m3/d)**	**Maximum Flow Rate (L/s)**	**Limits** L/s (PTTW)	**Limits** m^3/d (PTTW)
January	3,278.1	105.75	138.9	3.57	7.58	654.6
February	2,679.3	95.69	130.1	3.39	7.58	654.6
March	2,688.9	86.74	122.7	3.2	7.58	654.6
April	2,536.1	84.54	115.2	4.53	7.58	654.6
May	3,110.7	100.35	148.3	4.74	7.58	654.6
June	2,143.1	71.44	119.5	3.91	7.58	654.6
July	2,226.6	71.83	88.1	3.78	7.58	654.6
August	2,270.7	73.25	95.1	4.88	7.58	654.6
September	1,941	64.7	90.1	4.87	7.58	654.6
October	1,666.1	53.75	66.4	4.95	7.58	654.6
November	1,809.6	60.32	88	3.82	7.58	654.6
December	1,888.8	60.93	113.7	4.07	7.58	654.6
Total	28,239					
Average		77.37				
Maximum			148.3	4.95	7.58	654.6


Sheguiandah WTP Raw Flow Rates
Raw Flow Rate (L/s)
8
7
6
5
4
3
2
1
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
Maximum
PTTW Limits


Sheguiandah WTP Raw Flow Data
Raw Flow Rate (m3/d)
700
600
500
400
300
200
100
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Month
Maximum
Average
PTTW Limits

Annual Raw Water Review

Raw Water Taking	Total Taking m3/d	Average Day m3/d	Max Day m3/d	Max Day % of PTTW allowable 654.624 m3/d
2022	28,239	77.37	148.3	23%
2021	35,490.3	97.23	317.5	48.5%
2020	35,116.5	95.95	321.3	49%
2019	30,977	84.87	238.8	36.5%
2018	40,487.3	110.92	312.6	47.8%

System Failures and Corrective Actions

The latest inspection of the drinking water facility took place on October 6, 2022. The facility scored 0/557 providing a rating of 100%.

AWQIs reported to the Ministry

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
22-May-22	Online data analyzer	Loss	n/a	AWQI#158439 – A power failure occurred and generator did not start. The UPS battery backups for the facility maintained as long as they could but were eventually depleted causing data loss. A new battery was installed and the generator was tested.	22-May-22

SECTION 4: SECTION 11 REPORT

Information to be provided

Population Served	353
Does your Drinking-Water System serve more than 10,000 people?	No
Is your annual report available to the public at no charge on a web site on the Internet?	Yes
Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.	Town of Little Current, Municipal Office 14 Water St E Little Current, Ontario P0P 1K0
Number of Designated Facilities served:	0
Did you provide a copy of your annual report to all Designated Facilities you serve?	NA
Number of Interested Authorities you report to:	0

Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?	**NA**
List all Drinking-Water Systems (if any), and their DWS Number which receive all of their drinking water from your system:	**N/A**
Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?	**N/A**
Indicate how you notified system users that your annual report is available, and is free of charge.	**Public access/notice via the web & via Government Office**
Indicate if you notified system users that your annual report is available and is free of charge using an alternate method	**YES**

Facility Description

The Sheguiandah plant consists of a raw water pumping station equipped with a sodium hypochlorite injection system for the control of zebra mussels. The zebra mussel control system is operated seasonally from May to November inclusive when the raw temperature is above 8 Celsius. The building houses three low lift vertical turbine pumps.

The treatment consists of a direct filtration chemically assisted plant with a rated capacity of 6.3 L/s. There are two multimedia filters after the flocculator. Each filter contains anthracite, sand and gravel. There are two backwash pumps, to provide filter backwashing as required. The plant has two clearwells, with a capacity of 142 m3 and 176 m3, respectively. Following the clear well there is a high lift pump well with a volume of 119.7 m3. There are three vertical turbine high lift pumps, two located in clearwell two and one located in the high lift pump well. Each pump has a rated capacity of 9.9 L/s at a TDH of 86.75 m. Also included in the highlift well is a fire pump rated at 23L/sec which can be activated from the Sheguiandah Fire Hall. There are two hydro pneumatic tanks which provide system pressure when the high lift pumps are off.

Primary disinfection is achieved by ultraviolet disinfection and sodium hypochlorite. The process wastewater supernatant is returned back to Sheguiandah Bay. The settled solids are hauled from the plant for disposal in the municipal lagoon.

Chemicals Used

Sodium Hypochlorite 12%	- Disinfection
Aluminum Sulphate (Dry)	– Coagulant

Significant Expenses

Significant expenses incurred to

[ ] Install required equipment
[] Repair required equipment
[X] Replace required equipment

Work Order	Completion Date	Comment
2500677	31-Jul-22	*ESA Deficiency repairs – $2,667.84*
2722238	21-Sept-22	*Verification and recalibration of UV and reference sensors – $2,369.08*

Adverse Water Quality Incidents

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
22-May-22	Online data analyzer	Loss	n/a	AWQI#158439 – A power failure occurred and generator did not start. The UPS battery backups for the facility maintained as long as they could but were eventually depleted causing data loss. A new battery was installed and the generator was tested.	22-May-22

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03.

	No. of Samples Collected	Range of E.Coli		Range of Total Coliform Results		Number of HPC Samples	Range of HPC Results	
		Min #	Max #	Min #	Max #		Min #	Max #
Raw Water	0							
Treated Water	0	0	0	0	0	0		
Distribution	28	0	0	0	0	28	0	15

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03

	No. of Samples Collected	Range of Results		Units of Measure
		Minimum	Maximum	
Turbidity, On-Line - Filter 1	8760	0	0.47	(NTU)
Turbidity, On-Line - Filter 2	8760	0	0.52	(NTU)
Free Chlorine Residual, Treated	8760	0.72	3.06	(mg/L)
Free Chlorine Residual, Distribution Location 1	103	0.79	2.20	(mg/L)

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter and limits	Month Sampled	Day Sampled	Result	Unit of Measure
MDWL 197-101 Issue Date: February 25, 2021 Expiry Date: February 24, 2026	Backwash (BW) Total Suspended Solids (TSS) Quarterly sampling 25 mg/L annual average	Jan	10	2	mg/L
		Feb			mg/L
		Mar			mg/L
		Apr	5	3	mg/L
		May			mg/L
		Jun			mg/L
		Jul	11	3	mg/L
		Aug			mg/L

		Sep			mg/L
		Oct	3	3	mg/L
		Nov			mg/L
		Dec			mg/L
		Annual Average		**2.75**	**mg/L**

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	No. of Exceedances MAC	1/2 MAC
Antimony: Sb (ug/L) - TW	2020/01/13	0.14	6.0	No	No
Arsenic: As (ug/L) - TW	2020/01/13	<MDL 0.2	25.0	No	No
Barium: Ba (ug/L) - TW	2020/01/13	12.2	1000.0	No	No
Boron: B (ug/L) - TW	2020/01/13	12.0	5000.0	No	No
Cadmium: Cd (ug/L) - TW	2020/01/13	0.003	5.0	No	No
Chromium: Cr (ug/L) - TW	2020/01/13	0.19	50.0	No	No
Mercury: Hg (ug/L) - TW	2020/01/13	<MDL 0.01	1.0	No	No
Selenium: Se (ug/L) - TW	2020/01/13	0.08	10.0	No	No
Uranium: U (ug/L) - TW	2020/01/13	0.01	20.0	No	No

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	No. of Exceedances MAC	1/2 MAC
Fluoride (mg/L) - TW	2022/01/10	<MDL 0.06	1.5	No	No
Nitrite (mg/L) - TW	2022/01/10	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/04/05	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/07/11	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/10/03	<MDL 0.003	1.0	No	No
Nitrate (mg/L) - TW	2022/01/10	0.171	10.0	No	No
Nitrate (mg/L) - TW	2022/04/05	0.168	10.0	No	No
Nitrate (mg/L) - TW	2022/07/11	0.128	10.0	No	No
Nitrate (mg/L) - TW	2022/10/03	0.112	10.0	No	No
Sodium: Na (mg/L) - TW	2022/01/10	6.51	20*	No	No

*There is no "MAC" for Sodium. The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

Summary of Lead testing under Schedule 15.1 during this reporting period

Location Type	No.of Samples	Range of Results Minimum	Maximum	MAC (ug/L)	Number of Exceedances
Distribution - Lead Results (ug/L)	n/a			10	0
Distribution - Alkalinity (mg/L)	2	64	78	n/a	n/a
Distribution - pH In-House	2	7.95	8.15	n/a	n/a

Summary of Organic parameters sampled during this reporting period or the most recent results

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	Number of Exceedances	
				MAC	1/2 MAC
Alachlor (ug/L) - TW	2020/01/13	<MDL 0.02	5.0	No	No
Atrazine + N-dealkylated metabolites (ug/L) - TW	2020/01/13	<MDL 0.01	5.0	No	No
Azinphos-methyl (ug/L) - TW	2020/01/13	<MDL 0.05	20.0	No	No
Benzene (ug/L) - TW	2020/01/13	<MDL 0.32	1.0	No	No
Benzo(a)pyrene (ug/L) - TW	2020/01/13	<MDL 0.004	0.01	No	No
Bromoxynil (ug/L) - TW	2020/01/13	<MDL 0.33	5.0	No	No
Carbaryl (ug/L) - TW	2020/01/13	<MDL 0.05	90.0	No	No
Carbofuran (ug/L) - TW	2020/01/13	<MDL 0.01	90.0	No	No
Carbon Tetrachloride (ug/L) - TW	2020/01/13	<MDL 0.17	2.0	No	No
Chlorpyrifos (ug/L) - TW	2020/01/13	<MDL 0.02	90.0	No	No
Diazinon (ug/L) - TW	2020/01/13	<MDL 0.02	20.0	No	No
Dicamba (ug/L) - TW	2020/01/13	<MDL 0.2	120.0	No	No
1,2-Dichlorobenzene (ug/L) - TW	2020/01/13	<MDL 0.41	200.0	No	No
1,4-Dichlorobenzene (ug/L) - TW	2020/01/13	<MDL 0.36	5.0	No	No
1,2-Dichloroethane (ug/L) - TW	2020/01/13	<MDL 0.35	5.0	No	No
1,1-Dichloroethylene (ug/L) - TW	2020/01/13	<MDL 0.33	14.0	No	No
Dichloromethane (Methylene Chloride) (ug/L) - TW	2020/01/13	<MDL 0.35	50.0	No	No
2,4-Dichlorophenol (ug/L) - TW	2020/01/13	<MDL 0.15	900.0	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D) (ug/L) - TW	2020/01/13	<MDL 0.19	100.0	No	No
Diclofop-methyl (ug/L) - TW	2020/01/13	<MDL 0.4	9.0	No	No
Dimethoate (ug/L) - TW	2020/01/13	<MDL 0.06	20.0	No	No
Diquat (ug/L) - TW	2020/01/13	<MDL 1.0	70.0	No	No
Diuron (ug/L) - TW	2020/01/13	<MDL 0.03	150.0	No	No
Glyphosate (ug/L) - TW	2020/01/13	<MDL 1.0	280.0	No	No
Malathion (ug/L) - TW	2020/01/13	<MDL 0.02	190.0	No	No
Metolachlor (ug/L) - TW	2020/01/13	<MDL 0.01	50.0	No	No
Metribuzin (ug/L) - TW	2020/01/13	<MDL 0.02	80.0	No	No
Monochlorobenzene (Chlorobenzene) (ug/L) - TW	2020/01/13	<MDL 0.3	80.0	No	No
Paraquat (ug/L) - TW	2020/01/13	<MDL 1.0	10.0	No	No
PCB (ug/L) - TW	2020/01/13	<MDL 0.04	3.0	No	No
Pentachlorophenol (ug/L) - TW	2020/01/13	<MDL 0.15	60.0	No	No
Phorate (ug/L) - TW	2020/01/13	<MDL 0.01	2.0	No	No
Picloram (ug/L) - TW	2020/01/13	<MDL 1.0	190.0	No	No
Prometryne (ug/L) - TW	2020/01/13	<MDL 0.03	1.0	No	No
Simazine (ug/L) - TW	2020/01/13	<MDL 0.01	10.0	N/A	N/A
Terbufos (ug/L) - TW	2020/01/13	<MDL 0.01	1.0	No	No
Tetrachloroethylene (ug/L) - TW	2020/01/13	<MDL 0.35	10.0	No	No
2,3,4,6-Tetrachlorophenol (ug/L) - TW	2020/01/13	<MDL 0.2	100.0	No	No
Triallate (ug/L) - TW	2020/01/13	<MDL 0.01	230.0	No	No
Trichloroethylene (ug/L) - TW	2020/01/13	<MDL 0.44	5.0	No	No

2,4,6-Trichlorophenol (ug/L) - TW	2020/01/13	<MDL 0.25	5.0	No	No
2-methyl-4-chlorophenoxyacetic acid (MCPA) (ug/L) - TW	2020/01/13	<MDL 0.12	100.0	No	No
Trifluralin (ug/L) - TW	2020/01/13	<MDL 0.02	45.0	No	No
Vinyl Chloride (ug/L) - TW	2020/01/13	<MDL 0.17	1.0	No	No
DISTRIBUTION WATER					
Trihalomethane: Total (ug/L) Annual Average - DW	2022/12/31	30.75	100.00	No	No
HAA Total (ug/L) Annual Average – DW	2022/12/31	17.1	80.0	No	No

SECTION 5:RAW WATER SUBMISSIONS

Raw water flows were submitted to the MECP on February 27, 2023.

Ontario

Location: WTRS / WT DATA / Input WT Record　　WTRS-WT-006

Water Taking Data submitted successfully.

Confirmation:

Thank you for submitting your water taking data online.

Permit Number: 0233-AJ8PD5
Permit Holder: THE CORPORATION OF THE TOWN OF NORTHEASTERN MANITOULIN AND THE ISLANDS.
Received on:Feb 27, 2023 3:23 PM

This confirmation indicates that your data has been received by the Ministry,but should not be construed as acceptance of this data if it differs from that specified on the Permit Number, assigned to the Permit Holder stated above.

Return to Main Page

TOWNSHIP OF HOWLAND | 2023/02/27
version: v4.5.0.21 (build#: 22)
Last modified: 2018/09/18

Ontario This site maintained by the Government of Ontario

SECTION 6: CONCLUSION

The Sheguiandah WTP delivers water that, in all its treated and distribution samples, indicates the water to be free of bacteriological contamination.

Based on information available for the 2022 operating year, the Sheguiandah WTP was able to meet the demand of water use without exceeding the PTTW or the MDWL.

List of Acronyms and Definitions

Alkalinity	The capacity of water for neutralizing an acid solution
AWQI	Adverse Water Quality Incident- when a water sample test result exceeds the Ontario Drinking Water Quality Standards
Backwash	Water pumped backwards to clean filters
BWA	Boil Water Advisory; Issued when risk of contamination is possible in drinking water
CFU	Colony Forming Units
Chlorine Residual	A low level of chlorine remaining in water after disinfection occurs
DW	Distribution Water
DWA	Drinking Water Advisory; Issued when water cannot be consumed by any means
DWWP	Drinking Water Works Permit - provides a description of the overall system
E.Coli	Bacteria used as indicators to measure the degree of pollution and sanitary quality of water
GUDI 170/03	Groundwater Under Direct Influence – Considered to be surface water under O.Reg
HPC	Heterotrophic Plant Count
L/s	Litres per Second
m3/d	Cubic Metres per Day
MAC	Maximum Acceptable Concentration
MDL	Minimum Detection Level
MDWL requirements	Municipal Drinking Water Licence - relates to the operation and performance
mg/L	Miligrams per Litre
Ministry	Ministry of the Environment and Climate Change
MOECC	Ministry of the Environment and Climate Change
O.Reg	Ontario Regulation
PTTW water	Permit to Take Water – Permit which allows water taking from groundwater or surface
RW	Raw Water
TC	Total Coliforms
TSS	Total Suspended Solids
Turbidity	Cloudiness or haziness of water
TW	Treated Water

Little Current Water Treatment

Large Municipal Residential Drinking Water System

January 1, 2022 – December 31, 2022

O.Reg 170/03 Schedule 22 Summary Report
O.Reg 170/03 Section 11 Annual Report
&
O.Reg 387/04 Annual Record of Water Taking

Prepared by the Ontario Clean Water Agency
For The Corporation of the Town of Northeastern Manitoulin and the Islands

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Drinking-Water System Number: *220002191*
Drinking-Water System Name: *LITTLE CURRENT DRINKING WATER SYSTEM*
Drinking-Water System Owner: *The Corporation of the Town of Northeastern Manitoulin and the Islands*
Drinking-Water System Category: *Large Municipal Residential*

SECTION 1: INTRODUCTION

This document is prepared in accordance with Section 11 and Schedule 22 of O.Reg.170/03 under the Safe Drinking Water Act and with Section 9 of O.Reg.387/04 under the Ontario Water Resources Act. The reports are prepared by the Ontario Clean Water Agency. Acronyms and definitions can be found at the end of the report.

A copy of the Summary Report must be provided to the members of the municipal council by March 31, 2023.

SECTION 2: REQUIREMENTS OF THE REPORTS

Schedule 22 Report

The report must list the requirements of the Act, the regulations, the system's approval and any order that the system **failed to meet** at any time during the period covered by the report. It must also specify the duration of the failure, and for each failure referred to, describe the measures that were taken to correct the failure.
For the purpose of enabling the owner of the system to assess the rated capability of their system to meet existing and future planned water uses, the following information is required to be included in this report:

- A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows.
- A comparison of the summary to the rated capacity and flow rates approved in the systems approval.

Section 11 Report

The annual report must contain the following:

- A brief description of the drinking water system and a list of chemicals used by the system.
- A description of any major expenses incurred during the period covered by the report to install, repair or replace required equipment.
- A summary of all adverse water quality incidents (AWQI) reported to the Ministry
- A summary of corrective actions taken in response all AWQIs
- A summary of all test results required under the regulation, under an approval, municipal drinking water licence or order, including an OWRA order.
- A statement of where a Schedule 22 report will be available for inspection.

The report must be prepared not later than February 28 of the following year.

Regulation 387 Report

On or before March 31 in every year, every holder of a permit to take water (PTTW) shall submit to a Director the data collected and recorded for the previous year.

A record of annual water taking can be found in Appendix A.

SECTION 3: SCHEDULE 22 REPORT

Flows - Treated

In accordance with the Municipal Drinking Water License (MDWL), the Little Current WTP shall not be operated to exceed a maximum daily volume of 3100 m3/d to the distribution system.

The daily treated water maximum flow was 1,963.6 m3 in December and represents 63% of capacity. In 2022, the total volume of water sent to the distribution system was 368,591.4 m3

The quantity of treated water supplied during the reporting period **did not** exceed the rated maximum capacity.

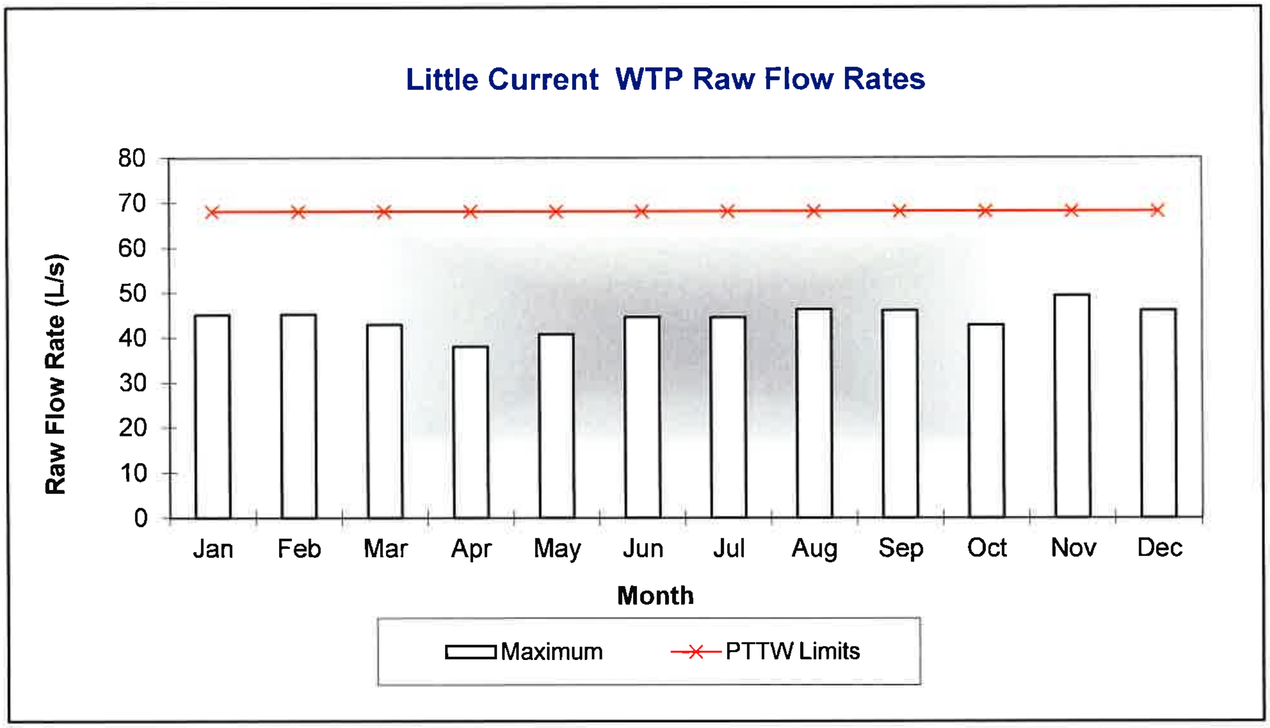
Flows - Raw

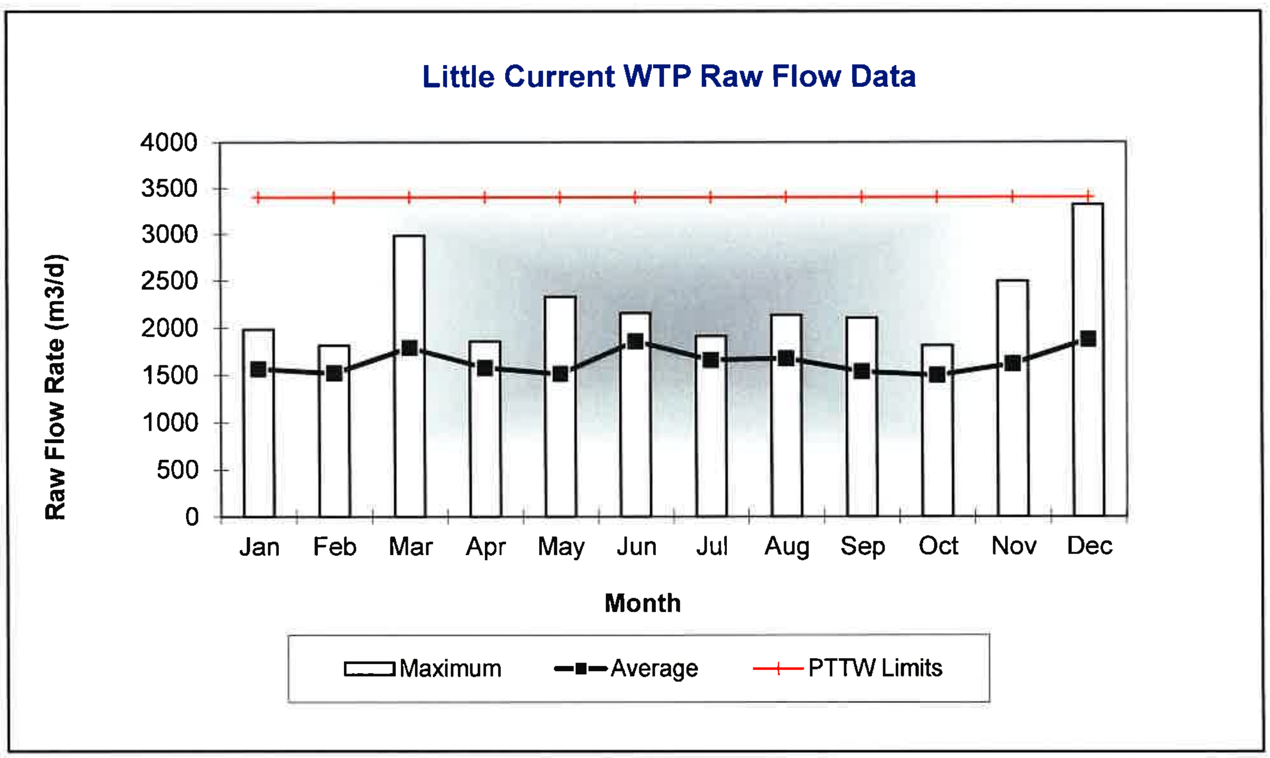
Daily raw maximum instantaneous flow is stated in the PTTW at a maximum rate of flow of 68.1 L/s and a maximum daily volume of 3400 m^3/d.

The average monthly raw water flow for this reporting period was 1,639.5m3/d. The maximum daily flow was 3,318 m^3/d representing 97.5% of water taking limits. In 2022, the total volume of water taken from the environment was 598,408.6 m3

The quantity of raw water taken **did not** exceed the limits stipulated within the PTTW.

	RAW WATER FLOW DATA - TOTAL ALL SOURCES					
Month	**Total Monthly Flow (m3)**	**Average Flow (m3/d)**	**Maximum Flow (m3/d)**	**Maximum Flow Rate (L/s)**	**Limits** L/s (PTTW)	m^3/d (PTTW)
January	48,407.8	1,561.54	1,981.5	45.06	68.1	3400
February	42,481.1	1,517.18	1,811.8	45.18	68.1	3400
March	55,369.4	1,786.11	2,982.9	42.93	68.1	3400
April	47,242.8	1,574.76	1,854.6	37.98	68.1	3400
May	46,820.8	1,510.35	2,329.7	40.79	68.1	3400
June	55,664.5	1,855.48	2,156.4	44.55	68.1	3400
July	51,367	1,657	1,910.6	44.47	68.1	3400
August	51,900.9	1,674.22	2,135.4	46.25	68.1	3400
September	46,049.2	1,534.97	2,106.4	46.07	68.1	3400
October	46,411.1	1,497.13	1,810.4	42.76	68.1	3400
November	48,561.4	1,618.71	2,499.1	49.33	68.1	3400
December	58,132.6	1,875.25	3,318	46	68.1	3400
Total	598,408.6					
Average		1,639.5				
Maximum			3,318	49.33	68.1	3400


Little Current WTP Raw Flow Rates
80
70
60
50
40
30
20
10
0
Raw Flow Rate (L/s)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Maximum
PTTW Limits


Little Current WTP Raw Flow Data
4000
3500
3000
2500
2000
1500
1000
500
0
Raw Flow Rate (m3/d)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Maximum
Average
PTTW Limits

Annual Raw Water Review

Raw Water Taking	Total Taking m3/d	Average Day m3/d	Max Day m3/d	Max Day % of PTTW allowable 3400 m3/d
2022	598,408.6	1,639.48	3,318	97.5%
2021	602,309.2	1,650.16	3,585.7	105%
2020	489,750.1	1,338.12	3,242.8	95%
2019	650,562.5	1,782.36	3,118.2	91.7%
2018	805,980.2	2,208.16	4,032.1	118.6 %
2017	754,481	2,067.07	4,551.5	133.9 %

System Failures and Corrective Actions

The latest inspection of the drinking water facility took place on January 23, 2023: the inspector is in the process of completing the inspection and preparing the report. Another inspection took place on February 15, 2022. The facility scored 30/514 providing a rating of 94.16%.

The following non-compliances were identified in the inspection report:

1. Is the owner in compliance with the conditions associated with maximum flow rate or the rated capacity conditions in the MDWL issued under Part V of the SDWA?

The owner was not in compliance with the conditions associated with maximum flow rate or the rated capacity conditions in the Municipal Drinking Water Licence issued under Part V of the SDWA.

The Municipal Drinking Water Licence (MDWL) for this plant identifies the rated capacity as 3,100 cubic meters per day of treated water from the treatment subsystem into the distribution system. A review of the treated water flow data confirmed that the rated capacity was maintained below the identified limit throughout the inspection period.

The Permit to Take Water (PTTW #4270-BALKYE), which forms part of the MDWL, allows for a maximum instantaneous flow rate of 4,086 litres per minute and a maximum daily water taking rate of 3,400,000 litres per day. Confirmed exceedances were noted on the following days:

- July 25, 2021
- July 26, 2021

Both exceedances were due to a failure of the permeate pumps which resulted in a plant shut down with water levels in the clearwell sinking to 4%. Once the issue was corrected and the plant was able to produce water again, an excess amount of water was required to fill the clearwell while still supplying water to the distribution. Due to the extenuating circumstances surrounding these exceedances and the lack of other exceedances throughout the inspection period, no further actions are required at this time.

2. Do all Operators possess the required certification?

All operators did not possess the required certification.

An operator attending the site and acting as both the OIC and the ORO on August 2, 3, 4 and 5, 2021 did not have a valid licence. The operating authority notified the Ministry of this situation on August 6, 2021, indicating that operator's licence had expired on July 31, 2021. The operator had made attempts to renew the licence on time; however, the renewal did not occur until August 6, 2021. This situation may well have been the result of the pandemic.

In order to address this issue, and to prevent such an occurrence in the future, the operating authority (OCWA) has developed new procedures. As of August 2021, training and licencing will be a regular topic at all cluster meetings. Training reports are to be prepared and presented quarterly to management detailing all staff licencing and training needs. In addition, OCWA has begun providing monthly updates to Management and Compliance based on OWWCOs valid licenced operator reports. Furthermore, management will take a more direct approach when dealing with operators who have let their licences lapse.

3. In the event that an issue of non-compliance outside the scope of this inspection protocol is identified, a "No" response may be used if further actions are deemed necessary (and approved by the DW Supervisor) to facilitate compliance.

The following instance(s) of non-compliance were also noted during the inspection:

From approximately July 16, 2021 to August 30, 2021, the lead chlorine pump was off site for repairs. During that time the plant was operating with only the back-up chlorine pump in operation and there was no redundancy (i.e. standby chlorine pump) available. Over six weeks is a long time for the water treatment plant to operate without such a key piece of equipment, which is required by Schedule A of Drinking Water Works Permit 197- 202 (both issues 3 and 4).

As subsection 31 (1) of the SDWA requires operation of a municipal drinking water system under the authority of and in accordance with municipal drinking water licence, operating the plant with only one disinfection chlorine pump in place amounts to a non-compliance issue.

4. Are all water quality monitoring requirements imposed by the MDWL and DWWP being met?

All water quality monitoring requirements imposed by the MDWL or DWWP issued under Part V of the SDWA were not being met.

The MDWL requires that monthly composite samples at the point of discharge to the North Channel be collected and tested for total suspended solids (TSS). The annual average concentration must not exceed 25 mg/L. Sampling for TSS was not completed in October 2021. The annual average concentration for 2021 (not including October) was <2.55 mg/L.

This sampling is a requirement of Condition 4.4 of Schedule C of MDWL 197-202, and subsection 31(1) states that no person shall use or operate a municipal drinking-water system except under the authority of and in accordance with an approval under this Part or municipal drinking-water licence.

The operating authority must ensure that all sampling is completed as per the requirements of the legislation. As this appears to be an isolated incident, no further actions are required at this time.

AWQIs reported to the Ministry

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
23-Jun-22	Pressure	0	psi	AWQI#158832 – A truck backed into a fire hydrant cracking the pipe near the base of the hydrant. Unable to isolate the hydrant but was able to isolate the line by closing 2 valves on the watermain. There were no households affected. After the break was repaired, two sets of bacti samples were collected. All results were non-detect for TC and EC.	27-Jun-22

SECTION 4: SECTION 11 REPORT

Information to be provided

Population Served	*1700*
Does your Drinking-Water System serve more than 10,000 people?	*No*
Is your annual report available to the public at no charge on a web site on the Internet?	*Yes*
Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.	*Town of Little Current, Municipal Office* *14 Water Street E* *Little Current, Ontario P0P 1K0*
Number of Designated Facilities served:	*0*
Did you provide a copy of your annual report to all Designated Facilities you serve?	*NA*
Number of Interested Authorities you report to:	*0*
Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility?	*NA*
List all Drinking-Water Systems (if any), and their DWS Number which receive all of their drinking water from your system:	*N/A*
Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water?	*N/A*
Indicate how you notified system users that your annual report is available, and is free of charge.	*Public access/notice via the web - & via Government Office*
Indicate if you notified system users that your annual report is available and is free of charge using an alternate method	*Yes*

Facility Description

The Little Current Water treatment facility consists of a low lift pumping station with three submersible pumps. The low lift pumping station includes a zebra mussel control system utilizing sodium hypochlorite.

Treatment consists of membrane filtration which is comprised of two concrete tanks, each tank with six ultrafiltration units. The rated capacity is 35.9 L/s into the treatment system. Each unit contains 12 modules each module has a filtering area of 23.23 m2. There are three permeate pumps used to push the water to the chlorine contact chamber. The contact chamber maintains a constant volume of 162 m3. Following the chlorine contact chamber there are two clear wells, each having a storage volume of 749.8 m3. The high lift pumping consists of four centrifugal high lift pumps, with two pumps having a capacity of 57.87 L/s and two pumps having a capacity of 28.94 L/s. The process back pulse & reject water from the plant is de-chlorinated and discharged back to the North Channel.

Wastewater from membrane cleaning is neutralized and discharged to the sanitary sewer system.

Chemicals Used

Sodium Hypochlorite 12%	Disinfection
Calcium Thiosulphate	Dechlorination of reject water & wastewater
Caustic Soda	Neutralizing membrane wastewater
Citric Acid	Membrane cleaning

Significant Expenses

Significant expenses incurred to

[] Install required equipment
[] Repair required equipment
[X] Replace required equipment

Work Order	Completion Date	Comment
2455534	16-Jun-22	Highlift pump VFD replacement – $20,303.66
2542190	13-Apr-22	Purchased new vacuum priming pump – $3,303.01
2723227	16-Jun-22	Permeate pump VFD replacement – $4,406.13
2775882	14-Nov-22	Replaced backpulse tank chemical pump system – $22,000

Adverse Water Quality Incidents

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Comment / Corrective Action	Corrective Action Date
23-Jun-22	Pressure	0	psi	AWQI#158832 – A truck backed into a fire hydrant cracking the pipe near the base of the hydrant. Unable to isolate the hydrant but was able to isolate the line by closing 2 valves on	27-Jun-22

				the watermain. There were no households affected. After the break was repaired, two sets of bacti samples were collected. All results were non-detect for TC and EC.	

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03.

	No. of Samples Collected	Range of E.Coli		Range of Total Coliform Results		Number of HPC Samples	Range of HPC Results	
		Min #	Max #	Min #	Max #		Collected	Min #
Raw Water	52	0	21	0	1000	n/a	n/a	n/a
Treated Water	52	0	0	0	0	52	0	8
Distribution	165	0	0	0	0	52	0	13

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03

	No. of Samples Collected	Range of Results		Units of Measure
		Minimum	Maximum	
Turbidity – Filter 1	8760	0.22	0.637	(NTU)
Turbidity – Filter 2	8760	0	1	(NTU)
Free Chlorine Residual – TW	8760	0.148	4.55	(mg/L)
Free Chlorine Residual, Distribution Location 1	100	0.87	1.72	(mg/L)
Free Chlorine Residual, Distribution Location 2	100	0.53	1.70	(mg/L)
Free Chlorine Residual, Distribution Location 3	100	0.71	1.75	(mg/L)
Free Chlorine Residual, Distribution Location 4	51	0.87	1.45	(mg/L)

Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter and limits	Month Sampled	Day Sampled	Result	Unit of Measure
197-101 Issue Date: February 25, 2021 Expiry Date: February 24, 2026	Membrane Reject Water Total Suspended Solids 25 mg/L	Jan	31	2	mg/L
		Feb	7	2	mg/L
		Mar	7	2	mg/L
		Apr	4	2	mg/L
		May	2	2	mg/L
		Jun	6	2	mg/L
		Jul	4	2	mg/L
		Aug	8	2	mg/L
		Sep	7	2	mg/L
		Oct	3	3	mg/L
		Nov	7	2	mg/L
		Dec	5	2	mg/L
		Annual Average		**2.08**	**mg/L**

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	No. of Exceedances	
				MAC	1/2 MAC
Antimony: Sb (ug/L) - TW	2022/01/10	<MDL 0.6	6.0	No	No
Arsenic: As (ug/L) - TW	2022/01/10	0.4	25.0	No	No
Barium: Ba (ug/L) - TW	2022/01/10	11.9	1000.0	No	No
Boron: B (ug/L) - TW	2022/01/10	12.0	5000.0	No	No
Cadmium: Cd (ug/L) - TW	2022/01/10	<MDL 0.003	5.0	No	No
Chromium: Cr (ug/L) - TW	2022/01/10	0.19	50.0	No	No
Mercury: Hg (ug/L) - TW	2022/01/10	<MDL 0.01	1.0	No	No
Selenium: Se (ug/L) - TW	2022/01/10	0.08	50.0	No	No
Uranium: U (ug/L) - TW	2022/01/10	0.147	20.0	No	No

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	No. of Exceedances	
				MAC	1/2 MAC
Fluoride (mg/L) - TW	2022/01/10	<MDL 0.06	1.5	No	No
Nitrite (mg/L) - TW	2022/01/04	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/04/04	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/07/04	<MDL 0.003	1.0	No	No
Nitrite (mg/L) - TW	2022/10/03	<MDL 0.003	1.0	No	No
Nitrate (mg/L) - TW	2022/01/04	0.178	10.0	No	No
Nitrate (mg/L) - TW	2022/04/04	0.175	10.0	No	No
Nitrate (mg/L) - TW	2022/07/04	0.157	10.0	No	No
Nitrate (mg/L) - TW	2022/10/03	0.112	10.0	No	No
Sodium: Na (mg/L) - TW	2022/01/10	6.58	20*	No	No

Summary of Lead testing under Schedule 15.1 during this reporting period

Location Type	No. of Samples	Range of Results		MAC (ug/L)	Number of Exceedances
		Minimum	Maximum		
Distribution - Lead Results (ug/L)	n/a			10	0
Distribution - Alkalinity (mg/L)	4	63	72	N/A	N/A
Distribution - pH In-House	4	8.15	8.21	N/A	N/A

Summary of Organic parameters sampled during this reporting period or the most recent results

TREATED WATER	Sample Date (yyyy/mm/dd)	Sample Result	MAC	Number of Exceedances	
				MAC	1/2 MAC
Alachlor (ug/L) - TW	2022/01/10	<MDL 0.02	5.0	No	No
Atrazine + N-dealkylated metabolites (ug/L) - TW	2022/01/10	0.01	5.0	No	No
Azinphos-methyl (ug/L) - TW	2022/01/10	<MDL 0.05	20.0	No	No
Benzene (ug/L) - TW	2022/01/10	<MDL 0.32	1.0	No	No

Benzo(a)pyrene (ug/L) - TW	2022/01/10	<MDL 0.004	0.01	No	No
Bromoxynil (ug/L) - TW	2022/01/10	<MDL 0.33	5.0	No	No
Carbaryl (ug/L) - TW	2022/01/10	<MDL 0.05	90.0	No	No
Carbofuran (ug/L) - TW	2022/01/10	<MDL 0.01	90.0	No	No
Carbon Tetrachloride (ug/L) - TW	2022/01/10	<MDL 0.17	2.0	No	No
Chlorpyrifos (ug/L) - TW	2022/01/10	<MDL 0.02	90.0	No	No
Diazinon (ug/L) - TW	2022/01/10	<MDL 0.02	20.0	No	No
Dicamba (ug/L) - TW	2022/01/10	<MDL 0.2	120.0	No	No
1,2-Dichlorobenzene (ug/L) - TW	2022/01/10	<MDL 0.41	200.0	No	No
1,4-Dichlorobenzene (ug/L) - TW	2022/01/10	<MDL 0.36	5.0	No	No
1,2-Dichloroethane (ug/L) - TW	2022/01/10	<MDL 0.35	5.0	No	No
1,1-Dichloroethylene (ug/L) - TW	2022/01/10	<MDL 0.33	14.0	No	No
Dichloromethane (Methylene Chloride) (ug/L) - TW	2022/01/10	<MDL 0.35	50.0	No	No
2,4-Dichlorophenol (ug/L) - TW	2022/01/10	<MDL 0.15	900.0	No	No
2,4-Dichlorophenoxy acetic acid (2,4-D) (ug/L) - TW	2022/01/10	<MDL 0.19	100.0	No	No
Diclofop-methyl (ug/L) - TW	2022/01/10	<MDL 0.4	9.0	No	No
Dimethoate (ug/L) - TW	2022/01/10	<MDL 0.06	20.0	No	No
Diquat (ug/L) - TW	2022/01/10	<MDL 1.0	70.0	No	No
Diuron (ug/L) - TW	2022/01/10	<MDL 0.03	150.0	No	No
Glyphosate (ug/L) - TW	2022/01/10	<MDL 1.0	280.0	No	No
Malathion (ug/L) - TW	2022/01/10	<MDL 0.02	190.0	No	No
Metolachlor (ug/L) - TW	2022/01/10	<MDL 0.01	50.0	N/A	N/A
Metribuzin (ug/L) - TW	2022/01/10	<MDL 0.02	80.0	No	No
Monochlorobenzene (Chlorobenzene) (ug/L) - TW	2022/01/10	<MDL 0.3	80.0	No	No
Paraquat (ug/L) - TW	2022/01/10	<MDL 1.0	10.0	No	No
PCB (ug/L) - TW	2022/01/10	<MDL 0.04	3.0	No	No
Pentachlorophenol (ug/L) - TW	2022/01/10	<MDL 0.15	60.0	No	No
Phorate (ug/L) - TW	2022/01/10	<MDL 0.01	2.0	No	No
Picloram (ug/L) - TW	2022/01/10	<MDL 1.0	190.0	No	No
Prometryne (ug/L) - TW	2022/01/10	<MDL 0.03	1.0	No	No
Simazine (ug/L) - TW	2022/01/10	<MDL 0.01	10.0	No	No
Terbufos (ug/L) - TW	2022/01/10	<MDL 0.01	1.0	No	No
Tetrachloroethylene (ug/L) - TW	2022/01/10	<MDL 0.35	10.0	No	No
2,3,4,6-Tetrachlorophenol (ug/L) - TW	2022/01/10	<MDL 0.2	100.0	No	No
Triallate (ug/L) - TW	2022/01/10	<MDL 0.01	230.0	No	No
Trichloroethylene (ug/L) - TW	2022/01/10	<MDL 0.44	5.0	No	No
2,4,6-Trichlorophenol (ug/L) - TW	2022/01/10	<MDL 0.25	5.0	No	No
2-methyl-4-chlorophenoxyacetic acid (MCPA) (ug/L) - TW	2022/01/10	<MDL 0.12	100.0	No	No
Trifluralin (ug/L) - TW	2022/01/10	<MDL 0.02	45.0	No	No
Vinyl Chloride (ug/L) - TW	2022/01/10	<MDL 0.17	1.0	No	No
DISTRIBUTION WATER					
Trihalomethane: Total (ug/L) Annual Average - DW	2022/12/31	37.5	100.00	No	No
HAA Total (ug/L) Annual Average - DW	2022/12/31	20.0	80.0	No	No

SECTION 5: RAW WATER SUBMISSIONS

Raw water flows were submitted to the Ministry on February 21, 2023.

Ontario

Location: WTRS / WT DATA / Input WT Record WTRS-WT-008

Water Taking Data submitted successfully.

Confirmation:

Thank you for submitting your water taking data online.

Permit Number: 4270-BALKYE
Permit Holder: THE CORPORATION OF THE TOWN OF NORTHEASTERN MANITOULIN AND THE ISLANDS.
Received on:Feb 21, 2023 1:52 PM

This confirmation indicates that your data has been received by the Ministry,but should not be construed as acceptance of this data if it differs from that specified on the Permit Number, assigned to the Permit Holder stated above.

Return to Main Page

TOWN OF LITTLE CURRENT | 2023/02/21
version: v4.5.0.21 (build#: 22)
Last modified: 2018/09/18

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SECTION 6: CONCLUSION

The Little Current WTP delivers water that, in all its treated and distribution samples, indicates the water to be free of bacteriological contamination.

Based on information available for the 2022 operating year, the Little Current was able to meet the demand of water use without exceeding the PTTW or the MDWL.

List of Acronyms and Definitions

Alkalinity	The capacity of water for neutralizing an acid solution
AWQI	Adverse Water Quality Incident- when a water sample test result exceeds the Ontario Drinking Water Quality Standards
Backwash	Water pumped backwards to clean filters
BWA	Boil Water Advisory; Issued when risk of contamination is possible in drinking water
CFU	Colony Forming Units
Chlorine Residual	A low level of chlorine remaining in water after disinfection occurs
DW	Distribution Water
DWA	Drinking Water Advisory; Issued when water cannot be consumed by any means
DWWP	Drinking Water Works Permit - provides a description of the overall system
E.Coli	Bacteria used as indicators to measure the degree of pollution and sanitary quality of water
GUDI	Groundwater Under Direct Influence – Considered to be surface water under O.Reg 170/03
HPC	Heterotrophic Plant Count
L/s	Litres per Second
m3/d	Cubic Metres per Day
MAC	Maximum Acceptable Concentration
MDL	Minimum Detection Level
MDWL	Municipal Drinking Water Licence - relates to the operation and performance requirements
mg/L	Miligrams per Litre
Ministry	Ministry of the Environment and Climate Change
MOECC	Ministry of the Environment and Climate Change
O.Reg	Ontario Regulation
PTTW	Permit to Take Water – Permit which allows water taking from groundwater or surface water
RW	Raw Water
TC	Total Coliforms
TSS	Total Suspended Solids
Turbidity	Cloudiness or haziness of water
TW	Treated Water

---------- Forwarded message ---------
From: **Marjorie** <mcollie@bell.net>
Date: Fri., Feb. 17, 2023, 10:39 a.m.
Subject: Resignation

Hello Heidi,

So nice to talk with you.

This is to let you know that due to personal reasons, I will be resigning from the Museum Committee. The time that I have spent on the committee has been very enjoyable and preserving the local history is something that is dear to my heart. I would like to continue to volunteer when there are events going on or things taking place that I can help with. Thank you to all the committee for working so diligently to keep the history of NEMI alive and to share it with others.

Best Regards

Marjorie Collie

NORTHEASTERN MANITOULIN AND THE ISLANDS

PUBLIC LIBRARY BOARD

MEETING MINUTES OF

December 20, 2022

Present: Maureen Armstrong, Rosemary Burnett, Laurie Cook, Mike Easton, Ned Martin, John Royal

Absent: Mark Ansara, Sheryl Wilkin, Library Treasurer

Also present: Kathy Berry, CEO/Librarian, Nina Coates

This meeting was called to order by Chairperson Ned Martin at 4:06 p.m.

Moved by: John Royal Seconded by: Maureen Armstrong
Resolved that the Agenda dated December 20, 2022 be approved. (cd)

Declarations of pecuniary interest: None

Moved by: John Royal Seconded by: Mike Easton
Resolved that the Minutes dated November 15, 2022 be approved. (cd)

Business arising from the minutes:

i) E-transfers to the library-
Sheryl Wilkin, Treasurer, was not available for comment.

ii) Reminder for Board Members to submit a letter to the Town's Clerk indicating their interest if a reappointment to the Library Board is desired. Board members were informed that council appointments are on the Municipal Agenda for December 20, 2022.

Correspondence: none

Treasurer's Report:
Ned Martin, Chairperson, reviewed the financial statement for the month ending November 30, 2022.

Moved by: Maureen Armstrong Seconded by: Laurie Cook
Resolved that the financial report for the month ending November 30, 2022, be adopted. (cd)

Librarian's Report:
Presented by Library CEO, Kathy Berry.

Moved By: Maureen Armstrong Seconded by: Mike Easton
Resolved that the Librarian's Report be adopted. (cd)

Reports of Committees:
Finance Committee: Did not meet

Policy Committee: Did not meet.

Fundraising, Programs and Special Events Committee: Did not meet.

New Business:
Board members are requested to implement their own efforts in recruiting potential board members, since the board will still not be at full compliment. Promotional efforts will continue including paid advertising if necessary. Streamlining of application process, an application form and process for submitting proof of eligibility are being considered.

The Board expressed its appreciation for their years of service to Mike Easton and to Nina Coates.

Next meeting date: January 17, 2022

Adjournment:
Moved by: John Royal
Resolved that this meeting be adjourned at 4:42 p.m.

(cd)

Ned Martin Chairperson

Kathy Berry Secretary

NORTHEASTERN MANITOULIN AND THE ISLANDS
PUBLIC LIBRARY BOARD
MEETING MINUTES OF
January 17, 2023

Present: In Person: Ned Martin, Brenda Dewar
Via Zoom: Maureen Armstrong, Laurie Cook

Regrets: Mark Ansara, Rosemary Burnett, John Royal

Absent: Sheryl Wilkin, Library Treasurer

Also present: Kathy Berry, CEO/Librarian

This meeting was called to order by Interim Chairperson Ned Martin at 4:02 p.m.
Brenda Dewar was welcomed as a new member of the library board.

Moved by: Maureen Armstrong Seconded by: Laurie Cook
Resolved that the Agenda be amended to remove items 1 through 3. The appointment of officers to be postponed until February 21, 2023 due to low attendance. (cd)

Declarations of pecuniary interest: None

Moved by: Laurie Cook Seconded by: Maureen Armstrong
Resolved that the Minutes dated December 20, 2022 be approved. (cd)

Business arising from the minutes:

i) E-transfers to the library-
Sheryl Wilkin, Treasurer, was not available for comment.

Correspondence: none

Treasurer's Report:
Ned Martin, Financial Committee Chair, reviewed the financial statement for the month ending December 31, 2022.

Moved by: Maureen Armstrong Seconded by: Brenda Dewar
Resolved that the financial report for the month ending December 31, 2022, be adopted. (cd)

Librarian's Report:
Presented by Library CEO, Kathy Berry.

Moved By: Brenda Dewar Seconded by: Maureen Armstrong
Resolved that the Librarian's Report be adopted. (cd)

Reports of Committees: Committees did not meet

New Business:
The roof leak from December 29, 2022 was discussed. Appreciation for municipal staff quick response was expressed. If library staff had not been present when leak began, it would have caused significant damage. Library staff covered bookshelves and equipment that could not be moved with tarps and removed artwork from the area that was leaking. The leak took over 3 days to stop after roof drainage path was cleared. Considerations for possible preventative measures such as heat tape were discussed.

The Garden Club would like to create a memorial garden but has concerns about no outdoor water source. Laurie Cook will advise the garden club to create a clear plan for the garden. An outdoor water source would serve multiple purposes.

Next meeting date: February 21, 2023

Adjournment:
Moved by: Brenda Dewar
Resolved that this meeting be adjourned at 4:40 p.m.

(cd)

Ned Martin — Chairperson

Kathy Berry — Secretary

Ministry of Natural Resources and Forestry

Policy Division

Director's Office
Crown Forests and Lands Policy Branch
70 Foster Drive, 3rd Floor
Sault Ste. Marie, ON P6A 6V5

Ministère des Richesses naturelles et des Forêts

Division de la politique

Bureau du directeur
Direction des politiques relatives aux forêts et aux terres de la Couronne
70, rue Foster, 3e étage
Sault Sainte Marie, ON P6A 6V5

Ontario

February 24, 2023

Hello,

We are writing to let you know that the Ministry of Natural Resources and Forestry is proposing to make amendments to Ontario Regulation 161/17 under *the Public Lands Act* regarding the use of floating accommodations and camping on water over public lands in Ontario. In addition, minor changes (listed below) are proposed for added clarity and consistency in the regulation.

The proposed changes are described in a regulation proposal notice that was posted on Ontario's Regulatory Registry and the Environmental Registry of Ontario (ERO) on February 24, 2023 (ERO number 019-6590).

The proposed changes related to floating accommodations were informed by feedback received by the ministry in response to the March 2022 ERO bulletin titled, "Seeking input about the use of floating accommodations on waterways over Ontario's public lands" (ERO number 019-5119).

We are proposing to amend Ontario Regulation 161/17 to clarify the types of camping units that can be used to camp on water over public land. It is proposed that the definition of 'camping unit' will be clarified to allow for camping on liveaboards and houseboats but will exclude floating accommodations, float homes and barges with residential units or camping facilities.

We are also proposing to change the conditions that must be met when camping on water over public lands in Ontario by:

- reducing the number of days that a person can camp on water over public land (per location, per calendar year) from 21 days to 7 days
- increasing the distance that a person camping on water must move their camping unit to be occupying a different location from 100 metres to 1 kilometre
- adding a new condition to prohibit camping on water within 300 metres of a developed shoreline, including any waterfront structure, dock, boathouse, erosion control structure, altered shoreline, boat launch and/or fill.

In addition, we are proposing to:

- harmonize the conditions for camping on public land so that residents and non-residents are required to follow the same conditions when camping on water over public lands or on public lands
- specify conditions for swim rafts, jumps, ramps for water sports, heat loops and water intake pipes
- clarify that camping on a road, trail, parking lot or boat launch is prohibited
- amend the regulation to add the following to the list of excluded public lands to which section 21.1 of the *Public Lands Act* and Ontario Regulation 161/17 do not apply:
    - lands subject to an agreement authorizing the use of those lands
    - lands subject to an authorization under the *Aggregate Resources Act*.

We encourage you to review the proposal notice (ERO number **019-6590**) and provide feedback through the ERO. The comment period for the proposal closes on **April 11, 2023.**

Online Information Sessions

We invite you to attend an online information session during which ministry staff will present an overview of the regulatory proposal and answer questions. Sessions will be held on the following dates:

Session 1 – Wednesday, March 8: 10:00 am to 11:30 am
Session 2 – Monday, March 20: 2:00 pm to 3:30 pm

If you wish to attend an online information session, please register by emailing public.lands@ontario.ca with the subject line "Regulatory Proposal Information Session" and indicate your preferred session date. You will receive a reply to your email with the session start/end times and information on how to join.

Sincerely,

Peter D. Henry, R.P.F.
Director, Crown Forests and Lands Policy Branch
Ministry of Natural Resources and Forestry

c: Pauline Desroches, Manager, Crown Lands Policy Section
Michelle Dano, Senior Program Advisor, Crown Lands Policy Section