



2021 Annual Report

Matawatchan Waste Disposal Site (A412204)

**Township of Greater Madawaska
County of Renfrew, Ontario**

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Executive Summary

This report has been prepared to document the results of the 2021 environmental monitoring program for the Township of Greater Madawaska's Matawatchan Waste Disposal Site, located on Part of Lot 13, Concession 5, in the geographic Township of Matawatchan, in the amalgamated Township of Greater Madawaska, in the County of Renfrew. Access to the site is provided by County Road 71 (Matawatchan Road), approximately one kilometre north of the Hamlet of Matawatchan.

The Matawatchan site was closed to all operations as of December 31, 2009, and prior to closure operated as an active waste disposal site, which was approved to accept municipal waste from the geographic Townships of Griffith and Matawatchan, in accordance with Environmental Compliance Approval A412204. The site consists of an approved waste disposal area of 2.3 hectares within a total property area of 4.9 hectares, inclusive of a 0.6 hectare road allowance. Additional lands acquired to the north and east of the site serve as a contaminant attenuation zone. In 2008, the Township of Greater Madawaska submitted an application to amend the Environmental Compliance Approval to approve final closure concepts at the Matawatchan site. The application to amend the Environmental Compliance Approval was approved with an amendment on February 26, 2010. Final closure activities were undertaken at the site in 2010 and 2011.

In 2021, the groundwater configuration at the site was similar to historical interpretations, with the predominant direction of groundwater flow in the shallow overburden unit being towards the east.

Groundwater quality at leachate monitoring well 91-2C was interpreted to be impacted from landfill-related factors, while downgradient monitoring wells 91-4A, 95-3B, 95-2A, and 95-2B were interpreted to have minor to no impacts resultant of landfill-related factors (including final closure activities). Significant impacts related to the closed Matawatchan site were not interpreted at the downgradient property boundary following completion of the 2021 groundwater monitoring program. Decreasing trends noted in groundwater quality results over the past five (5) years were interpreted to represent that landfill-related impacts are diminishing over time downgradient of the site.

No Reasonable Use Concept non-conformances were documented in results from downgradient monitoring well 95-2A in spring 2021, and no sample was obtained during the fall 2021 sampling event due to low-water conditions. No Reasonable Use Concept non-conformances were documented in results for monitoring well 95-2B in spring 2021, while Reasonable Use Concept non-conformances for concentrations of alkalinity, iron, and total dissolved solids for the fall 2021 sampling event. The noted Reasonable Use Concept non-conformances from monitoring well 95-2B were attributed to the low groundwater conditions noted across the site in fall 2021, and not to landfill-related factors. The concentrations of alkalinity and total dissolved solids were only slightly elevated above the Reasonable Use Concept limit, while the iron concentration in results from 95-2B for fall 2021 was noted to be less than the concentration documented in background monitoring well 95-1 for the same sampling event. The Matawatchan Waste Disposal Site was not interpreted to be significantly impacting groundwater quality at the adjacent property boundary in 2021 and the site was interpreted to meet the intent of Guideline B-7.

With the inclusion of the 2021 surface water quality results, current and historical results at downstream location SW-2 were interpreted to suggest that significant impacts have not been occurring downstream of the Matawatchan Waste Disposal Site. The Matawatchan Waste Disposal Site was interpreted to be in conformance with Provincial Water Quality Objectives in 2021.

Given that the Matawatchan site has been closed since 2009, and since recent groundwater sampling events at the site have been interpreted to represent significant attenuation downgradient of the closed waste mound and conformance with Guideline B-7 at the downgradient property boundary, it is recommended that the Ontario Ministry of the Environment, Conservation, and Parks consider reductions in the scope of the groundwater monitoring program. Recommendations for changes to the program are included in Section 5.0 of this report.

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1.0 Introduction

1.1 Site Information

The Matawatchan Waste Disposal Site operates under Environmental Compliance Approval (ECA) A412204 and the most recent amendment dated February 26, 2010 (Appendix A). The Matawatchan Waste Disposal Site is located in the geographic Township of Matawatchan, in the amalgamated Township of Greater Madawaska (Township), on Part of Lot 13, Concession 5. The Universal Transverse Mercator (UTM) coordinates at the site entrance gate relative to the North American Datum (NAD83) are 333853.0 metres (m) East, 5002303.0 m North, in Zone 18T (Google Earth, 2013). The site is accessed by County Road 71 (Matawatchan Road), approximately one (1) kilometre (km) north of the hamlet of Matawatchan (Figure 1).

The Matawatchan site consists of an approved waste disposal area (AWDA) of 2.3 hectares (ha) within a total property area of 4.9 ha, inclusive of a 0.6 ha road allowance (Figure 2). The lands to the north and east of the AWDA, within the total property area, serve as a contaminant attenuation zone (CAZ) for the site as proposed in the approved Closure Plan (Greenview Environmental Management Limited [Greenview], 2008a). The Township registered the CAZ lands on title on March 5, 2013 (Appendix A).

Since December 31, 2009, the Matawatchan site has been closed to the public and all waste operations in accordance with an application to amend the ECA and supporting technical information (Closure Plan; Greenview, 2008a), which was submitted to the Ontario Ministry of the Environment, Conservation, and Parks (MECP) on September 19, 2008. Prior to site closure, the Matawatchan site operated as an active waste disposal site, and was approved to accept municipal waste from the geographic Townships of Griffith and Matawatchan.

1.2 Background

As part of the Township's long-term waste management plan, the Matawatchan Waste Disposal Site was closed to all waste operations as of December 31, 2009. The Closure Plan (Greenview, 2008a) was approved in the most recent Amendment to the ECA for the site, dated February 26, 2010 (Appendix A).

On December 18, 2012, the Township submitted a Certificate of Requirement to the MECP, in accordance with Condition 1 (14) (a) of the ECA (Appendix A), regarding registration of the CAZ lands on title. On March 5, 2013, the Certificate of Requirement was registered on title to the site at the land registry office in accordance with Condition 1 (14) (b) of the ECA, and subsequently a duplicate registered copy was submitted to the MECP Director (Appendix A; Greenview, 2013).

In 2013, the Township also passed a new waste management by-law, By-law No. 09 – 2013, to maintain and regulate a system for the disposal of municipal waste, recyclables and other refuse (Greenview, 2014).

On September 29, 2014, the Township received MECP Technical Support Section (TSS) groundwater review comments to the 2011 and 2012 Annual Reports (Greenview, 2012 and 2013), dated January 10, 2014 (Greenview, 2015). A response to the MECP TSS groundwater review of the 2011 and 2012 Annual Reports was included in the 2014 Annual Report (Greenview, 2015). As part of the MECP TSS review, the MECP approved the removal of the summer groundwater elevation measurement event for the Matawatchan site. This change was instituted for the 2015 groundwater monitoring program (Greenview, 2016).

In 2016, the MECP TSS issued a surface water review of the 2015 Annual Report for the Matawatchan site, dated July 5, 2016 (Greenview, 2017). As part of the review, the MECP TSS reviewer noted their agreement with Greenview's interpretation in the 2015 Annual Report (Greenview, 2016) that the surface water system in the vicinity of the Matawatchan site was in conformance with the Provincial Water Quality Objectives (PWQO) and the surface water system was not significantly impacted by the closed landfill (Greenview, 2017).

The Matawatchan Waste Disposal Site was inspected by the MECP Ottawa District Office on July 11, 2016. Subsequent to the inspection, a *Closed Waste Disposal Site Inspection Report* (Inspection Report) was issued by the MECP Ottawa District Office dated July 19, 2016, and was received by the Township electronically on

July 26, 2016 (Greenview, 2017). No action items were noted as part of the Inspection Report.

On October 30, 2017, the MECP TSS issued groundwater review comments to the 2016 Annual Report for the Matawatchan site (Greenview, 2018). The review noted that groundwater quality in 2016 was similar to previous years and was not interpreted to indicate significant adverse landfill-related impacts. A contingency plan was not deemed to be warranted at the time of the review.

In 2021, and as of the time of preparation of this 2021 Annual Report, no communications relative to the Matawatchan site were understood to have been received by the Township from the MECP.

Greenview was retained by the Township to complete the 2021 environmental monitoring and reporting program at the Matawatchan Waste Disposal Site.

1.3 Purpose and Scope

The purpose of this report is to provide an overview of the annual monitoring, environmental compliance, and operations at the Matawatchan Waste Disposal Site, in accordance with Condition 2 (3) and 2 (4) of the ECA (Appendix A), including the following:

- Groundwater quality assessment and Reasonable Use Concept (MECP Guideline B-7) compliance (Section 4.1).
- Surface water quality assessment (Section 4.2).
- Site operational overview (Section 4.3).
- Conclusions and recommendations (Section 5.0).

2.0 Site Description

The following sections present a summary of the physical characteristics for the Matawatchan Waste Disposal Site. Locations of features described in this report are referenced to grid north.

2.1 Topography and Drainage

The former landfilling area at the Matawatchan site is located on a bedrock ridge that slopes generally to the northeast of the site (Figure 2). Based on the northeastern trending slope, the direction of surface water drainage and groundwater flow in the vicinity of the former landfilling area is predominantly to the east (Figures 3 and 4). The western property boundary of the site acts as a drainage divide with surface water to the west of this boundary flowing westward towards a seasonal creek between the site and Matawatchan Road, where it is diverted southward towards an intermittent creek (Figures 3 and 4). The nearest significant water body in the vicinity of the Matawatchan site is Centennial (Black Donald) Lake, which is located approximately 2 km to the east (Greenview, 2009).

2.2 Hydrogeological Conditions

Overburden geology at the Matawatchan site is characterized by subsurface layers of sand and silty sand from 1.8 metres (m) to 3.3 m (recorded at boreholes 91-4 and 91-5), with pockets of sand and gravel underlying the refuse at the site (Golder, 2007). Gneiss bedrock is found at the site, ranging in depth from 2.0 to 7.0 m below ground surface, with the sand and gravel to silty sand overburden overlying the bedrock unit. Overburden depths are greater at the eastern portion of the site, given the relief of the natural topography sloping towards the east, and the layers of sand and refuse located on the eastern slope of the site in this area (Golder Associates Ltd. [Golder], 2007). Bedrock outcrops are visible to the west of the waste mound at the site, in the vicinity of monitoring well 95-4, indicating that overburden thickness is generally shallow in this area. Immediately to the south of the site is a steep bedrock ridge overlain by limited to no overburden material. Bedrock outcropping to surface is visible along most of the eastward-trending ridge; the private lands south of the bedrock ridge are at a significantly lower elevation than the Matawatchan Waste Disposal Site (Figure 2). No groundwater-to-surface water interactions have been observed along the extent of the eastward-trending bedrock ridge.

Hydraulic conductivity values for overburden geology at the site have been estimated at 1×10^{-7} to 2×10^{-3} centimetres per second (cm/s) for silt, 2×10^{-5} to 2×10^{-2} cm/s for fine to medium sand, and 3×10^{-2} to 3 cm/s for gravel (Sonderegger and Wade, 2001).

Borehole logs recorded during monitoring well installations at the site are not available.

Based on site topography and annual groundwater monitoring at the site, groundwater at the Matawatchan site is interpreted to flow predominantly to the east (Figures 3 and 4).

2.3 Land Use

The land use designation for the Matawatchan site is Waste Disposal (WD), per the County's Official Plan. The property is bound to the south by private property designated as Rural (RU), and to the west, north, and east by designated Renfrew County Forest lands (CFR). The Renfrew County Forest is owned and managed by the County of Renfrew. The Matawatchan site has been closed to all waste operations since December 31, 2009.

2.4 Operational Setting

The Matawatchan site consists of an AWDA of 2.3 ha within a total property area of 4.9 ha, inclusive of a 0.6 ha road allowance (Figure 2). The land to the north and east of the AWDA, within the total property area, serves as a CAZ for the site as proposed in the Closure Plan (Greenview, 2008a). The Closure Plan (Greenview, 2008a) and the application to amend the site's ECA were approved by the MECP with the Amendment to the ECA dated February 26, 2010 (Appendix A). On December 18, 2012, the Township submitted

a Certificate of Requirement to the MECP regarding registration of the CAZ lands on title, in accordance with Condition 1 (14) (a) of the ECA (Appendix A). On March 5, 2013, the Certificate of Requirement was registered on title to the site at the land registry office in accordance with Condition 1 (14) (b) of the ECA, and subsequently a duplicate registered copy was submitted to the MECP Director (Appendix A; Greenview, 2013).

Prior to site closure on December 31, 2009, the Matawatchan site operated as an active waste disposal site, and was approved to accept municipal waste from the service area of the geographic Townships of Griffith and Matawatchan. Access to the site is provided by County Road 71 (Matawatchan Road), approximately one (1) km north of the Hamlet of Matawatchan (Figure 1). The site is surrounded primarily by forested lands, with a lowland area located to the east of the site (Figure 2).

As part of the Township's long-term waste management plan, the Matawatchan site was closed to all operations on December 31, 2009. The application of 600 millimetres (mm) of barrier soil to satisfy final cover requirements of the waste mound was substantially completed in late 2010 (Greenview, 2011). The Township completed additional final cover application, grading, and seeding of the site in order to satisfy final cover requirements in spring 2011. Final cover application in spring 2011 included additional barrier soil (600 mm) placement in the northeastern portion of the former landfilling area and vegetative cover (150 mm) placement over the entire former landfilling area. Monitoring well 91-2C was extended concurrent with final cover application in the northeastern corner of the former landfilling area (Figure 2).

3.0 2021 Environmental Monitoring Program

The following sections present a methodology of the environmental monitoring program conducted at the Matawatchan Waste Disposal Site in 2021.

3.1 Groundwater Monitoring

Groundwater monitoring and sampling activities were conducted at the site by Greenview on May 18, 2021 and November 16, 2021 from the site's network of groundwater monitoring wells as part of the 2021 environmental monitoring program (Figures 3 and 4; Table 1). The UTM coordinates of the groundwater monitoring wells were confirmed or measured by Greenview personnel during site visits in 2021 using a handheld geographic positioning system (GPS) instrument with an anticipated accuracy of within +/- 5 m (Table 2). Groundwater sampling was conducted in accordance with Condition 2 (2) of the ECA for the Matawatchan site (Appendix A).

Further to MECP TSS review comments to the Closure Plan (Greenview, 2010), shallow monitoring well 95-2A was added to the environmental monitoring program in 2010 (Table 1). Additionally, monitoring well 91-4A is compared annually to the Provincial Water Quality Objectives (PWQO) given that groundwater is interpreted to discharge to surface in the vicinity of 91-4A, based on the historically observed flowing conditions during spring sampling events (Greenview, 2009). During the spring and fall sampling events in 2021, groundwater elevations were measured at each monitoring well using an electronic water level tape prior to sampling. Based on the groundwater elevations, well purge volumes equivalent to approximately three (3) borehole volumes were calculated in-situ using a standard conversion factor relevant to the respective well diameter.

During the spring sampling event, monitoring well 91-4A was observed to pump dry and full purge volumes were not achieved, while monitoring well 95-3B was observed to be damaged and no sample was obtained. Monitoring well 95-3B was subsequently repaired by Greenview in summer 2021. During the fall sampling event, monitoring well 95-2A was observed to have insufficient water to sample, monitoring well 95-3B was observed to be dry and no sample was obtained, and monitoring wells 95-1, 95-4, and 95-2B were observed to pump dry and full purge volumes were not achieved (Appendix B).

Groundwater samples were collected from each monitoring well using dedicated polyethylene tubing and inertial lift foot-valves. Samples were collected into appropriate sample bottles, as provided by an accredited laboratory, and the designated sample for metal parameters was field-filtered using a dedicated high capacity 45-micron filter to reduce the potential for turbidity induced bias in the analytical results for the metal parameters.

A duplicate groundwater sample was collected for Quality Assurance and Quality Control (QA/QC) purposes from monitoring wells 91-4A and 91-2C for the spring and fall 2021 sampling events, respectively (Appendix B).

All samples were submitted to an accredited analytical laboratory to be analyzed for the parameter suite listed in Table 1.

Field measurements of pH, conductivity, dissolved oxygen (DO) and temperature were recorded at each respective groundwater well immediately following the collection of the groundwater samples. Field sampling records completed during the 2021 monitoring program are included in Appendix B. The groundwater samples were recorded on a laboratory Chain of Custody Form, and placed in coolers packed with contained ice for preservation during transport to the analytical laboratory.

The results of the 2021 groundwater monitoring program are presented in Section 4.1.

3.2 Surface Water Monitoring

Surface water monitoring and sampling activities were conducted by Greenview on May 18, 2021 and November 16, 2021 from the established surface water monitoring locations at the site (Figure 2), in accordance with Condition 2 (2) of the ECA for the Matawatchan site (Appendix A). The UTM coordinates of the surface

monitoring locations were confirmed or measured by Greenview personnel during site visits in 2021 using a handheld GPS instrument with an anticipated accuracy of within +/- 5 m (Table 2).

The surface water samples were collected by submerging a dedicated, non-preserved, sample container into the water body and decanting into preserved sample bottles so as not to displace preservative chemicals.

Surface water sampling locations SW2 and SW3 were sampled during both the spring and fall 2021 sampling events, while location SW1 was observed to have insufficient water to sample during both sampling events in 2021 (Appendix B).

A duplicate surface water sample was collected for QA/QC purposes from surface water sampling location SW-2 for both the spring and fall 2021 sampling events (Appendix B).

All samples were submitted to an accredited analytical laboratory to be analyzed for the parameter suite listed in Table 1.

Field measurements of pH, conductivity, DO, and temperature were recorded at each surface water sampling location immediately following the collection of the surface water samples. Physical characteristics including depth, width, and flow velocity of each surface water location were recorded at the time of sampling. Field sampling records completed during the 2021 monitoring program are included in Appendix B. The surface water samples were recorded on a laboratory Chain of Custody Form, and placed in coolers packed with contained ice for preservation during transport to the analytical laboratory.

The results of the 2021 surface water monitoring program are presented in Section 4.2.

3.3 Analytical Laboratory Accreditation

Collected groundwater and surface water samples were submitted for analysis to the Caduceon Environmental Laboratories (Caduceon), located in Kingston, Ontario. Caduceon is accredited by the Canadian Association for Laboratory Accreditation (CALA), for specific environmental testing procedures listed in the scope of accreditation and is assessed biannually by CALA to the ISO/IEC 17025 standard. ISO/IEC 17025 is an international standard for both quality management and technical aspects of operating a testing laboratory. Caduceon is licensed by the MECP to perform analysis on drinking water in Ontario in accordance with the Safe Drinking Water Act.

3.4 Landfill Gas Monitoring

Landfill gas monitoring is not part of the current environmental monitoring program for the site. The waste mound at the Matawatchan site is covered with porous soil materials, allowing natural gas flux to the atmosphere. Overburden geology at and adjacent to the site is characterized by shallow, sandy materials, overlying a dense bedrock unit. These overburden and bedrock characteristics, coupled with the extended distance to the nearest residence, provide a minimal risk of landfill gases impinging off-site receivers.

3.5 Operational Monitoring

Operational monitoring at the Matawatchan Waste Disposal Site is minimal, given that the site was closed to all waste activities on December 31, 2009. On September 27, 2011, a survey was conducted to update the existing topographic data for the Matawatchan site following completion of final closure activities in 2011, which included the application of vegetative cover.

Waste record keeping and reporting were not conducted for the Matawatchan site in 2021, as the site was closed to operations and did not receive waste or recyclables for disposal, transfer, or market.

In 2021, all monitoring wells at the Matawatchan Waste Disposal Site were observed to be in good condition and in compliance with Ontario Regulation 903 (O. Reg. 903), as amended, with the exception of monitoring well 95-3B in spring 2021. Monitoring well 95-3B was repaired by Greenview in summer 2021, and was observed to be dry in fall 2021 (Appendix B).

4.0 Environmental Monitoring Results

The following sections present a summary of the environmental monitoring results of the 2021 environmental monitoring program conducted at the Matawatchan Waste Disposal Site.

4.1 Groundwater Quality Assessment

The results of the 2021 groundwater monitoring program conducted at the site are presented as follows.

4.1.1 Groundwater Configuration

Historically, groundwater at the site has been interpreted to flow towards the east, in the general direction of the gully immediately east of the site (Golder, 2007). The interpreted groundwater configuration at the Matawatchan site in the shallow overburden unit in 2021 was generally consistent with historical interpretations (Greenview, 2021), as groundwater was interpreted to flow predominantly to the east (Figures 3 and 4).

Groundwater elevation data obtained during the 2021 groundwater monitoring program at the site are provided in Table 3. Average horizontal gradients in the vicinity of the waste mound and to the east of the site in 2021 were calculated as follows:

Location	Horizontal Gradient (Spring 2021)	Predominant Direction	Horizontal Gradient (Fall 2021)	Predominant Direction
Vicinity of waste mound	0.159	East	0.150	East

Using groundwater elevations measured in 2021 (Table 3), vertical hydraulic gradients were calculated at the following pairs of shallow and deep monitoring wells for the spring and fall groundwater elevation monitoring events. The vertical gradients calculated in 2021 were as follows:

Monitoring Wells	Vertical Gradient (Spring 2021)	Vertical Gradient (Fall 2021)
91-2A and 91-2B	- 0.006	0.015
95-2A and 95-2B	- 0.244	- 0.209

Typically, vertical gradients at monitoring well pairs 91-2A/91-2B and 95-2A/95-2B have been downward for both the spring and fall sampling events (i.e. 2020, 2018, 2014, 2012, and 2011); however, upward vertical gradients (or zero gradients) have been documented periodically for monitoring well pair 91-2A/91-2B (i.e. 2021, 2017, 2015, and 2010). Monitoring well 95-2A has also been observed to be dry during the fall sampling event (i.e. 2019, 2016 and 2013), and less frequently during the spring sampling event (i.e. 2013), resulting in no calculation of vertical gradient at this monitoring well pair location (Table 3).

4.1.2 Groundwater Quality

The results of the 2021 groundwater monitoring program are presented in Table 4 and the accredited laboratory Certificates of Analysis are attached in Appendix C. Analytical data obtained from the groundwater samples were compared to the Ontario Drinking Water Standards (ODWS; MECP, 2006), median background groundwater quality at the site, and MECP Guideline B-7 and the RUC (MECP, 1994a). Additionally, given that groundwater was interpreted to discharge to surface in the vicinity of 91-4A, based on the historically observed flowing conditions of the well in previous spring sampling events (Table 3; Greenview, 2021), groundwater quality results at monitoring well 91-4A were compared with the PWQO (MECP, 1994b) and Table B of the MECP Technical Guidance Document (TGD, MECP, 2010). Trend analysis was completed using results from the previous five (5) years and only significant trends are discussed.

The blind duplicate samples collected from monitoring wells 91-4A and 91-2C during the spring and fall 2021

sampling events were similar to the identified samples, indicating that the results of the 2021 groundwater monitoring program can be interpreted with confidence.

Consistent with historical results (Greenview, 2021), background groundwater quality at the Matawatchan Waste Disposal Site in 2021 was assessed at monitoring wells 95-1 and 95-4, located approximately 70 m and 45 m west and upgradient, respectively, of the existing limit of waste (Figures 3 and 4). In 2021, some parameter concentrations in the samples collected from background wells 95-1 and 95-4 were above the median background concentrations (Table 4). Non-conformances of ODWS and significant groundwater trends at background groundwater monitoring locations 95-1 and 95-4 were as follows (Table 4):

Monitoring Well	ODWS Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
95-1 (background)	<ul style="list-style-type: none"> Iron Manganese 	<ul style="list-style-type: none"> Iron Manganese 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> No significant trends
95-4 (background)	<ul style="list-style-type: none"> Alkalinity (low) 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> No significant trends

Concentrations of iron and manganese have historically been above the ODWS limits at 95-1 and 95-4 and were interpreted to be the result of naturally-occurring conditions in the background at the site and/or related to off-site sources (Table 4). Low pH values have also periodically been documented in results at background monitoring wells 95-1 and 95-4. Results from 95-1 and 95-4 were interpreted to continue to be representative of background groundwater quality at the Matawatchan site in 2021.

Monitoring well 91-2C, located within the existing limit of waste at the site, has historically been used to characterize leachate quality at the Matawatchan site (Figures 3 and 4). In 2021, most parameter concentrations in samples collected from leachate well 91-2C were above the median background concentrations (Table 4). Non-conformances of ODWS and significant groundwater trends at leachate groundwater monitoring location 91-2C were as follows (Table 4):

Monitoring Well	ODWS Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
91-2C	<ul style="list-style-type: none"> Manganese 	<ul style="list-style-type: none"> Manganese 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> Alkalinity Calcium Chloride Conductivity (lab-tested) Manganese Total Dissolved Solids (TDS)

In 2021, groundwater samples collected from 91-2C did not exhibit non-conformances of ODWS for concentrations of volatile organic compounds (VOC; Table 4). Groundwater quality at 91-2C was interpreted to be impacted from landfill-related factors in 2021, consistent with the historical interpretation that groundwater results from 91-2C characterize leachate quality at the site (Greenview, 2021). Decreasing trends noted in groundwater quality results over the past five (5) years were interpreted to represent that landfill-related impacts at 91-2C are diminishing over time. Iron concentrations at 91-2C (leachate well) have generally been historically lower than those documented in the background at monitoring wells 95-1 and 95-4 (Table 4).

Groundwater monitoring well 91-4A is located east and approximately 50 m downgradient of the limit of waste (Figures 3 and 4). Consistent with historical results, flowing conditions were observed for 91-4A during the spring 2021 groundwater sampling event at the Matawatchan site (Table 3; Appendix B). In 2021, many parameter

concentrations in samples collected from 91-4A were above the median background concentrations (Table 4). Non-conformances of ODWS and significant groundwater trends at groundwater monitoring location 91-4A were as follows (Table 4):

Monitoring Well	ODWS Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
91-4A	<ul style="list-style-type: none"> Manganese 	<ul style="list-style-type: none"> TDS 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> Nitrate

Based on 2021 results, 91-4A was not interpreted to be significantly impacted by landfill-related factors (Table 4; Figures 3 and 4). Consistent with recent results, impacts related to the closed waste mound were interpreted to be decreasing with time in the vicinity of 91-4A (Greenview, 2021).

As noted in previous MECP TSS surface water review comments (Greenview, 2009), it was recommended that groundwater quality from monitoring well 91-4A be compared to the PWQO (MECP, 1994b), given that groundwater was interpreted to discharge to surface in the vicinity of 91-4A based on the observation of flowing conditions of the well during historical spring sampling events (Table 3). Non-conformances of PWQO and Table B of the TGD at 91-4A (and from background monitoring wells 95-1 and 95-4 for comparison purposes) were as follows (Table 5):

Monitoring Well	PWQO Non-Conformance		Table B of TGD Non-Conformance	
	Spring 2021	Fall 2021	Spring 2021	Fall 2021
95-1 (background)	<ul style="list-style-type: none"> Iron 	<ul style="list-style-type: none"> Iron 	<ul style="list-style-type: none"> Nitrite 	<ul style="list-style-type: none"> None
95-4 (background)	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Nitrite 	<ul style="list-style-type: none"> None
91-4A	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Boron 	<ul style="list-style-type: none"> Nitrite 	<ul style="list-style-type: none"> None

Consistent with historical results, boron concentrations were not in conformance with the PWQO for the fall 2021 sampling event at 91-4A (Table 5). However, the concentration of boron did not exceed the limits of Table B of the TGD in fall 2021 at 91-4A. Minor non-conformances of the Table B limit for concentrations of nitrite were documented in both background monitoring wells 95-1 and 95-4 and in monitoring well 91-4A in spring 2021. Given that the non-conformances for nitrite were noted in both background wells as well as in monitoring well 91-4A, the non-conformances were not interpreted to be significant.

Monitoring well 95-3B is located approximately 40 m southeast of monitoring well 91-4A, and approximately 80 m east and downgradient of the limit of waste at the Matawatchan site (Figures 3 and 4). In 2021, no groundwater samples were obtained from monitoring well 95-3B in spring 2021 as it was observed to be damaged (Table 4; Appendix D). As noted in the 2020 Annual Report (Greenview, 2021), a detailed review of the condition of monitoring well 95-3B was completed as part of the spring 2021 sampling event, and based on the condition assessment, it was repaired by Greenview in summer 2021. During the fall 2021 sampling event, monitoring well 95-3B was documented to be dry and no sample was obtained. Non-conformances of ODWS and significant groundwater trends at groundwater monitoring location 95-3B were as follows (Table 4):

Monitoring Well	ODWS Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
95-3B	<ul style="list-style-type: none"> No sample (damaged well) 	<ul style="list-style-type: none"> Dry – No sample 	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> n/a

Monitoring well 95-3B will continue to be monitored in future groundwater sampling events at the Matawatchan Waste Disposal Site.

Groundwater quality at the southeastern downgradient property boundary at the Matawatchan site was assessed at nested monitoring wells 95-2A and 95-2B, which are located approximately 85 m east of the limit of waste (Figures 3 and 4). 95-2A was added to the environmental monitoring program in 2010, in accordance with recommendations of the MECP TSS review comments to the Closure Plan (Greenview, 2010). In 2021, most parameter concentrations in samples collected from 95-2A and 95-2B were above the median background concentrations (Table 4). Consistent with recent historical results (Greenview, 2021), monitoring well 95-2A was not sampled in fall 2021, as it was observed to have insufficient water for sampling purposes (Appendix B). Non-conformances of ODWS and significant groundwater trends at groundwater monitoring locations 95-2A and 95-2B were as follows (Table 4):

Monitoring Well	ODWS Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
95-2A	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Insufficient water for sampling purposes 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> No significant trends
95-2B	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Iron 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> No significant trends

Neither 95-2A or 95-2B were interpreted to be significantly impacted from landfill-related factors 2021 (Table 4). Impacts related to the closed waste mound were interpreted to be decreasing with time in the vicinity of 95-2A and 95-2B.

4.1.3 Reasonable Use Concept Assessment

In an effort to assess potential landfill-related impacts migrating beyond the site boundary, the RUC was used as an assessment tool to monitor downgradient impacts from the Matawatchan Waste Disposal Site. Downgradient impacts are typically assessed using the MECP RUC at monitoring wells located at, or in close proximity to, the downgradient property boundary. The downgradient monitoring wells located near the property boundary were compared to trigger concentrations for specific parameters as determined by groundwater quality at the site using the RUC for groundwater (MECP Procedure B-7-1, 1994a).

The MECP Procedure B-7-1: Determination of Contaminant Limits and Attenuation Zones iterates that in accordance with the appropriate criteria for particular uses, a change in groundwater quality on an adjacent property as a result of landfilling activities will only be accepted by the MECP as follows:

The quality cannot be degraded by an amount in excess of 50% of the difference between background and the Ontario Drinking Water Standards for non-health related parameters and in excess of 25% of the difference between background and the Ontario Drinking Water Standards for health-related parameters. Background is considered to be the quality of the groundwater prior to any man-made contamination.

MECP Procedure B-7-1

The RUC assessment was conducted using the concepts and procedures outlined in MECP Procedure B-7-1 (MECP, 1994a), specifically using the median value of individual parameter concentrations from background monitoring wells 95-1 and 95-4 to characterize natural groundwater quality at the site. Groundwater monitoring wells 95-2A and 95-2B were used for monitoring downgradient impacts at the property boundary southeast of the Matawatchan site, and for assessing site compliance with the RUC and MECP Guideline B-7.

All parameters tested as part of the established annual monitoring program were used as groundwater triggers, and a respective RUC criteria value was calculated for each parameter at the Matawatchan Waste Disposal Site. The trigger concentrations used to assess RUC compliance for the groundwater regime at the site are based on the MECP RUC for each of the respective parameters.

The RUC values for individual parameters should be generated each year based on analytical results obtained from the groundwater monitoring program. If RUC exceedances are noted, then action will be undertaken as appropriate and necessary in accordance with a defined groundwater contingency plan for the site. In cases where a groundwater contingency plan is not defined, a meeting with representatives of the district MECP office should be held to develop an appropriate contingency plan, as necessary and appropriate for the particular site.

Non-conformances of RUC in spring and fall 2021 from groundwater results at downgradient monitoring wells 95-2A and 95-2B (and from background monitoring wells 95-1 and 95-4 for comparison purposes) are included in the table below:

Monitoring Well	RUC Non-Conformance	
	Spring 2021	Fall 2021
95-1 (background)	<ul style="list-style-type: none"> • Iron • Manganese 	<ul style="list-style-type: none"> • Iron • Manganese
95-4 (background)	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • None
95-2A	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Insufficient water for sampling purposes
95-2B	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Alkalinity • Iron • TDS

No RUC non-conformances were documented in downgradient RUC monitoring well 95-2A in spring 2021, and no sample was obtained during the fall 2021 sampling event due to low-water conditions (Table 4). No RUC non-conformances were documented in results for monitoring well 95-2B in spring 2021, while RUC non-conformances for concentrations of alkalinity, iron, and TDS for the fall 2021 sampling event. The noted RUC non-conformances from monitoring well 95-2B were attributed to the low groundwater conditions noted across the site in fall 2021, and not to landfill-related factors. The concentrations of alkalinity and TDS were only slightly elevated above the RUC limit, while the iron concentration in results from 95-2B for fall 2021 was noted to be less than the concentration documented in background monitoring well 95-1 for the same sampling event (Table 4).

There are no known users of groundwater immediately downgradient and southeast of the site, and as no RUC non-conformances attributed to landfill-related impacts were documented in 2021 results from at the downgradient monitoring wells located near the downgradient property boundary, the Matawatchan Waste Disposal Site was not interpreted to be significantly impacting groundwater quality at the adjacent property boundary in 2021 and the site was interpreted to meet the intent of MECP Guideline B-7.

Consistent with previous Annual Reports (Greenview, 2021), for trend analysis review purposes, Graph 1 (Trend Analysis – Total Dissolved Solids) was prepared for this report to demonstrate that since 2011, TDS concentrations in leachate monitoring well 91-2C, and RUC monitoring wells 95-2A and 95-2B, were interpreted to be generally decreasing. Based on documented groundwater quality results (Table 4), impacts related to the

closed landfill were interpreted to be decreasing with time. Continued sampling and analysis are required to monitor site conformance with Guideline B-7 and to confirm the interpreted decreasing trends for TDS downgradient of the Matawatchan site.

4.2 Surface Water Quality Assessment

As part of the spring and fall 2021 surface water sampling events, physical characteristics of sampling locations SW-1, SW-2, and SW-3 (background) were recorded.

For the spring 2021 sampling event, depth (m), width (m), velocity (metres per second, m/s), and discharge (cubic metres per second, m³/s) were measured and calculated with results as follows:

Spring 2021				
Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m ³ /s)
SW-1	No sample (dry)			
SW-2	0.15	0.30	No discernible flow	
SW-3 (background)	0.20	0.45	0.20	0.016

For the fall 2021 sampling event, depth (m), width (m), velocity (m/s), and discharge (m³/s) were measured and calculated with results as follows:

Fall 2021				
Sample Location	Depth (m)	Width (m)	Velocity (m/s)	Discharge (m ³ /s)
SW-1	No sample (dry)			
SW-2	0.15	1.00	No discernible flow	
SW-3 (background)	0.15	0.5	0.20	0.014

Surface water quality results for the Matawatchan site were compared to PWQO (MECP, 1994b) and the results of the 2021 surface water monitoring program are presented in Table 6. Surface water quality results were also compared with the Canadian Water Quality Guidelines (CWQG; Canadian Council of Resource and Environment Ministers [CCREM], 1987) for select parameters, in accordance with Table B of the MECP Technical Guidance Document (TGD; MECP, 2010). Accredited laboratory Certificates of Analysis for the surface water quality results are provided in Appendix C. Background surface water quality was established using the median of a minimum of the previous ten (10) sampling event results from background surface water monitoring location SW-3. Trend analysis was completed using results from the previous five (5) years and only significant trends are discussed in this report.

No surface water samples were obtained as part of the spring and fall 2021 sampling event from sampling location SW-1, as it was observed to have insufficient water to sample (dry) at the time of sampling (Appendix B).

The blind duplicate sample collected at surface water locations SW-2 during the spring and fall 2021 sampling events were similar to the identified samples, indicating that the results of the 2021 surface water monitoring program can be interpreted with confidence.

Historically, background surface water quality at the Matawatchan Waste Disposal Site was assessed at surface water sampling location SW-3, located on the intermittent creek south of the site and upstream of a small low-lying area southeast of the site (Figure 2). The following photographs are representative of background surface water location SW-3:

Photograph 1: Surface Water Location SW-3 (Spring 2021)



In 2021, some parameter concentrations at SW-3 in spring and fall 2021 were above median background surface water quality at the site (Table 6). Non-conformances of PWQO, and significant trends, at background surface water sampling location SW-3 were as follows (Table 6):

Sampling Location	PWQO Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
SW-3 (background)	<ul style="list-style-type: none"> Iron Phosphorus 	<ul style="list-style-type: none"> Iron Phosphorus 	<ul style="list-style-type: none"> Iron Phosphorus 	<ul style="list-style-type: none"> No significant trends

Surface water quality at SW-3 in 2021 was interpreted to be generally consistent with historical results (Table 6). Iron and phosphorus concentrations have been noted historically to be elevated in background surface water quality at the Matawatchan site, and the noted non-conformances of the PWQO were attributed to naturally occurring conditions at the site and/or off-site sources (Table 6). In 2021, the concentrations of cadmium (spring and fall) and nitrite (spring only) were in non-conformance with the limits of Table B of the TGD for results from background surface water location SW-3. Surface water quality at SW-3 was interpreted to be generally stable over time and continued to be representative of background surface water quality at the site in 2021.

Surface water quality immediately to the east of the waste mound was assessed at SW-1, located approximately 60 m downgradient of the limit of waste along an intermittent stream in the gully east of the site. The following photographs are representative of surface water location SW-1 in 2021:

Photograph 2: Surface Water Location SW-1 (Fall 2021)



Surface water location SW-1 is located in the vicinity of the historically observed groundwater seep and well 91-4A (Figures 3 and 4). Consistent with historical results, SW-1 was observed to have insufficient water to sample (dry) in spring and fall 2021 (Greenview, 2021; Appendix B). The intermittent stream on which SW-1 is located terminates to underground near downgradient monitoring well 95-2B (Figures 3 and 4), and is not directly connected to the surface water channel along which SW-3 (background) and SW-2 are located. Non-conformances of PWQO, and significant trends, at surface water sampling location SW-1 were as follows (Table 6):

Sampling Location	PWQO Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
SW-1	• No sample (dry)	• No sample (dry)	• n/a	• n/a

Surface water location SW-1 will continue to be monitored in future surface water sampling events at the Matawatchan Waste Disposal Site.

Surface water sampling location SW-2 is located southeast of the Matawatchan Waste Disposal Site on an intermittent creek, downstream of the small low-lying area, as shown on Figure 2. The following photographs are representative of surface water location SW-2 in 2021:

Photograph 3: Surface Water Location SW-2 (Spring 2021)



In 2021, few parameter concentrations at SW-2 in spring and fall 2021 were above median background surface water quality at the site (Table 6). Non-conformances of PWQO, and significant trends, at surface water sampling location SW-2 were as follows (Table 6):

Sampling Location	PWQO Non-Conformance		Five (5) Year Trend Analysis	
	Spring 2021	Fall 2021	Increasing	Decreasing
SW-2	<ul style="list-style-type: none"> Phosphorus 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> No significant trends 	<ul style="list-style-type: none"> No significant trends

In 2021, the concentrations of nitrite (spring only) was in non-conformance with the limits of Table B of the TGD for results from downstream surface water location SW-2. Given the historically observed shallow depth of the sampling location (0.15 m in spring and fall 2021; Appendix B), concentration effects have been interpreted to have occurred in samples collected at SW-2 which may have affected the observed concentrations of dissolved constituents at the sampling location (Table 6). Based on surface water quality results in 2021, significant impacts resultant of landfill-related activities were not interpreted to be occurring in the vicinity of SW-2.

Historical results at downstream location SW-2 were interpreted to suggest that significant impacts have not been occurring downstream of the Matawatchan Waste Disposal Site (Table 6).

4.3 Operations Summary

A summary of 2021 waste management operations at the Matawatchan Waste Disposal Site are presented below.

4.3.1 Site Operations

On December 31, 2009, the Matawatchan Waste Disposal Site was closed to all waste operations, in advance of final closure activities at the site. Prior to closure, the site operated as a municipal solid waste landfill, accepting municipal waste and recyclables for disposal and market. The Matawatchan site was approved to accept waste from the geographic Townships of Griffith and Matawatchan, and operated in accordance with ECA A412204 (Appendix A).

An application to amend the ECA and supporting technical information including the Closure Plan (Greenview, 2008a), were submitted to the MECP on September 19, 2008 in recognition of the operational concepts for the Township’s waste management facilities. The Closure Plan was approved by the MECP in the Amendment to the ECA for the site issued on February 26, 2010 (Appendix A).

A sign is posted at the entrance to the waste disposal site that indicates that the site was closed as of December 31, 2009, and provides addresses of other Township sites that are available to accept waste and recyclables. Access to the site is provided by County Road 71 (Matawatchan Road), approximately 1 km north of the Hamlet of Matawatchan (Figures 1 and 2).

Access to the Matawatchan site is restricted by a lockable gate at the site entrance. The site is surrounded by forested lands, which provide adequate screening and restricted access for vehicular traffic, aside of the maintained site entrance-way. The site access road extending from County Road 71 has sufficient width at the entrance and within the site to allow for unimpeded winter travel and access for emergency and snow removal equipment, when required. The site access road was observed to be in serviceable condition during the routine site inspections conducted by Greenview during site visits in 2021.

4.3.2 Waste Disposal / Transfer Summary

The Matawatchan site has been closed to all waste and recycling operations since December 31, 2009. Prior to

closure, the Matawatchan Waste Disposal Site was approved to receive municipal waste and recyclables from the geographic Townships of Griffith and Matawatchan.

Developed as part of the Closure Plan, a proposed limit of waste for final closure was defined complete with associated final contours at closure (Greenview, 2008a). As such, final closure activities in 2010 and 2011 were undertaken in accordance with the Closure Plan (Greenview, 2008a) and MECP guidelines. On September 27, 2011, a survey was conducted to update the existing site topographic data at the Matawatchan site following completion of final closure activities in 2011, which included the application of vegetative cover.

In 2013, the Township passed a new waste management by-law (By-law No. 09 – 2013), to establish, maintain and regulate a system for the disposal of municipal waste, recyclables and other refuse (Greenview, 2014).

4.3.3 Site Inspections and Maintenance

Site inspections of the Matawatchan site were conducted by Greenview on May 18, 2021 during the spring sampling event and on November 16, 2021 during the fall sampling event (Appendix B). The Township also conducted periodic inspections to verify the compliance status of the site.

The site inspections included a cursory investigation of housekeeping/litter control aspects, monitoring well maintenance requirements in accordance with O. Reg. 903 (Wells), as amended, and a general site overview for MECP regulatory compliance issues.

The application of final cover (600 mm barrier cover plus 150 mm vegetative cover) was completed at the site in 2011 inclusive of seeding of the site in order to satisfy final cover requirements. Additional seeding of the former landfilling area at the site was completed in the spring 2012, specifically to the northeast and in the vicinity of monitoring well 91-2C. The extent of cover application is consistent with the limit of waste for final closure, as recognized in the ECA (February 26, 2010; Appendix A), and as shown on Figure 2.

4.3.4 Complaints

There were no complaints received by the Township with respect to waste management operations at the Matawatchan Waste Disposal Site in 2021.

4.3.5 Monitoring and Screening Checklist

In accordance with the MECP TGD (MECP, 2010), the Monitoring and Screening Checklist for the Matawatchan Waste Disposal Site is included as Appendix D of this report.

5.0 Conclusions and Recommendations

Based on the results of the 2021 environmental monitoring program completed for the Matawatchan Waste Disposal Site, the following conclusions are provided:

- The interpreted groundwater configuration at the site was similar to historical interpretations with the predominant direction of groundwater flow interpreted to be to the east. In spring and fall 2021, the average horizontal gradients in the vicinity of and to the east of the waste mound were calculated to be 0.159 and 0.150, respectively.
- Based on groundwater elevation data, monitoring wells 91-2A and 91-2B were calculated to have a downward vertical gradient of 0.006 in spring 2021 and an upward vertical gradient of 0.015 in fall 2021, respectively. Monitoring wells 95-2A and 95-2B were calculated to have downward vertical gradients of 0.244 and 0.209 in spring and fall 2021, respectively.
- Groundwater quality at leachate monitoring well 91-2C was interpreted to be impacted from landfill-related factors, while downgradient monitoring wells 91-4A, 95-3B, 95-2A, and 95-2B were interpreted to have minor to no impacts resultant of landfill-related factors (including final closure activities). Significant impacts related to the closed Matawatchan site were not interpreted at the downgradient property boundary following completion of the 2021 groundwater monitoring program. Decreasing trends noted in groundwater quality results over the past five (5) years were interpreted to represent that landfill-related impacts are diminishing over time downgradient of the site.
- No RUC non-conformances were documented in results from downgradient RUC monitoring well 95-2A in spring 2021, and no sample was obtained during the fall 2021 sampling event due to low-water conditions. No RUC non-conformances were documented in results for monitoring well 95-2B in spring 2021, while RUC non-conformances for concentrations of alkalinity, iron, and TDS for the fall 2021 sampling event. The noted RUC non-conformances from monitoring well 95-2B were attributed to the low groundwater conditions noted across the site in fall 2021, and not to landfill-related factors. The concentrations of alkalinity and TDS were only slightly elevated above the RUC limit, while the iron concentration in results from 95-2B for fall 2021 was noted to be less than the concentration documented in background monitoring well 95-1 for the same sampling event. The Matawatchan Waste Disposal Site was not interpreted to be significantly impacting groundwater quality at the adjacent property boundary in 2021 and the site was interpreted to meet the intent of MECP Guideline B-7.
- Based on the results of the 2021 environmental monitoring program at the Matawatchan Waste Disposal Site, the groundwater monitoring program at the site was interpreted to be sufficient; however, consideration should be given by the MECP for decreasing the scope of the groundwater monitoring program at the site.
- With the inclusion of the 2021 surface water quality results, current and historical results at downstream location SW-2 were interpreted to suggest that significant impacts have not been occurring downstream of the Matawatchan Waste Disposal Site. The Matawatchan Waste Disposal Site was interpreted to be in conformance with PWQO in 2021.
- The Matawatchan site has been closed since December 31, 2009, and no waste or recycling operations were conducted at the site in 2021.

The following recommendations are provided to the Township for consideration as part of the 2022 environmental work program for the Matawatchan Waste Disposal Site:

- The 2022 groundwater monitoring program for the site should continue to include two (2) sampling events annually (spring and fall). The groundwater samples should be collected in accordance with the parameter suite shown in Table 1, for the groundwater regime at the site.

- In 2022, the surface water monitoring program at the site should continue to include two (2) sampling events annually (spring and fall), inclusive of surface water sampling stations SW-1, SW-2, and SW-3, for the parameter suite shown in Table 1, to monitor the surface water regime at the site. Collection of surface water samples during scheduled sampling events should only be conducted if sufficient quantities of water are available at the sampling location to avoid potentially biased results.
- Given that the Matawatchan site has been closed since 2009, and since recent groundwater sampling events at the site have been interpreted to represent significant attenuation downgradient of the closed waste mound and conformance with MECP Guideline B-7 at the downgradient property boundary, it is recommended that the MECP consider reductions in the scope of the groundwater monitoring program. At this time, it is recommended that the groundwater monitoring program be modified to include the sampling and analysis of the following monitoring wells twice annually in spring and fall: 95-1 (background), 95-4 (background), 91-2C (leachate), 95-2A (RUC), and 95-2B (RUC). No changes to the existing parameter suite for analysis are recommended as part of a revised groundwater monitoring program. Sampling for VOC at 91-2C annually in spring is recommended to be discontinued, given that no impacts related to VOCs have been historically apparent in results. All existing wells on-site are recommended to remain in place, such that groundwater elevations can be measured at each existing well for the establishment of groundwater contours and flow direction in future spring and fall sampling events; no monitoring wells are proposed to be decommissioned at this time. If approved by the MECP, these proposed changes should be implemented the monitoring year following formal MECP approval of the changes.

6.0 Closing

Greenview has prepared the 2021 Annual Report in accordance with MECP guidelines to document the results of the 2021 environmental monitoring program for the Matawatchan Waste Disposal Site, per Condition 2 (3) and 2 (4) of the Amended ECA.

This report is governed by the attached statement of service conditions and limitations (Appendix E).

All respectfully submitted by,

Greenview Environmental Management Limited



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Senior Project Manager / Geologist



Tyler H. Peters, P.Eng.
Project Director

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Tables



Table 1
2021 Groundwater and Surface Water Monitoring Program
Matawatchan Waste Disposal Site

Location		Frequency	Parameters		
Groundwater					
91-2C	91-4A	Twice (2x)	Alkalinity	Ammonia (total)	Boron
95-1	95-2A		Calcium	Chloride	COD
95-2B	95-3B		Copper	Ion Balance	Iron
95-4			Magnesium	Manganese	Nitrate
			Nitrite	Phenols	Potassium
			Sodium	Strontium	Sulphate
1x QA/QC		(Spring & Fall)	TDS	TKN	
			Field Measurements		
			Conductivity	Dissolved Oxygen	pH
			Temperature		
COUNT =	8				
Groundwater (Volatile Organic Compounds)					
91-2C		Once (1x)	EPA 624 Volatile Organic Compounds		
COUNT =	1	(Spring)			
Groundwater Elevations					
91-2A	91-2B	Twice (2x)	Groundwater Levels (All Wells)		
91-2C	91-4A				
95-1	95-2A				
95-2B	95-3B	(Spring & Fall)			
95-4					
COUNT =	9				
Surface Water					
SW-1	SW-2	Twice (2x)	Alkalinity	Ammonia (total)	BOD
SW-3			Boron	Cadmium	Calcium
			Chloride	COD	Copper
			Ion Balance	Iron	Magnesium
1x QA/QC			Manganese	Nitrate	Nitrite
			Phenols	Phosphorus (total)	Potassium
		(Spring & Fall)	Sodium	Strontium	Sulphate
			TDS	TKN	Zinc
			Field Measurements		
			Conductivity	Dissolved Oxygen	pH
COUNT =	4		Temperature	Un-ionized Ammonia (calculation)	

Table 2
Groundwater Monitoring Well and Surface Water Sampling Locations
Matawatchan Waste Disposal Site

Groundwater			
Monitor	Zone	Northing	Easting
91-2C	18T	5002265	334182
91-4A	18T	5002314	334255
95-1	18T	5002289	334030
95-2A	18T	5002228	334214
95-2B	18T	5002227	334216
95-3B	18T	5002287	334316
95-4	18T	5002254	334114

Surface Water			
Monitor	Zone	Northing	Easting
SW-1	18T	5002260	334215
SW-2	18T	5002147	334360
SW-3	18T	5002055	334180

Notes:

Global Positioning System (GPS) point locations acquired by Greenview using a Garmin eTrex Venture HC.

Table 3
Groundwater Elevations
Matawatchan Waste Disposal Site

Monitor	Ground Elevation (m) ¹	Top of Pipe Elevation (m) ²	Original Stick-Up (m) ³	Measured Stick-Up (m) ⁴	Depth of Well (m) ⁷	Well Diameter (mm)	Groundwater Elevation (m)													
							25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21
91-2A ⁵	96.66	97.59	0.94	0.94	35.30	38.1	87.79	87.24	88.06	86.70	88.45	87.15	88.05	86.91	88.49	86.75	88.25	87.07	87.88	86.96
91-2B ⁵	96.66	97.62	0.96	0.95	24.45	38.1	87.89	87.24	87.97	86.73	88.79	87.10	88.35	86.92	88.97	86.76	88.72	87.12	87.94	86.80
91-2C ⁵	96.66	97.63	0.96	0.95	16.49	38.1	86.33	85.26	86.27	84.92	88.20	85.07	87.97	85.00	88.61	84.98	88.47	85.17	86.57	85.03
91-4A	77.76	78.48	0.72	0.74	9.38	38.1	flowing	77.98	flowing	77.62	flowing	77.81	flowing	77.61	flowing	77.63	flowing	77.55	flowing	77.89
95-1	99.67	100.72	0.99	0.97	4.64	38.1	98.64	98.05	98.58	98.29	99.78	97.99	99.83	97.76	99.65	98.30	99.06	98.45	98.66	98.28
95-2A	71.99	72.99	1.00	1.01	4.83	38.1	67.77	67.61	67.79	Dry	67.95	67.58	67.96	67.31	68.02	Dry	67.92	67.65	67.81	67.63
95-2B	71.97	73.07	1.10	0.88	7.50	38.1	67.16	67.10	67.17	66.97	67.24	67.08	67.24	66.99	67.27	66.98	67.24	67.15	67.19	67.10
95-3B ⁸	74.07	75.05	1.15	0.98	5.96	38.1	72.19	71.63	72.21	71.61	74.11	71.71	74.21	71.47	74.01	71.44	74.25	-	-	Dry
95-4	104.38	105.41	1.03	1.02	4.51	38.1	102.18	100.76	102.09	101.53	102.73	100.47	102.70	100.40	102.56	100.21	102.47	101.96	102.17	101.66

Notes:

1. Ground elevations from SGS Lakefield Research (2004).
2. Top of pipe elevation from SGS Lakefield Research (2004).
3. Original stick-up based on survey information from SGS Lakefield Research (2004).
4. Stick-up measured by Greenview on April 24, 2007.
5. Decommissioned on November 8, 2010.
6. Top of pipe, ground elevation, stick up based on survey completed by Greenview in September 2011.
7. Depth of well below ground surface (m).
8. Monitoring well 95-3B repaired by Greenview in 2021. Ground elevation, top of pipe, and measured stick-up updated based on a survey completed on November 16, 2021.

All elevations are relative to a site specific benchmark elevation of 100.00 m.

Groundwater elevations from April 2007 to present are calculated using top of pipe elevations.

* Well casing upgrade in 2002 increased top of pipe elevation.

"-" indicates data is not available.

Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	91-2C														5-year Trends (sparkline)
				25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	79	290	30 - 500	483	470	467	461	468	450	407	390	401	413	395	377	416	414	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	< 0.1	0.08	0.06	0.05	0.07	0.14	0.12	0.08	0.10	0.05	0.06	0.05	0.05	
Boron	0.008	1.3	5	0.312	0.253	0.256	0.263	0.247	0.261	0.250	0.242	0.238	0.247	0.255	0.234	0.232	0.241	
Calcium	34	N/L	N/L	158	161	154	156	153	159	150	156	127	151	138	137	123	139	
Chemical Oxygen Demand	12	N/L	N/L	19	12	22	10	15	27	23	14	27	19	31	18	15	23	
Chloride	0.7	125	250	21	18	13.9	12.5	10.5	9.6	11.9	10.5	9.8	8.8	9.4	8.0	7.4	7.3	
Conductivity (µS/cm) ³	235	N/L	N/L	-	-	959	962	936	933	881	853	867	892	852	830	820	861	
Conductivity (µS/cm) ⁴	168	N/L	N/L	657	751	703	672	663	676	622	564	547	941	506	581	631	604	
Copper	0.002	0.5	1	0.00155	0.00125	0.003	< 0.002	< 0.002	< 0.002	0.005	0.002	< 0.002	< 0.002	0.002	< 0.002	0.0038	0.0034	
Iron	0.4	0.4	0.3	0.018	0.179	0.064	0.250	0.098	0.077	0.037	0.021	0.072	0.100	0.005	0.054	0.017	0.090	
Magnesium	3.9	N/L	N/L	24.5	26.4	26.2	29.6	26.4	27.8	26.4	25.5	23.6	26.6	25.0	25.4	23.1	24.6	
Manganese	0.078	0.078	0.05	1.09	0.937	1.57	0.700	0.932	0.725	0.662	0.710	0.490	0.653	0.596	0.624	0.722	0.536	
Nitrate (as N)	0.07	2.6	10	< 0.06	< 0.06	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	0.21	< 0.05	0.10	0.05	0.12	< 0.05	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	7.03	6.90	7.31	7.08	7.20	7.75	7.96	6.65	7.16	7.39	7.01	7.18	7.51	7.50	
Phenols	0.002	N/L	N/L	0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	
Potassium	2.3	N/L	N/L	12.3	13.3	12.6	13.5	12.3	14.1	14.6	14.3	12.2	13.5	13.3	13.1	12.0	13.1	
Sodium	1.4	101	200	23.4	15.4	19.4	16.6	17.8	15.6	16.9	15.5	18.4	15.5	17.6	13.9	16.7	15.8	
Strontium	0.058	N/L	N/L	0.912	0.921	0.942	1.00	0.888	0.965	0.908	0.888	0.840	0.931	0.876	0.841	0.808	0.868	
Sulphate	33	267	500	60	54	53	50	40	38	49	46	42	39	42	43	43	45	
Total Dissolved Solids	120	310	500	594	634	539	532	515	513	466	450	458	457	453	433	433	430	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	< 0.5	< 0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.4	0.4	0.5	0.4	0.4	0.3	
Cation Sum (meq/L)	-	N/L	N/L	-	11.2	11.1	11.3	11.0	11.3	10.8	11.0	9.42	10.8	10.1	9.90	9.10	10.0	-
Anion Sum (meq/L)	-	N/L	N/L	-	11.00	10.80	10.60	10.50	10.00	9.49	9.05	9.18	9.30	9.04	8.64	9.43	9.41	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	0.90	1.20	3.20	2.22	5.87	6.47	9.56	1.31	7.36	5.44	6.77	1.79	3.11	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.

Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	91-4A														5-year Trends (sparkline)
				25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	79	290	30 - 500	286	410	323	534	348	473	294	454	331	443	322	399	280	497	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	< 0.1	0.02	< 0.01	< 0.01	0.01	0.03	0.06	0.02	0.04	< 0.01	< 0.01	< 0.01	< 0.01	
Boron	0.008	1.3	5	0.265	0.371	0.243	0.400	0.233	0.374	0.204	0.378	0.228	0.363	0.219	0.359	0.184	0.370	
Calcium	34	N/L	N/L	95.0	147	107	178	115	165	104	183	108	158	113	149	82.7	163	
Chemical Oxygen Demand	12	N/L	N/L	8	11	14	9	6	22	14	12	15	23	8	8	7	18	
Chloride	0.7	125	250	4	9	3.8	8.9	2.4	5.2	1.9	5.6	2.6	5.6	2.7	4.7	2.5	4.3	
Conductivity (µS/cm) ³	235	N/L	N/L	-	-	699	1120	718	1030	612	998	723	954	695	899	566	1009	
Conductivity (µS/cm) ⁴	168	N/L	N/L	378	664	512	756	473	635	398	594	441	997	390	761	359	624	
Copper	0.002	0.5	1	0.0025	0.0030	0.0040	0.0030	0.0020	< 0.002	0.0040	0.0020	< 0.002	< 0.002	0.0020	0.0030	0.0023	0.0046	
Iron	0.4	0.4	0.3	0.009	0.018	< 0.005	0.010	0.009	0.020	0.011	0.018	0.006	0.012	< 0.005	0.014	0.121	0.021	
Magnesium	3.9	N/L	N/L	15.8	26.3	19.4	35.0	20.6	30.0	18.2	30.9	20.3	29.5	20.9	29.0	16.1	29.9	
Manganese	0.078	0.078	0.05	0.0162	0.0238	0.009	0.040	0.023	0.056	0.021	0.078	0.013	0.033	0.011	0.027	0.053	0.044	
Nitrate (as N)	0.07	2.6	10	0.86	1.15	0.6	0.6	1.05	0.94	0.68	0.52	1.20	0.31	0.89	0.34	0.41	0.65	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	7.36	7.25	6.02	6.83	6.62	6.74	7.10	6.78	7.20	7.35	6.99	6.68	7.04	7.37	
Phenols	0.002	N/L	N/L	0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	0.012	< 0.002	< 0.002	< 0.002	
Potassium	2.3	N/L	N/L	5.64	8.29	6.1	9.4	6.2	9.2	7.0	10.1	6.6	9.2	7.0	9.0	6.0	9.4	
Sodium	1.4	101	200	14.1	20.8	14.9	26.5	14.6	22.4	14.3	25.5	12.8	22.1	12.2	21.2	11.0	23.1	
Strontium	0.058	N/L	N/L	0.356	0.532	0.393	0.604	0.405	0.557	0.357	0.553	0.387	0.535	0.388	0.488	0.359	0.564	
Sulphate	33	267	500	48	84	51	101	39	69	30	77	43	60	38	59	31	69	
Total Dissolved Solids	120	310	500	351	609	389	634	395	566	318	532	377	504	369	464	291	521	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	< 0.5	< 0.5	0.2	0.5	0.3	0.4	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.3	
Cation Sum (meq/L)	-	N/L	N/L	-	10.60	7.74	13.1	8.24	11.9	7.49	13.0	7.79	11.5	8.07	11.0	6.09	11.8	-
Anion Sum (meq/L)	-	N/L	N/L	-	10.20	7.67	13.1	7.83	11.1	6.59	10.9	7.67	10.3	7.37	9.36	6.35	11.5	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	1.96	0.479	0.289	2.53	3.53	6.37	9.15	0.736	5.60	4.55	7.95	2.05	1.31	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.

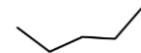
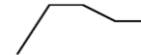




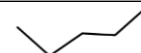



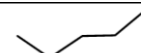

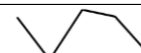
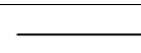
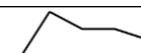
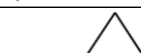
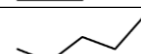

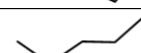

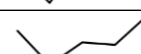
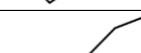
**Table 4
Groundwater Quality
Matawatchan Waste Disposal Site**

Parameter	Background (median)	RUC ¹	ODWS ²	95-1 (Background)														5-year Trends (sparkline)
				25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	79	290	30 - 500	88	77	80	79	58	77	53	63	57	67	49	68	84	83	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	< 0.1	0.03	< 0.01	< 0.01	0.01	0.02	0.10	0.02	0.04	0.02	0.01	< 0.01	0.02	
Boron	0.008	1.3	5	0.0511	0.0640	0.007	< 0.005	< 0.005	0.008	< 0.005	< 0.005	< 0.005	0.005	< 0.005	0.007	0.005	0.010	
Calcium	34	N/L	N/L	33.6	34.7	40.8	34.1	26.9	33.6	27.0	34.3	23.8	28.3	29.5	36.5	35.0	37.7	
Chemical Oxygen Demand	12	N/L	N/L	15	< 8	13	< 5	< 5	9	12	< 5	7	15	8	7	< 5	12	
Chloride	0.7	125	250	< 1	< 1	< 0.5	< 0.5	< 0.5	0.8	< 0.5	1.1	0.7	1.2	0.9	0.8	0.7	0.6	
Conductivity (µS/cm) ³	235	N/L	N/L	-	-	260	252	204	249	190	212	208	209	197	236	251	255	
Conductivity (µS/cm) ⁴	168	N/L	N/L	145	213	157	179	140	175	118	170	119	94	111	220	159	303	
Copper	0.002	0.5	1	0.00270	0.00098	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	0.0011	0.0042	
Iron	0.4	0.4	0.3	0.101	0.770	2.04	0.758	1.32	1.20	< 0.005	0.750	0.860	0.923	0.959	1.10	0.553	1.72	
Magnesium	3.9	N/L	N/L	3.04	4.98	5.28	5.49	3.94	4.96	4.01	4.69	3.77	4.07	4.46	5.45	5.39	5.60	
Manganese	0.078	0.078	0.05	0.0528	0.0606	0.183	0.105	0.103	0.073	0.113	0.069	0.078	0.063	0.121	0.147	0.085	0.136	
Nitrate (as N)	0.07	2.6	10	0.09	< 0.06	< 0.1	0.1	< 0.05	< 0.05	< 0.05	0.09	0.18	< 0.05	0.07	< 0.05	0.10	< 0.05	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.03	< 0.1	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	6.91	7.00	7.28	6.71	6.33	6.22	7.41	6.84	6.87	7.04	6.55	6.41	7.44	7.73	
Phenols	0.002	N/L	N/L	0.003	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	
Potassium	2.3	N/L	N/L	1.86	3.55	3.1	3.2	2.2	3.3	2.8	3.2	2.1	2.8	2.8	3.4	3.2	3.8	
Sodium	1.4	101	200	1.55	1.31	1.4	1.7	1.2	1.4	1.4	1.5	1.4	1.5	1.5	1.4	1.2	1.7	
Strontium	0.058	N/L	N/L	0.0687	0.0494	0.075	0.053	0.040	0.048	0.038	0.051	0.038	0.044	0.047	0.056	0.055	0.060	
Sulphate	33	267	500	22	40	40	45	33	35	36	35	38	35	33	36	40	38	
Total Dissolved Solids	120	310	500	149	151	138	138	112	137	97	108	106	110	93	113	124	115	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	< 0.5	< 0.5	0.1	0.2	1.3	0.1	0.1	0.3	< 0.1	0.1	0.2	0.1	0.1	0.1	
Cation Sum (meq/L)	-	N/L	N/L	-	2.29	2.72	2.36	1.85	2.30	1.82	2.29	1.66	1.94	2.03	2.48	2.36	2.61	-
Anion Sum (meq/L)	-	N/L	N/L	-	2.37	2.45	2.54	1.86	2.29	1.81	2.04	1.96	2.10	1.71	2.12	2.55	2.45	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	-1.75	5.36	3.77	0.312	0.201	0.0285	5.84	8.26	3.92	8.55	8.03	3.97	3.12	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.


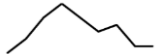
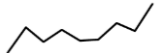

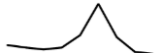




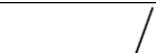
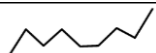

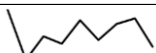
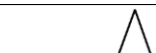


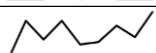


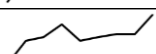


Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	95-2A							5-year Trends (sparkline)
				25-May-15	26-May-16	04-May-17	08-May-18	14-May-19	23-Apr-20	18-May-21	
Alkalinity (as CaCO ₃)	79	290	30 - 500	209	253	161	104	139	135	223	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	0.04	< 0.01	0.03	0.03	0.02	0.02	
Boron	0.008	1.3	5	0.174	0.182	0.137	0.129	0.128	0.134	0.218	
Calcium	34	N/L	N/L	67.9	89.3	53.1	35.8	47.6	50.5	65.5	
Chemical Oxygen Demand	12	N/L	N/L	16	100	68	33	58	96	56	
Chloride	0.7	125	250	4	3.4	1.1	0.9	1.7	1.7	1.7	
Conductivity (µS/cm) ³	235	N/L	N/L	-	601	374	247	346	340	469	
Conductivity (µS/cm) ⁴	168	N/L	N/L	301	443	669	168	207	174	315	
Copper	0.002	0.5	1	0.0030	0.0040	0.0030	0.0030	< 0.002	0.0030	0.0039	
Iron	0.4	0.4	0.3	< 0.007	0.006	< 0.005	0.221	1.48	0.007	0.009	
Magnesium	3.9	N/L	N/L	8.70	12.2	7.34	5.02	7.34	7.42	10.3	
Manganese	0.078	0.078	0.05	0.00192	< 0.001	0.005	0.012	0.064	0.001	0.003	
Nitrate (as N)	0.07	2.6	10	0.19	0.3	0.54	0.20	0.61	0.55	0.26	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	8.39	7.62	6.70	8.05	7.58	7.58	7.29	
Phenols	0.002	N/L	N/L	0.003	< 0.001	< 0.001	< 0.001	< 0.002	0.002	< 0.002	
Potassium	2.3	N/L	N/L	3.20	3.4	2.4	2.2	2.6	2.4	3.0	
Sodium	1.4	101	200	21.6	25.8	16.3	13.1	12.6	11.1	15.5	
Strontium	0.058	N/L	N/L	0.144	0.207	0.116	0.080	0.116	0.115	0.162	
Sulphate	33	267	500	45	53	27	15	31	28	33	
Total Dissolved Solids	120	310	500	306	327	206	126	178	173	242	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	< 0.5	1.1	0.7	0.7	0.8	1.6	1.9	
Cation Sum (meq/L)	-	N/L	N/L	-	6.67	4.02	2.84	3.68	3.68	4.87	-
Anion Sum (meq/L)	-	N/L	N/L	-	6.29	3.80	2.44	3.52	3.37	5.22	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	2.89	2.87	7.67	2.16	4.33	3.48	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.









Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	95-2B													5-year Trends (sparkline)
				25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	79	290	30 - 500	246	278	197	259	167	243	181	239	178	172	210	212	297	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	< 0.1	0.04	0.01	< 0.01	0.02	0.05	0.07	0.05	0.03	0.04	0.01	0.01	
Boron	0.008	1.3	5	0.158	0.190	0.114	0.147	0.083	0.184	0.127	0.175	0.130	0.135	0.201	0.170	0.281	
Calcium	34	N/L	N/L	88.4	96.6	64.7	78.3	47.1	81.1	58.1	84.7	54.9	57.6	75.4	63.4	101	
Chemical Oxygen Demand	12	N/L	N/L	11	10	91	113	95	72	54	71	185	480	170	34	16	
Chloride	0.7	125	250	6	7	2.9	4.3	1.3	2.7	1.8	3.0	1.8	2.2	2.3	1.6	2.0	
Conductivity (µS/cm) ³	235	N/L	N/L	-	-	455	572	391	545	428	553	423	399	488	450	640	
Conductivity (µS/cm) ⁴	168	N/L	N/L	338	451	320	343	235	360	209	334	213	191	491	296	422	
Copper	0.002	0.5	1	0.00361	0.0041	0.0040	0.0030	0.0020	0.0040	0.0040	0.0050	< 0.002	0.0040	0.0050	0.0047	0.0055	
Iron	0.4	0.4	0.3	< 0.007	0.015	0.009	0.007	0.008	0.011	0.017	0.005	0.025	0.026	0.016	0.017	0.528	
Magnesium	3.9	N/L	N/L	11.3	12.5	8.6	11.5	6.14	10.7	8.05	10.7	7.96	8.08	10.9	9.31	14.1	
Manganese	0.078	0.078	0.05	0.00038	0.00056	< 0.001	0.001	< 0.001	0.001	< 0.001	0.001	< 0.001	< 0.001	0.001	0.002	0.009	
Nitrate (as N)	0.07	2.6	10	0.46	0.17	0.5	0.4	0.43	0.15	0.28	0.24	0.37	0.26	0.35	0.38	0.22	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	6.25	6.79	7.76	6.98	6.52	6.85	7.86	7.25	7.54	7.50	7.01	7.51	7.56	
Phenols	0.002	N/L	N/L	0.003	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.003	< 0.002	0.004	< 0.002	< 0.002	< 0.002	
Potassium	2.3	N/L	N/L	3.62	4.13	2.9	3.3	2.1	3.8	3.0	3.8	2.8	2.9	3.6	3.1	4.2	
Sodium	1.4	101	200	20.2	25.2	18.0	22.4	11.9	22.5	15.5	20.9	15.8	13.6	16.3	14.8	21.5	
Strontium	0.058	N/L	N/L	0.174	0.197	0.149	0.168	0.115	0.167	0.130	0.169	0.125	0.127	0.168	0.146	0.221	
Sulphate	33	267	500	55	54	37	52	24	31	32	36	31	32	33	33	39	
Total Dissolved Solids	120	310	500	337	426	252	330	215	300	221	287	218	214	254	234	312	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	< 0.5	< 0.5	0.8	0.8	1.5	0.6	0.7	0.6	3.3	4.8	0.5	0.7	0.5	
Cation Sum (meq/L)	-	N/L	N/L	-	7.05	4.80	5.91	3.43	6.00	4.32	6.12	4.16	4.21	5.46	4.65	7.27	-
Anion Sum (meq/L)	-	N/L	N/L	-	6.87	4.81	6.42	3.88	5.59	4.36	5.63	4.28	4.17	4.96	5.00	6.82	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	1.26	0.137	4.13	6.14	3.60	0.505	4.16	1.40	0.426	4.84	3.61	3.20	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
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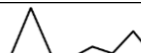



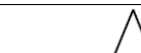



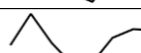



Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	95-3B										5-year Trends (sparkline)
				25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	
Alkalinity (as CaCO ₃)	79	290	30 - 500	242	342	212	376	191	303	127	311	195	292	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	< 0.1	0.04	0.10	< 0.01	0.05	0.04	0.10	0.09	0.06	
Boron	0.008	1.3	5	0.160	0.246	0.133	0.235	0.146	0.258	0.111	0.258	0.172	0.219	
Calcium	34	N/L	N/L	84.2	112.0	72.5	113	64.5	103	46.4	109	58.4	84.4	
Chemical Oxygen Demand	12	N/L	N/L	13	16	93	222	164	114	156	132	401	81	
Chloride	0.7	125	250	5	9.0	2.9	5.3	1.6	3.2	1.2	3.5	2.0	3.9	
Conductivity (µS/cm) ³	235	N/L	N/L	-	-	504	784	443	660	304	685	416	594	
Conductivity (µS/cm) ⁴	168	N/L	N/L	329	538	339	555	283	433	189	441	249	635	
Copper	0.002	0.5	1	0.00353	0.00379	0.004	0.003	0.003	0.003	0.003	< 0.002	< 0.002	0.002	
Iron	0.4	0.4	0.3	< 0.007	0.06	0.008	< 0.005	0.006	0.012	0.019	0.010	0.031	0.667	
Magnesium	3.9	N/L	N/L	10.1	14.3	9.57	16.8	8.76	13.6	6.18	13.7	8.44	12.0	
Manganese	0.078	0.078	0.05	0.00068	0.6050	0.001	0.065	< 0.001	0.027	0.002	0.038	0.003	0.069	
Nitrate (as N)	0.07	2.6	10	0.45	0.14	0.6	0.5	0.78	0.21	0.42	0.43	0.89	0.58	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	7.73	7.10	6.09	6.84	6.90	6.64	8.11	7.01	7.72	7.36	
Phenols	0.002	N/L	N/L	0.003	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.005	< 0.002	< 0.002	
Potassium	2.3	N/L	N/L	3.47	5.29	3.2	4.7	2.5	4.8	2.5	5.0	2.7	4.2	
Sodium	1.4	101	200	20.8	32.0	21.8	33.1	17.0	29.9	13.5	27.7	13.6	22.0	
Strontium	0.058	N/L	N/L	0.178	0.272	0.174	0.261	0.146	0.222	0.108	0.229	0.145	0.194	
Sulphate	33	267	500	47	63	43	61	30	33	21	40	34	39	
Total Dissolved Solids	120	310	500	326	474	278	455	244	363	156	356	215	333	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	0.6	< 0.5	1.6	2.8	3.9	3.5	3.7	2.1	9.9	0.4	
Cation Sum (meq/L)	-	N/L	N/L	-	8.29	5.43	8.57	4.74	7.69	3.48	7.91	4.28	6.31	-
Anion Sum (meq/L)	-	N/L	N/L	-	8.40	5.25	8.97	4.48	6.85	3.05	7.18	4.72	6.80	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	-0.62	1.68	2.28	2.80	5.78	6.56	4.84	4.93	3.75	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.

Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	95-4 (Background)											5-year Trends (sparkline)
				25-May-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	14-May-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	79	290	30 - 500	84	87	111	55	132	90	39	25	89	79	88	
Ammonia, Total (as N)	0.03	N/L	N/L	< 0.1	0.05	0.03	0.01	0.08	0.03	0.02	0.01	0.02	0.02	< 0.01	
Boron	0.008	1.3	5	0.0245	0.011	0.005	< 0.005	0.016	0.009	0.005	0.006	0.010	0.010	0.013	
Calcium	34	N/L	N/L	36.5	43.4	43.2	24.1	57.4	31.4	18.0	13.0	37.2	40.7	43.2	
Chemical Oxygen Demand	12	N/L	N/L	< 8	17	< 5	18	28	33	15	13	9	22	16	
Chloride	0.7	125	250	< 1	< 0.5	< 0.5	< 0.5	0.9	< 0.5	0.7	0.7	0.7	0.7	0.9	
Conductivity (µS/cm) ³	235	N/L	N/L	-	244	263	152	319	235	111	86	226	231	244	
Conductivity (µS/cm) ⁴	168	N/L	N/L	146	179	140	161	168	137	124	64	183	173	173	
Copper	0.002	0.5	1	0.0008	0.0030	< 0.002	< 0.002	< 0.002	0.0030	< 0.002	0.0030	0.0030	0.0031	0.0048	
Iron	0.4	0.4	0.3	2.29	0.0620	0.365	0.026	0.402	0.029	0.011	0.097	0.045	0.216	0.024	
Magnesium	3.9	N/L	N/L	5.12	3.85	3.58	3.01	4.62	3.43	1.98	1.45	3.52	3.81	3.46	
Manganese	0.078	0.078	0.05	0.131	0.076	0.129	0.017	0.357	0.022	0.010	0.010	0.018	0.057	0.025	
Nitrate (as N)	0.07	2.6	10	< 0.06	0.1	0.3	0.11	0.11	< 0.05	0.18	0.06	0.16	0.17	0.12	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.1	0.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	
pH (units) ⁴	7.00	6.5 - 8.5	6.5 - 8.5	7.10	6.23	7.06	6.46	6.14	7.96	6.86	6.56	6.92	7.03	7.59	
Phenols	0.002	N/L	N/L	0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	
Potassium	2.3	N/L	N/L	3.51	2.0	1.8	1.5	2.5	1.8	1.1	1.0	2.0	1.9	2.2	
Sodium	1.4	101	200	1.31	1.7	1.8	1.9	2.1	1.5	1.1	0.9	1.5	1.5	1.5	
Strontium	0.058	N/L	N/L	0.0511	0.100	0.091	0.065	0.127	0.069	0.027	0.029	0.078	0.096	0.093	
Sulphate	33	267	500	45	23	24	17	23	22	13	11	21	23	23	
Total Dissolved Solids	120	310	500	149	122	150	84	175	120	56	42	120	102	111	
Total Kjeldahl Nitrogen	0.4	N/L	N/L	< 0.5	0.4	0.5	0.5	0.5	0.4	0.2	0.2	0.2	0.4	0.3	
Cation Sum (meq/L)	-	N/L	N/L	-	2.62	2.60	1.57	3.44	1.97	1.14	0.841	2.27	2.47	2.56	-
Anion Sum (meq/L)	-	N/L	N/L	-	2.22	2.74	1.46	3.15	2.27	1.07	0.755	2.25	2.10	2.27	-
Anion-Cation Balance (% difference)	-	N/L	N/L	-	8.23	2.56	3.68	4.53	7.08	3.34	5.36	0.371	8.14	5.97	-

Notes:

1. Reasonable Use Concept (RUC) criteria.
 2. Ontario Drinking Water Standards (ODWS).
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the ODWS.
 Bold and italic values exceed RUC limits.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.

Table 4
Groundwater Quality
Matawatchan Waste Disposal Site

Parameter	ODWS ¹	91-2C						
		25-May-15	26-May-16	04-May-17	08-May-18	14-May-19	23-Apr-20	18-May-21
Acetone	N/L	-	< 0.002	< 0.002	< 0.002	< 0.03	< 0.03	< 0.03
Benzene	0.001	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bromobenzene	N/L	-	< 0.0001	< 0.0001	< 0.0001	< 0.0004	< 0.0004	< 0.0004
Bromodichloromethane	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.002	< 0.002	< 0.002
Bromoform	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.005	< 0.005	< 0.005
Bromomethane	N/L	< 0.0005	< 0.0003	< 0.0003	< 0.0003	< 0.0005	< 0.0005	< 0.0005
Carbon tetrachloride	0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Monochlorobenzene (Chlorobenzene)	0.08	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005
Chloroethane	N/L	< 0.005	< 0.0001	< 0.0001	< 0.0001	< 0.003	< 0.003	< 0.003
Chloroform	N/L	< 0.0005	< 0.0003	< 0.0003	< 0.0003	< 0.001	< 0.001	< 0.001
Chloromethane	N/L	< 0.005	< 0.0003	< 0.0003	< 0.0003	< 0.002	< 0.002	< 0.002
Chlorotoluene,2-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chlorotoluene,4-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dibromo-3-Chloropropane, 1,2-	N/L	-	< 0.001	< 0.001	< 0.001	< 0.0006	< 0.0006	< 0.0006
Dibromochloromethane	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.002	< 0.002	< 0.002
Dibromoethane,1,2- (Ethylene Dibromide)	N/L	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002
Dibromomethane	N/L	-	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.0001
Dichlorobenzene,1,2-	0.2	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichlorobenzene,1,3-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichlorobenzene,1,4-	0.005	< 0.0005	0.0003	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005
Dichlorodifluoromethane	N/L	-	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002
Dichloroethane,1,1-	N/L	< 0.0005	0.0002	< 0.0001	0.0002	< 0.0005	< 0.0005	< 0.0005
Dichloroethane,1,2-	0.005	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichloroethene, cis-1,2-	N/L	0.0021	0.0013	0.0008	0.0009	0.0005	< 0.0005	0.0006
Dichloroethene, trans-1,2-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichloroethene,1,1-	0.014	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichloromethane (Methylene Chloride)	0.05	< 0.0005	< 0.0003	< 0.0003	< 0.0003	< 0.005	< 0.005	< 0.005
Dichloropropane,1,2-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichloropropane,1,3-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichloropropane,2,2-	N/L	-	< 0.0002	< 0.0002	< 0.0002	-	-	-
Dichloropropene, cis-1,3-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichloropropene, trans-1,3-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Dichloropropene,1,1-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Ethylbenzene	0.14	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Hexachlorobutadiene	N/L	-	< 0.001	< 0.001	< 0.001	< 0.0006	< 0.0006	< 0.0006
Hexane	N/L	-	< 0.001	< 0.001	< 0.001	< 0.005	< 0.005	< 0.005
Isopropylbenzene	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Isopropyltoluene,4-	N/L	-	< 0.0004	< 0.0004	< 0.0004	< 0.0002	< 0.0002	< 0.0002
Methyl Butyl Ketone	N/L	-	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005
Methyl Ethyl Ketone	N/L	-	< 0.001	< 0.001	< 0.001	< 0.02	< 0.02	< 0.02
Methyl Isobutyl Ketone	N/L	-	< 0.001	< 0.001	< 0.001	< 0.02	< 0.02	< 0.02
Methyl-t-butyl Ether	N/L	-	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002
Naphthalene	N/L	-	< 0.0007	< 0.0007	< 0.0007	< 0.0004	< 0.0004	< 0.0004
n-Butylbenzene	N/L	-	< 0.0007	< 0.0007	< 0.0007	< 0.0004	< 0.0004	< 0.0004
n-Propylbenzene	N/L	-	< 0.0004	< 0.0004	< 0.0004	< 0.0001	< 0.0001	< 0.0001
sec-Butylbenzene	N/L	-	< 0.0005	< 0.0005	< 0.0005	< 0.0001	< 0.0001	< 0.0001
Styrene	N/L	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
tert-Butylbenzene	N/L	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Tetrachloroethane 1,1,1,2-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethane 1,1,2,2-	N/L	< 0.0005	< 0.0004	< 0.0004	< 0.0004	< 0.0005	< 0.0005	< 0.0005
Tetrachloroethene	0.03	< 0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005
Toluene	0.06	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Total Purgeables (Gasoline, C6-C10)	N/L	-	< 0.050	-	-	-	-	-
Trichlorobenzene,1,2,3-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005
Trichlorobenzene,1,2,4-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005
Trichloroethane,1,1,1-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Trichloroethane,1,1,2-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Trichloroethylene	0.005	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005
Trichlorofluoromethane	N/L	< 0.005	< 0.0001	< 0.0001	< 0.0001	< 0.005	< 0.005	< 0.005
Trichloropropane,1,2,3-	N/L	-	< 0.0002	< 0.0002	< 0.0002	< 0.0005	< 0.0005	< 0.0005
Trimethylbenzene,1,2,4-	N/L	-	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001
Trimethylbenzene,1,3,5-	N/L	-	< 0.0006	< 0.0006	< 0.0006	< 0.0001	< 0.0001	< 0.0001
Vinyl Chloride	0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Xylene (Total)	0.09	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0015	< 0.0015	< 0.0015
Xylene, m,p-	N/L	< 0.0005	< 0.0004	< 0.0004	< 0.0004	< 0.001	< 0.001	< 0.001
Xylene, o-	N/L	< 0.0005	< 0.0001	< 0.0001	< 0.0001	< 0.0005	< 0.0005	< 0.0005

Notes:
1. Ontario Drinking Water Standards (ODWS).

All results are expressed in mg/L unless otherwise stated.
Bold and shaded values exceed the ODWS.

N/L indicates No Limit.

-" indicates parameter not analyzed.

Table 5
Groundwater Quality Compared to PWQO
Matawatchan Waste Disposal Site

Parameter	PWQO ¹	95-1 (Background)													
		25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21
Alkalinity (as CaCO ₃)	25% Decrease	88	77	80	79	58	77	53	63	57	67	49	68	84	83
Ammonia, Total (as N)	N/L	< 0.1	< 0.1	0.03	< 0.01	< 0.01	0.01	0.02	0.10	0.02	0.04	0.02	0.01	< 0.01	0.02
Boron	0.2	0.0511	0.0640	0.007	< 0.005	< 0.005	0.008	< 0.005	< 0.005	< 0.005	0.005	< 0.005	0.007	0.005	0.010
Calcium	N/L	33.6	34.7	40.8	34.1	26.9	33.6	27.0	34.3	23.8	28.3	29.5	36.5	35.0	37.7
Chemical Oxygen Demand	N/L	15	< 8	13	< 5	< 5	9	12	< 5	7	15	8	7	< 5	12
Chloride	N/L	< 1	< 1	< 0.5	< 0.5	< 0.5	0.8	< 0.5	1.1	0.7	1.2	0.9	0.8	0.7	0.6
Conductivity (µS/cm) ²	N/L	-	-	260	252	204	249	190	212	208	209	197	236	251	255
Conductivity (µS/cm) ³	N/L	145	213	157	179	140	175	118	170	119	94	111	220	159	303
Copper	0.005	0.00270	0.00098	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	0.001	0.0042
Iron	0.3	0.101	0.770	2.04	0.758	1.32	1.20	< 0.005	0.750	0.860	0.923	0.959	1.10	0.55	1.72
Magnesium	N/L	3.04	4.98	5.28	5.49	3.94	4.96	4.01	4.69	3.77	4.07	4.46	5.45	5.39	5.60
Manganese	N/L	0.0528	0.0606	0.183	0.105	0.103	0.073	0.113	0.069	0.078	0.063	0.121	0.147	0.085	0.136
Nitrate (as N)	N/L	0.09	< 0.06	< 0.1	0.1	< 0.05	< 0.05	< 0.05	0.09	0.18	< 0.05	0.07	< 0.05	0.10	< 0.05
Nitrite (as N)	N/L	< 0.03	< 0.03	< 0.1	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05
pH (units) ³	6.5 - 8.5	6.91	7.00	7.28	6.71	6.33	6.22	7.41	6.84	6.87	7.04	6.55	6.41	7.44	7.73
Phenols	0.001	0.003	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002
Potassium	N/L	1.86	3.55	3.1	3.2	2.2	3.3	2.8	3.2	2.1	2.8	2.8	3.4	3.2	3.8
Sodium	N/L	1.55	1.31	1.4	1.7	1.2	1.4	1.4	1.5	1.4	1.5	1.5	1.4	1.2	1.7
Strontium	N/L	0.0687	0.0494	0.075	0.053	0.040	0.048	0.038	0.051	0.038	0.044	0.047	0.056	0.055	0.060
Sulphate	N/L	22	40	40	45	33	35	36	35	38	35	33	36	40	38
Total Dissolved Solids	N/L	149	151	138	138	112	137	97	108	106	110	93	113	124	115
Total Kjeldahl Nitrogen	N/L	< 0.5	< 0.5	0.1	0.2	1.3	0.1	0.1	0.3	< 0.1	0.1	0.2	0.1	0.1	0.1
Cation Sum (meq/L)	N/L	-	2.29	2.72	2.36	1.85	2.30	1.82	2.29	1.66	1.94	2.03	2.48	2.36	2.61
Anion Sum (meq/L)	N/L	-	2.37	2.45	2.54	1.86	2.29	1.81	2.04	1.96	2.10	1.71	2.12	2.55	2.45
Anion-Cation Balance (% difference)	N/L	-	-1.75	5.36	3.77	0.312	0.201	0.0285	5.84	8.26	3.92	8.55	8.03	3.97	3.12

Notes:

1. Provincial Water Quality Objectives (PWQO).
2. Results obtained from laboratory analysis.
3. Results obtained from field analysis.

All results are expressed in mg/L unless otherwise stated.

Bold and shaded values exceed the PWQO.

N/L indicates No Limit.

"-" indicates parameter not analyzed.

**Table 5
Groundwater Quality Compared to PWQO
Matawatchan Waste Disposal Site**

Parameter	PWQO ¹	95-4 (Background)										
		25-May-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	14-May-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21
Alkalinity (as CaCO ₃)	25% Decrease	84	87	111	55	132	90	39	25	89	79	88
Ammonia, Total (as N)	N/L	< 0.1	0.05	0.03	0.01	0.08	0.03	0.02	0.01	0.02	0.02	< 0.01
Boron	0.2	0.0245	0.011	0.005	< 0.005	0.016	0.009	0.005	0.006	0.010	0.010	0.013
Calcium	N/L	36.5	43.4	43.2	24.1	57.4	31.4	18.0	13.0	37.2	40.7	43.2
Chemical Oxygen Demand	N/L	< 8	17	< 5	18	28	33	15	13	9	22	16
Chloride	N/L	< 1	< 0.5	< 0.5	< 0.5	0.9	< 0.5	0.7	0.7	0.7	0.7	0.9
Conductivity (µS/cm) ²	N/L	-	244	263	152	319	235	111	86	226	231	244
Conductivity (µS/cm) ³	N/L	146	179	140	161	168	137	124	64	183	173	173
Copper	0.005	0.00075	0.003	< 0.002	< 0.002	< 0.002	0.003	< 0.002	0.003	0.003	0.0031	0.0048
Iron	0.3	2.29	0.062	0.365	0.026	0.402	0.029	0.011	0.097	0.045	0.216	0.024
Magnesium	N/L	5.12	3.85	3.58	3.01	4.62	3.43	1.98	1.45	3.52	3.81	3.46
Manganese	N/L	0.131	0.076	0.129	0.017	0.357	0.022	0.010	0.010	0.018	0.057	0.025
Nitrate (as N)	N/L	< 0.06	0.1	0.3	0.11	0.11	< 0.05	0.18	0.06	0.16	0.17	0.12
Nitrite (as N)	N/L	< 0.03	< 0.1	0.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05
pH (units) ³	6.5 - 8.5	7.10	6.23	7.06	6.46	6.14	7.96	6.86	6.56	6.92	7.03	7.59
Phenols	0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Potassium	N/L	3.51	2.0	1.8	1.5	2.5	1.8	1.1	1.0	2.0	1.9	2.2
Sodium	N/L	1.31	1.7	1.8	1.9	2.1	1.5	1.1	0.9	1.5	1.5	1.5
Strontium	N/L	0.0511	0.100	0.091	0.065	0.127	0.069	0.027	0.029	0.078	0.096	0.093
Sulphate	N/L	45	23	24	17	23	22	13	11	21	23	23
Total Dissolved Solids	N/L	149	122	150	84	175	120	56	42	120	102	111
Total Kjeldahl Nitrogen	N/L	< 0.5	0.4	0.5	0.5	0.5	0.4	0.2	0.2	0.2	0.4	0.3
Cation Sum (meq/L)	N/L	-	2.62	2.60	1.57	3.44	1.97	1.14	0.841	2.27	2.47	2.56
Anion Sum (meq/L)	N/L	-	2.22	2.74	1.46	3.15	2.27	1.07	0.755	2.25	2.10	2.27
Anion-Cation Balance (% difference)	N/L	-	8.23	2.56	3.68	4.53	7.08	3.34	5.36	0.371	8.14	5.97

Notes:

1. Provincial Water Quality Objectives (PWQO).
2. Results obtained from laboratory analysis.
3. Results obtained from field analysis.

All results are expressed in mg/L unless otherwise stated.

Bold and shaded values exceed the PWQO.

N/L indicates No Limit.

"-" indicates parameter not analyzed.

Table 5
Groundwater Quality Compared to PWQO
Matawatchan Waste Disposal Site

Parameter	PWQO ¹	91-4A													
		25-May-15	19-Oct-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	30-Oct-18	14-May-19	17-Oct-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21
Alkalinity (as CaCO ₃)	25% Decrease	286	410	323	534	348	473	294	454	331	443	322	399	280	497
Ammonia, Total (as N)	N/L	< 0.1	< 0.1	0.02	< 0.01	< 0.01	0.01	0.03	0.06	0.02	0.04	< 0.01	< 0.01	< 0.01	< 0.01
Boron	0.2	0.265	0.371	0.243	0.400	0.233	0.374	0.204	0.378	0.228	0.363	0.219	0.359	0.184	0.370
Calcium	N/L	95	147	107	178	115	165	104	183	108	158	113	149	82.7	163
Chemical Oxygen Demand	N/L	8	11	14	9	6	22	14	12	15	23	8	8	7	18
Chloride	N/L	4	9	3.8	8.9	2.4	5.2	1.9	5.6	2.6	5.6	2.7	4.7	2.5	4.3
Conductivity (µS/cm) ²	N/L	-	-	699	1120	718	1030	612	998	723	954	695	899	566	1009
Conductivity (µS/cm) ³	N/L	378	664	512	756	473	635	398	594	441	997	390	761	359	624
Copper	0.005	0.0025	0.0030	0.0040	0.0030	0.0020	< 0.002	0.0040	0.0020	< 0.002	< 0.002	0.0020	0.0030	0.0023	0.0046
Iron	0.3	0.009	0.018	< 0.005	0.010	0.009	0.020	0.011	0.018	0.006	0.012	< 0.005	0.014	0.121	0.021
Magnesium	N/L	15.8	26.3	19.4	35.0	20.6	30.0	18.2	30.9	20.3	29.5	20.9	29.0	16.1	29.9
Manganese	N/L	0.0162	0.0238	0.009	0.040	0.023	0.056	0.021	0.078	0.013	0.033	0.011	0.027	0.053	0.044
Nitrate (as N)	N/L	0.86	1.15	0.6	0.6	1.05	0.94	0.68	0.52	1.20	0.31	0.89	0.34	0.41	0.65
Nitrite (as N)	N/L	< 0.03	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05
pH (units) ³	6.5 - 8.5	7.36	7.25	6.02	6.83	6.62	6.74	7.10	6.78	7.20	7.35	6.99	6.68	7.04	7.37
Phenols	0.001	0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	0.012	< 0.002	< 0.002	< 0.002
Potassium	N/L	5.64	8.29	6.1	9.4	6.2	9.2	7.0	10.1	6.6	9.2	7.0	9.0	6.0	9.4
Sodium	N/L	14.1	20.8	14.9	26.5	14.6	22.4	14.3	25.5	12.8	22.1	12.2	21.2	11.0	23.1
Strontium	N/L	0.356	0.532	0.393	0.604	0.405	0.557	0.357	0.553	0.387	0.535	0.388	0.488	0.359	0.564
Sulphate	N/L	48	84	51	101	39	69	30	77	43	60	38	59	31	69
Total Dissolved Solids	N/L	351	609	389	634	395	566	318	532	377	504	369	464	291	521
Total Kjeldahl Nitrogen	N/L	< 0.5	< 0.5	0.2	0.5	0.3	0.4	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.3
Cation Sum (meq/L)	N/L	-	10.6	7.74	13.1	8.24	11.9	7.49	13.0	7.79	11.5	8.07	11.0	6.1	11.8
Anion Sum (meq/L)	N/L	-	10.2	7.67	13.1	7.83	11.1	6.59	10.9	7.67	10.3	7.37	9.36	6.35	11.5
Anion-Cation Balance (% difference)	N/L	-	1.96	0.479	0.289	2.53	3.53	6.37	9.15	0.736	5.60	4.55	7.95	2.05	1.31

Notes:

1. Provincial Water Quality Objectives (PWQO).
2. Results obtained from laboratory analysis.
3. Results obtained from field analysis.




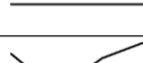


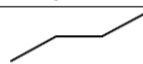
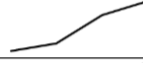


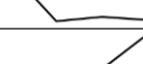


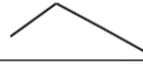






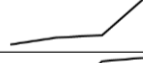


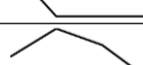
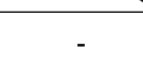



All results are expressed in mg/L unless otherwise stated.

Bold and shaded values exceed the PWQO.

N/L indicates No Limit.

"-" indicates parameter not analyzed.

Table 6
Surface Water Quality
Matawatchan Waste Disposal Site

Parameter	Background (75th Percentile)	PWQO ¹	SW-1						5-year Trends (sparkline)
			25-May-15	26-May-16	04-May-17	08-May-18	14-May-19	23-Apr-20	
Alkalinity (as CaCO ₃)	132	25 % Decrease	236	316	192	132	169	191	
Ammonia, Total (as N)	0.1	N/L	0.1	0.02	< 0.01	0.02	0.09	0.02	
Ammonia, Un-ionized (as N) ²	0.00038	0.02	0.0002	0.00003	0.00001	0.00028	0.00037	0.00007	
Biological Oxygen Demand	4	N/L	< 4	< 2	< 2	< 2	< 3	< 3	
Boron	0.0083	0.2	0.183	0.260	0.201	0.126	0.192	0.228	
Cadmium	0.000022	0.0002	0.000205	0.00005	0.000098	0.000019	0.000029	0.000024	
Calcium	51	N/L	81.7	105	62.9	51.7	66.4	74.9	
Chemical Oxygen Demand	15	N/L	14	28	12	15	15	18	
Chloride	15	N/L	5	4.7	1.5	1.6	2.0	2.2	
Conductivity (µS/cm) ³	342	N/L	-	707	451	304	424	470	
Conductivity (µS/cm) ⁴	241	N/L	120	532	298	212	255	232	
Copper	0.0015	0.005	0.0129	0.0041	0.0068	0.0023	0.0027	0.0024	
Dissolved Oxygen ⁴	14.04	5	10.22	12.66	11.99	10.80	12.23	15.82	
Iron	0.104	0.3	0.836	0.060	0.036	0.046	0.056	0.012	
Magnesium	7.86	N/L	10.5	14.7	8.87	7.32	8.58	10.2	
Manganese	0.013	N/L	0.363	0.064	0.015	0.019	0.016	0.013	
Nitrate (as N)	0.09	N/L	0.96	0.5	0.76	0.46	0.90	0.92	
Nitrite (as N)	0.06	N/L	< 0.03	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	
pH (units) ⁴	8.01	6.5 - 8.5	6.99	6.87	6.83	7.87	7.46	7.44	
Phenols	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	
Phosphorus, Total	0.02	0.03	0.088	0.03	0.02	0.01	0.02	< 0.01	
Potassium	2.1	N/L	3.81	3.9	2.6	2.3	2.7	3.1	
Sodium	7.2	N/L	24.3	29.7	16.7	14.9	13.5	15.0	
Strontium	0.12	N/L	0.182	0.260	0.148	0.151	0.152	0.170	
Sulphate	14	N/L	55	59	31	22	34	35	
Total Dissolved Solids	192	N/L	331	391	248	156	229	236	
Total Kjeldahl Nitrogen	0.5	N/L	< 0.5	0.5	0.6	0.4	0.4	0.4	
Zinc	0.009	0.02	0.007	< 0.005	0.008	0.018	0.012	< 0.005	
Cation Sum (meq/L)	-	N/L	6.10	7.86	4.66	3.89	4.68	5.31	-
Anion Sum (meq/L)	-	N/L	6.01	7.71	4.52	3.16	4.21	4.67	-
Anion-Cation Balance (% Difference)	-	N/L	0.67	0.950	1.59	10.40	5.28	6.38	-

Notes:

1. Provincial Water Quality Objectives (PWQO).
2. Calculated using Total Ammonia and field analysis.
3. Results obtained from laboratory analysis.
4. Results obtained from field analysis.


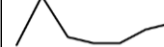

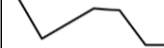





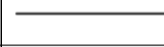
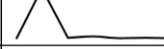
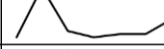



All results are expressed in mg/L unless otherwise stated.

Bold and shaded values exceed the PWQO.

N/L indicates No Limit.

"-" indicates parameter not analyzed.





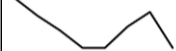



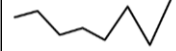
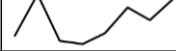







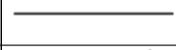



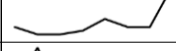
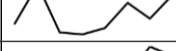
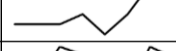
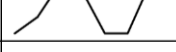
Table 6
Surface Water Quality
Matawatchan Waste Disposal Site

Parameter	Background (75th Percentile)	PWQO ¹	SW-2										5-year Trends (sparkline)
			25-May-15	26-May-16	26-Oct-16	04-May-17	25-Oct-17	08-May-18	14-May-19	23-Apr-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	132	25 % Decrease	137	140	171	91	178	101	91	89	134	166	
Ammonia, Total (as N)	0.1	N/L	< 0.1	0.02	0.01	< 0.01	0.10	0.02	0.03	0.01	< 0.01	0.02	
Ammonia, Un-ionized (as N) ²	0.00038	0.02	0.0006	0.00004	0.00008	0.00001	0.00012	0.00001	0.00027	0.00005	0.00011	0.00022	
Biological Oxygen Demand	4	N/L	< 4	< 2	< 2	< 2	9	< 2	< 3	< 3	< 3	< 3	
Boron	0.0083	0.2	0.0196	0.007	< 0.005	0.017	0.066	0.005	0.005	< 0.005	0.008	< 0.005	
Cadmium	0.000022	0.0002	0.000019	0.00002	< 0.00002	0.000083	0.00147	0.000025	0.000061	< 0.000015	< 0.000015	< 0.000015	
Calcium	51	N/L	47.6	48.0	60.8	34.7	82.1	42.3	36.6	36.2	49.5	55.2	
Chemical Oxygen Demand	15	N/L	< 8	19	< 5	6	575	27	17	11	< 5	6	
Chloride	15	N/L	7	4.2	5.3	10.6	6.3	7.8	9.3	9.1	5.7	5.7	
Conductivity (µS/cm) ³	342	N/L	-	303	373	251	381	235	234	241	307	354	
Conductivity (µS/cm) ⁴	241	N/L	190	201	225	166	270	165	140	121	216	246	
Copper	0.0015	0.005	0.00131	0.0018	0.0003	0.0054	0.0551	0.0019	0.0033	0.0009	0.0009	0.0011	
Dissolved Oxygen ⁴	14.04	5	10.59	16.07	8.05	13.53	7.00	11.51	12.57	14.09	7.58	12.20	
Iron	0.104	0.3	0.224	0.276	0.478	0.019	44.8	0.387	0.941	0.006	0.080	0.022	
Magnesium	7.86	N/L	6.84	7.20	9.47	5.16	17.0	6.21	5.11	5.00	6.64	9.35	
Manganese	0.013	N/L	0.0521	0.033	0.089	0.003	7.14	0.089	0.192	0.001	0.013	0.009	
Nitrate (as N)	0.09	N/L	0.07	0.2	0.1	0.06	0.05	0.12	0.21	0.07	0.11	0.10	
Nitrite (as N)	0.06	N/L	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	
pH (units) ⁴	8.01	6.5 - 8.5	7.55	7.12	7.79	6.95	6.80	6.56	7.82	7.65	7.71	7.91	
Phenols	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	
Phosphorus, Total	0.02	0.03	0.011	0.05	0.02	0.02	2.97	0.05	0.12	< 0.01	0.04	0.02	
Potassium	2.1	N/L	1.69	1.3	1.6	1.3	3.0	1.5	1.3	1.4	1.4	1.9	
Sodium	7.2	N/L	5.11	3.4	3.7	6.0	5.4	6.6	5.3	5.6	5.5	4.1	
Strontium	0.12	N/L	0.0999	0.104	0.113	0.085	0.181	0.112	0.080	0.083	0.100	0.111	
Sulphate	14	N/L	11	10	12	11	6	8	10	12	10	11	
Total Dissolved Solids	192	N/L	160	169	204	138	210	120	123	118	147	183	
Total Kjeldahl Nitrogen	0.5	N/L	< 0.5	0.4	0.5	2.5	17.4	0.4	0.9	0.2	0.2	0.2	
Zinc	0.009	0.02	0.002	< 0.005	< 0.005	0.007	0.623	0.019	0.015	< 0.005	0.013	0.010	
Cation Sum (meq/L)	-	N/L	3.20	3.19	4.05	2.46	8.53	2.97	2.57	2.50	3.30	3.75	-
Anion Sum (meq/L)	-	N/L	3.16	3.13	3.82	2.35	3.85	2.43	2.30	2.30	3.06	3.71	-
Anion-Cation Balance (% Difference)	-	N/L	0.64	0.898	2.87	2.28	37.8	10.1	5.55	4.22	3.70	0.538	-

Notes:

1. Provincial Water Quality Objectives (PWQO).
 2. Calculated using Total Ammonia and field analysis.
 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
- All results are expressed in mg/L unless otherwise stated.
 Bold and shaded values exceed the PWQO.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.

Table 6
Surface Water Quality
Matawatchan Waste Disposal Site

Parameter	Background (75th Percentile)	PWQO ¹	SW-3 (Background)										5-year Trends (sparkline)
			25-May-15	26-May-16	04-May-17	25-Oct-17	08-May-18	14-May-19	23-Apr-20	27-Oct-20	18-May-21	16-Nov-21	
Alkalinity (as CaCO ₃)	132	25 % Decrease	132	127	82	162	92	78	96	132	129	139	
Ammonia, Total (as N)	0.1	N/L	0.2	0.02	< 0.01	0.01	0.01	< 0.01	0.01	0.01	0.01	0.01	
Ammonia, Un-ionized (as N) ²	0.00038	0.02	0.00019	0.00004	0.00001	0.00001	0.00000	0.00000	0.00005	0.00002	0.00034	0.00009	
Biological Oxygen Demand	4	N/L	< 4	< 2	< 2	< 2	< 2	< 3	< 3	< 3	< 3	< 3	
Boron	0.0083	0.2	0.0104	0.008	0.014	0.009	0.005	< 0.005	< 0.005	0.006	0.010	< 0.005	
Cadmium	0.000022	0.0002	0.000036	< 0.00002	< 0.000014	0.000016	< 0.000015	< 0.000015	< 0.000015	< 0.000015	0.000053	0.000027	
Calcium	51	N/L	47.1	43.0	33.6	56.0	40.1	32.3	38.6	50.6	46.3	51.7	
Chemical Oxygen Demand	15	N/L	10	10	13	5	19	< 5	9	13	39	25	
Chloride	15	N/L	11	5.8	13.0	14.4	9.2	10.7	8.1	15.4	7.1	17.9	
Conductivity (µS/cm) ³	342	N/L	-	284	244	390	227	217	253	342	299	371	
Conductivity (µS/cm) ⁴	241	N/L	262	211	120	273	148	130	131	275	214	252	
Copper	0.0015	0.005	0.00246	0.0006	0.0009	0.0005	0.0008	0.0008	0.0009	0.0008	0.0029	0.0019	
Dissolved Oxygen ⁴	14.04	5	10.37	18.68	15.01	12.25	11.63	13.72	11.75	17.20	11.84	12.72	
Iron	0.104	0.3	0.401	0.012	0.034	0.026	0.051	0.043	0.009	0.050	0.874	0.386	
Magnesium	7.86	N/L	6.52	5.86	4.97	8.42	5.69	4.15	5.52	7.67	6.08	9.17	
Manganese	0.013	N/L	0.0511	0.002	0.004	0.003	0.009	0.003	0.003	0.003	0.137	0.048	
Nitrate (as N)	0.09	N/L	0.07	0.1	< 0.05	0.07	< 0.05	0.17	0.09	< 0.05	0.09	< 0.05	
Nitrite (as N)	0.06	N/L	< 0.03	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	
pH (units) ⁴	8.01	6.5 - 8.5	6.69	6.96	6.93	6.72	6.07	8.20	7.61	7.28	8.20	7.89	
Phenols	0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	
Phosphorus, Total	0.02	0.03	0.042	< 0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.14	0.07	
Potassium	2.1	N/L	2.08	1.6	1.4	2.2	1.5	1.4	1.4	2.2	1.7	2.1	
Sodium	7.2	N/L	6.73	5.5	6.9	8.1	7.1	6.6	5.2	10.1	6.6	8.7	
Strontium	0.12	N/L	0.110	0.111	0.083	0.137	0.115	0.075	0.086	0.112	0.108	0.121	
Sulphate	14	N/L	12	11	11	9	9	10	13	11	11	22	
Total Dissolved Solids	192	N/L	166	161	134	215	116	112	124	176	144	194	
Total Kjeldahl Nitrogen	0.5	N/L	< 0.5	0.2	0.2	0.2	0.2	0.3	0.1	0.3	0.6	0.5	
Zinc	0.009	0.02	0.007	0.006	< 0.005	0.006	0.018	0.015	< 0.005	< 0.005	0.018	0.014	
Cation Sum (meq/L)	-	N/L	3.23	2.91	2.42	3.90	2.82	2.28	2.65	3.66	3.19	3.79	-
Anion Sum (meq/L)	-	N/L	0.64	2.94	2.24	3.84	2.29	2.08	2.43	3.28	3.01	3.74	-
Anion-Cation Balance (% Difference)	-	N/L	0.56	0.437	3.90	0.764	10.4	4.45	4.23	5.36	2.97	0.748	-

Notes:

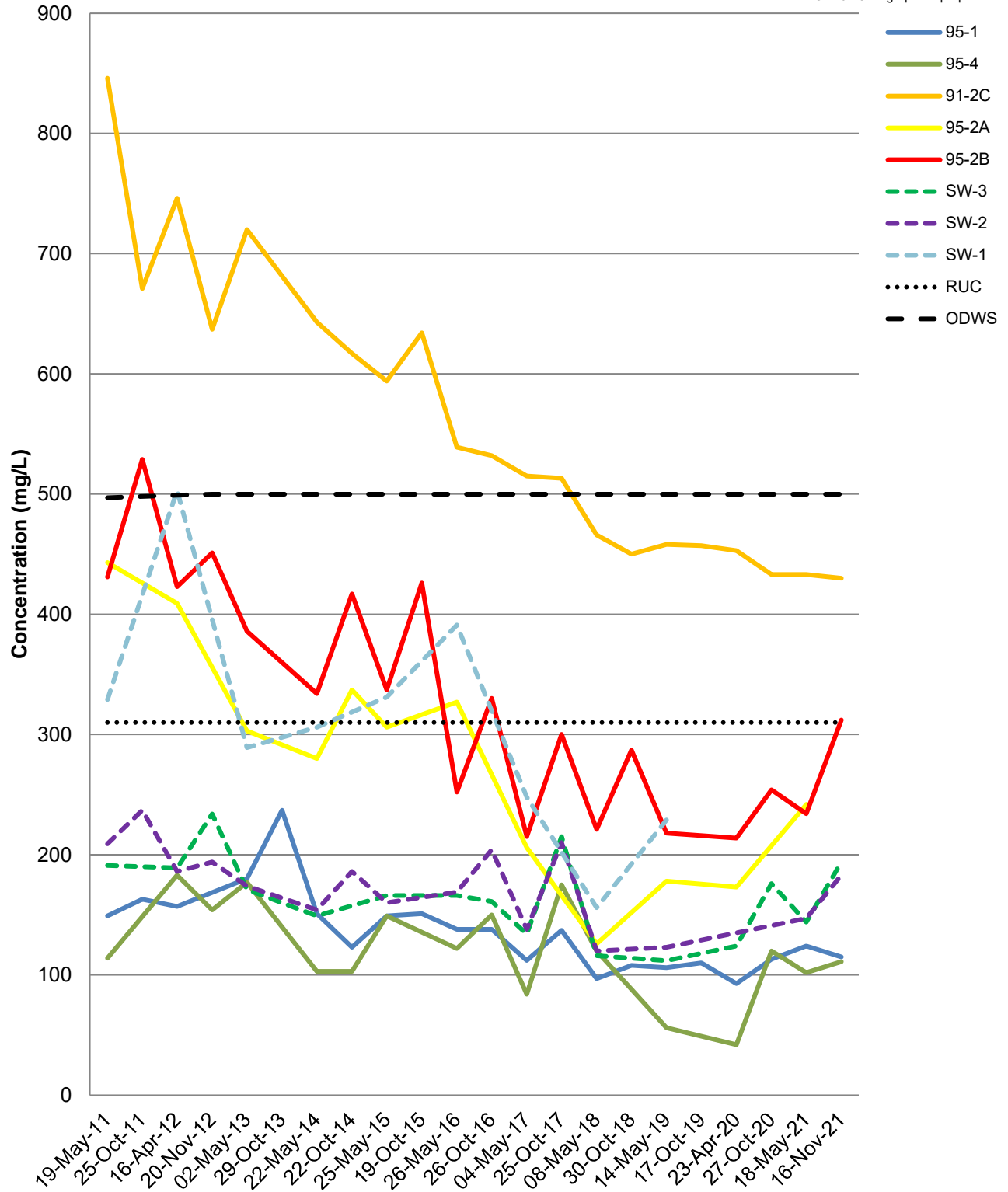
1. Provincial Water Quality Objectives (PWQO).
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 3. Results obtained from laboratory analysis.
 4. Results obtained from field analysis.
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 Bold and shaded values exceed the PWQO.
 N/L indicates No Limit.
 "-" indicates parameter not analyzed.

Graphs



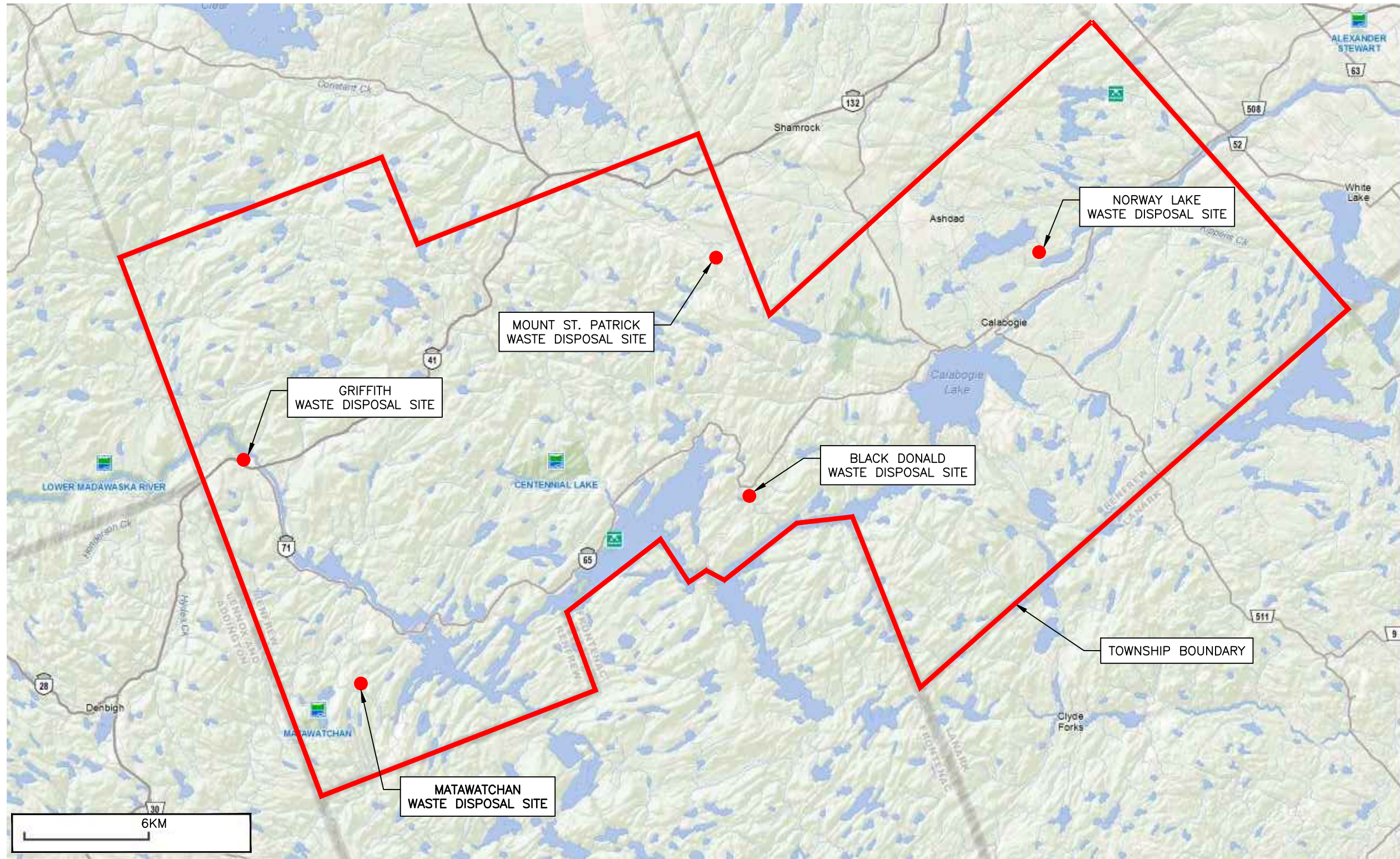
Graph 1
Trend Analysis - Total Dissolved Solids - Groundwater and Surface Water
Matawatchan Waste Disposal Site

Note:
Anomolously low TDS concentration of
63 mg/L deleted from 91-2C from
Oct29-13 for graphical purposes.



Figures





SOURCE: ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY, LAND INFORMATION ONTARIO, 2016.



13 Commerce Court
Bancroft, Ontario
613.332.0057
greenview-environmental.ca

No.	DATE	BY	REMARKS
1	MAR18-22	MAG	ISSUED FOR MECP REVIEW
0	DEC22-21	MAG	ISSUED FOR CLIENT REVIEW

DRAWN BY:	CHECKED BY:
MAG	DMH
DESIGNED BY:	APPROVED BY:
MAG	DMH
SCALE:	DATE:
AS NOTED	MAR 2022



PROJECT:

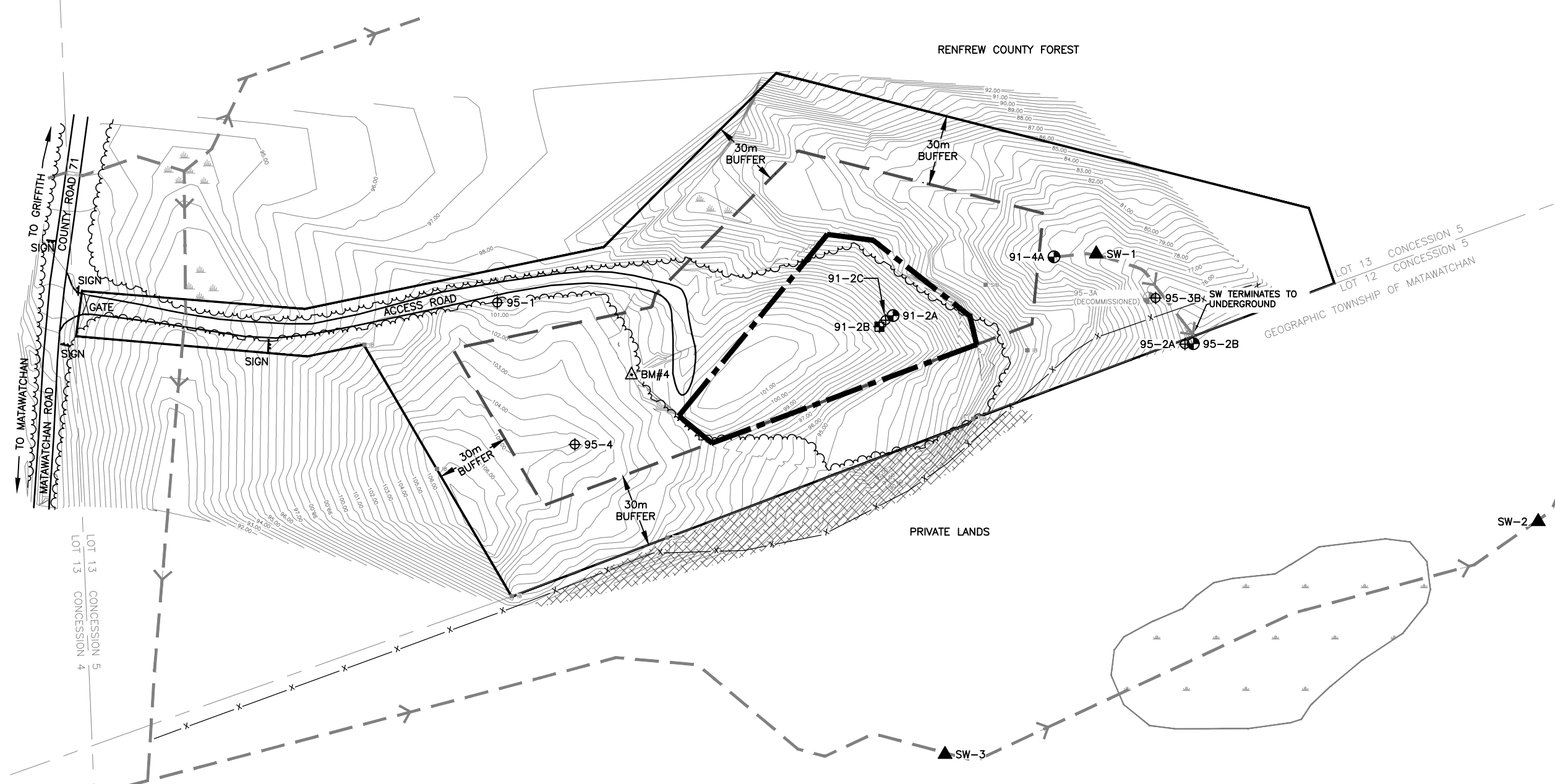
REGIONAL LOCATION PLAN
2021 ANNUAL REPORT
MATAWATCHAN WASTE DISPOSAL SITE
TOWNSHIP OF GREATER MADAWASKA

PROJECT No:
102.21.012

FIGURE:
1
1 OF 4

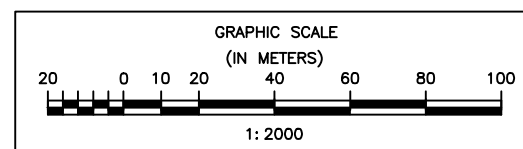
LEGEND

- PROPERTY BOUNDARY
- - - - - APPROVED WASTE DISPOSAL AREA
- ▬▬▬▬▬▬▬ LIMIT OF WASTE FOR FINAL CLOSURE
- - - 97.00 - - - FINAL CONTOURS AT CLOSURE
- IB ■ SIB PROPERTY BARS
- 98.00 — TOPOGRAPHIC CONTOUR LINE
- ▬▬▬▬▬ ON-SITE ROAD
- x-x-x-x FENCELINE
- - - - - LOT LINE
- ~ ~ ~ ~ ~ APPROXIMATE TREE LINE
- - - - - SURFACE WATER SYSTEM LOCATION
- ▨ ROCK OUTCROP
- ▭ SWAMP / MARSH
- ⊕ 95-4 SHALLOW GROUNDWATER MONITORING WELL
- ⊕ 91-2B INTERMEDIATE GROUNDWATER MONITORING WELL
- ⊕ 95-2B DEEP GROUNDWATER MONITORING WELL
- ▲ SW-3 SURFACE WATER SAMPLING LOCATION
- △ BM#4 BENCHMARK



NOTES

1. BENCHMARKS
BM#4
NAIL AND WASHER ON NORTHEAST SIDE OF TREE
SOUTHWEST OF FORMER ACTIVE AREA.
ELEVATION = 101.65m
2. DRAWING BASED ON DIGITAL INFORMATION PROVIDED BY
GOLDER ASSOCIATES, 2006.
3. TEST PITS AND LIMIT OF WASTE DEFINITION COMPLETED
BY GREENVIEW ON AUGUST 22 AND 23, 2007.
4. UPDATED TOPOGRAPHIC SURVEY COMPLETED BY
GREENVIEW ON SEPTEMBER 26, 2011.



Greenview
ENVIRONMENTAL MANAGEMENT

13 Commerce Court
Bancroft, Ontario
613.332.0057
greenview-environmental.ca

No.	DATE	BY	REMARKS
1	MAR18-22	MAG	ISSUED FOR MECP REVIEW
0	DEC22-21	MAG	ISSUED FOR CLIENT REVIEW

DRAWN BY: MAG	CHECKED BY: DMH
DESIGNED BY: MAG	APPROVED BY: DMH
SCALE: 1:2000	DATE: MAR 2022

CLIENT:

PROJECT:

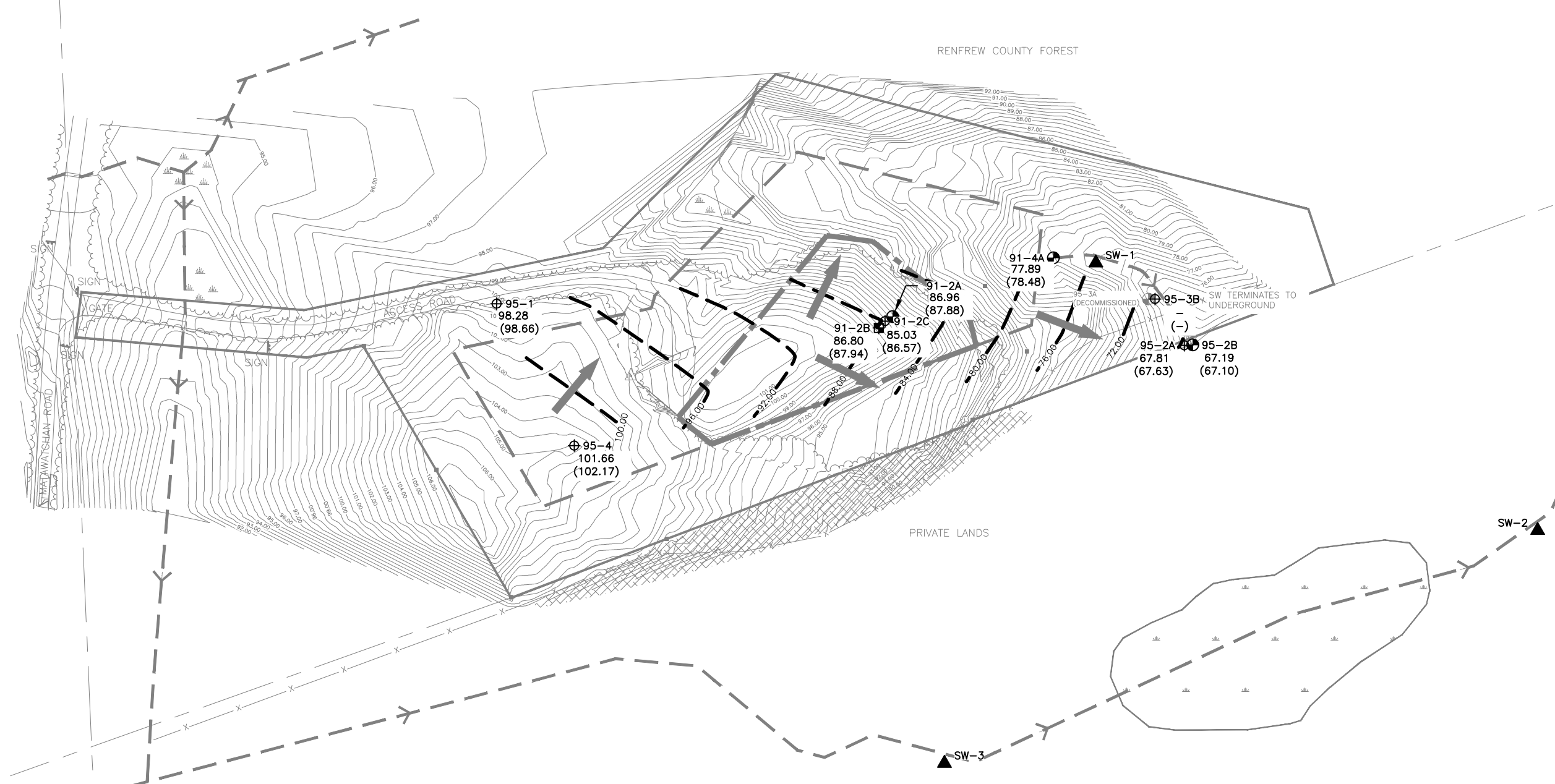
EXISTING SITE CONDITIONS PLAN
2021 ANNUAL REPORT
MATAWATCHAN WASTE DISPOSAL SITE
TOWNSHIP OF GREATER MADAWASKA

PROJECT No: 102.21.012
FIGURE: 2
2 OF 4

G:\Vita040\102_Greater Madawaska\012 Matawatchan WDS\012.012 - TGM - MATAWATCHAN WDS - 2021 AR FIGURES - FINAL.dwg

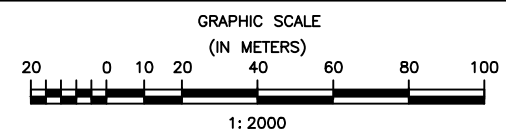
LEGEND

- PROPERTY BOUNDARY
- - - APPROVED WASTE DISPOSAL AREA
- ▬▬▬▬▬ LIMIT OF WASTE FOR FINAL CLOSURE
- - 95.00 - - FINAL CONTOURS AT CLOSURE
- IB ■ SIB PROPERTY BARS
- 97.00 — TOPOGRAPHIC CONTOUR LINE
- ON-SITE ROAD
- x - x - FENCELINE
- - - LOT LINE
- ~ ~ ~ APPROXIMATE TREE LINE
- - - - - SURFACE WATER SYSTEM LOCATION
- ▨ ROCK OUTCROP
- ▭ SWAMP / MARSH
- ⊕ 95-4 SHALLOW GROUNDWATER MONITORING WELL
- ⊕ 91-2B INTERMEDIATE GROUNDWATER MONITORING WELL
- ⊕ 95-2B DEEP GROUNDWATER MONITORING WELL
- ▲ SW-3 SURFACE WATER SAMPLING LOCATION
- 100.00 — EQUIPOTENTIAL CONTOUR (MAY 18, 2021)
- 87.03 GROUNDWATER ELEVATIONS (88.13) NOVEMBER 16, 2021 (MAY 18, 2021)
- ➔ GROUNDWATER FLOW DIRECTION
- △ BM#4 BENCHMARK



NOTES

1. BENCHMARKS
BM#4
NAIL AND WASHER ON NORTHEAST SIDE OF TREE
SOUTHWEST OF FORMER ACTIVE AREA.
ELEVATION = 101.65m
2. DRAWING BASED ON DIGITAL INFORMATION PROVIDED BY
GOLDER ASSOCIATES, 2006.
3. TEST PITS AND LIMIT OF WASTE DEFINITION COMPLETED
BY GREENVIEW ON AUGUST 22 AND 23, 2007.
4. UPDATED TOPOGRAPHIC SURVEY COMPLETED BY
GREENVIEW ON SEPTEMBER 26, 2011.



Greenview
ENVIRONMENTAL MANAGEMENT

13 Commerce Court
Bancroft, Ontario
613.332.0057
greenview-environmental.ca

No.	DATE	BY	REMARKS
1	MAR18-22	MAG	ISSUED FOR MECP REVIEW
0	DEC22-21	MAG	ISSUED FOR CLIENT REVIEW

DRAWN BY: MAG	CHECKED BY: DMH
DESIGNED BY: MAG	APPROVED BY: DMH
SCALE: 1:2000	DATE: MAR 2022

CLIENT:

PROJECT:

ENVIRONMENTAL MONITORING LOCATION PLAN – SPRING
2021 ANNUAL REPORT
MATAWATCHAN WASTE DISPOSAL SITE
TOWNSHIP OF GREATER MADAWASKA

PROJECT No:
102.21.012

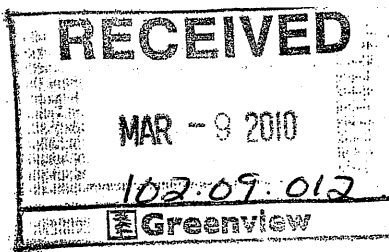
FIGURE:
3

3 OF 4

G:\Vat040\102_Greater Madawaska\012 Matawatchan WDS\Org\102.21.012 - TGM - MATAWATCHAN WDS - 2021 AR FIGURES - FINAL.dwg

Appendix A



AMENDMENT TO PROVISIONAL CERTIFICATE OF
APPROVAL
WASTE DISPOSAL SITE
NUMBER A412204
Notice No. 1
Issue Date: February 26, 2010

The Corporation of the Township of Greater Madawaska
1101 Francis St
Post Office Box, No. 180
Greater Madawaska, Ontario
K0J 1H0

Site Location: Matawatchan Waste Disposal Site
3508 Matawatchan Rd
Greater Madawaska Township, County of Renfrew

You are hereby notified that I have amended Provisional Certificate of Approval No. A412204 issued on April 2, 1980 for the use, operation and maintenance of a 2.3 hectare landfill site within a total site area of 4.9 hectare , as follows:

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

"Certificate " means this entire provisional Certificate of Approval document, issued in accordance with section 39 of the *EPA*, and includes any schedules to it, the application and the supporting documentation listed in Schedule "A";

"Director" means any *Ministry* employee appointed in writing by the Minister pursuant to section 5 of the *EPA* as a Director for the purposes of Part V of the *EPA*;

"District Manager" means the District Manager of the local district office of the *Ministry* in which the *Site* is geographically located;

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

"*Ministry* " means the Ontario Ministry of the Environment;

"Owner" means any person that is responsible for the establishment or operation of the *Site* being

approved by this *Certificate*, and includes The Corporation of the Township of Greater Madawaska successors and assigns;

"*Regional Director* " means the Regional Director of the local Regional Office of the *Ministry* in which the *Site* is located; and

"*Site* " means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone at Matawatchan Waste Disposal Site, 3508 Matawatchan Rd, Greater Madawaska Township, County of Renfrew.

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

TERMS AND CONDITIONS

1. GENERAL

Compliance

- (1) The *Owner* and *Operator* shall ensure compliance with all the conditions of this *Certificate* and shall ensure that any person authorized to carry out work on or operate any aspect of the *Site* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
- (2) Any person authorized to carry out work on or operate any aspect of the *Site* shall comply with the conditions of this *Certificate* .

In Accordance

- (3) Except as otherwise provided by this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the documentation listed in the attached Schedule "A".

Interpretation

- (4) Where there is a conflict between a provision of any document listed in Schedule "A" in this *Certificate*, and the conditions of this *Certificate*, the conditions in this *Certificate* shall take precedence.
- (5) Where there is a conflict between the application and a provision in any document listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the *Ministry* approved the amendment.
- (6) Where there is a conflict between any two documents listed in Schedule "A", the

document bearing the most recent date shall take precedence.

- (7) The conditions of this *Certificate* are severable. If any condition of this *Certificate*, or the application of any condition of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

Other Legal Obligations

- (8) The issuance of, and compliance with, this *Certificate* does not:
- (a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or
 - (b) limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Certificate*.

Adverse Effect

- (9) The *Owner* shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the *Site*, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.
- (10) Despite an *Owner* or any other person fulfilling any obligations imposed by this *Certificate* the person remains responsible for any contravention of any other condition of this *Certificate* or any applicable statute, regulation, or other legal requirement resulting from any act or omission that caused the adverse effect to the natural environment or impairment of water quality.

Change of Ownership

- (11) The *Owner* shall notify the *Director*, in writing, and forward a copy of the notification to the *District Manager*, within 30 days of the occurrence of any changes in the following information:
- (a) the ownership of the *Site*;
 - (b) the *Operator* of the *Site*;
 - (c) the address of the *Owner* or *Operator*; and
 - (d) the partners, where the *Owner* or *Operator* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act*, R. S. O. 1990, c. B.17, shall be included in the notification.
- (12) No portion of this *Site* shall be transferred or encumbered prior to or after closing of the *Site* unless the *Director* is notified in advance and sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out.

- (13) In the event of any change in *Ownership* of the works, other than change to a successor Owner, the *Owner* shall notify the successor of and provide the successor with a copy of this *Certificate*, and the *Owner* shall provide a copy of the notification to the *District Manager* and the *Director*.

Certificate of Requirement/Registration on Title -Site

- (14) The Owner shall:
- (a) Within two (2) years of the date of the issuance of this *Certificate*, submit to the *Director* for review, two copies of a completed Certificate of Requirement with a registerable description of the *Site*; and
 - (b) Within 10 calendar days of receiving the Certificate of Requirement authorized by the *Director*, register the Certificate of Requirement in the appropriate Land Registry Office on title to the *Site* and submit to the Director the duplicate registered copy immediately following registration.
- (15) Pursuant to Section 197 of the Environmental Protection Act, neither the *Owner* nor any person having an interest in the *Site* shall deal with the *Site* in any way without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

2. LANDFILL MONITORING

Compliance

- (1) The *Site* shall be operated in such a way as to ensure compliance with the following:
- (a) Reasonable Use Guideline B-7 for the protection of the groundwater at the *Site*; and
 - (b) Provincial Water Quality Objectives included in the July 1994 publication entitled *Water Management Policies, Guidelines, Provincial Water Quality Objectives*, as amended from time to time or limits set by the *Regional Director*, for the protection of the surface water at and off the *Site*.

Surface Water and Ground Water

- (2) The *Owner* shall monitor surface water and ground water as per documents in Schedule "A".

Annual Report

- (3) A written report on the development, operation and monitoring of the *Site*, shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the *District Manager*, by March 31st of the year following the period being reported upon.
- (4) The Annual Report shall include the following:
 - (a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
 - (b) site plans showing the final contours of the *Site* and vegetative cover;
 - (c) a discussion of any operational problems encountered at the *Site* and corrective action taken;
 - (d) a report on the status of all monitoring wells and a statement as to compliance with *Ontario Regulation 903*;
 - (e) any other information with respect to the *Site* which the *Regional Director* may require from time to time; and
 - (f) a summary and analysis of all hydraulic and geochemical monitoring results.

Groundwater Wells and Monitors

- (5) The *Owner* shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage.
- (6) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.
- (7) Any groundwater monitoring well included in the on-going monitoring program that are damaged shall be assessed, repaired, replaced or decommissioned by the *Owner*, as required.
 - (a) The *Owner* shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular sampling event is missed.
 - (b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the *District Manager* for abandonment, shall be decommissioned by the *Owner*, as required, in accordance with *O.Reg. 903*, that will prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

Changes to the Monitoring Plan

- (8) The *Owner* may request to make changes to the monitoring program(s) to the *District Manager* in accordance with the recommendations of the annual report. The *Owner* shall make clear reference to the proposed changes in separate letter that shall accompany the

annual report.

- (9) Within fourteen (14) days of receiving the written correspondence from the *District Manager* confirming that the *District Manager* is in agreement with the proposed changes to the environmental monitoring program, the *Owner* shall forward a letter identifying the proposed changes and a copy of the correspondences from the *District Manager* and all other correspondences and responses related to the changes to the monitoring program, to the *Director* requesting the *Certificate* be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.
- (10) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the *Owner* shall follow current ministry procedures for seeking approval for amending the *Certificate*.

3. CLOSURE PLAN

- (1) The Closure Plan titled "The Closure Plan, Matawatchan Waste Disposal Site (A412204), Township of Greater Madawaska, County of Renfrew, Ontario" dated September 19, 2008 and prepared by Greenview Environmental Management" is hereby approved.
- (2) The *Site* shall be closed in accordance with the Closure Plan as approved by the *Director*.
- (3) This landfill is now closed and no waste shall be accepted for disposal at the *Site* .

SCHEDULE "A"

1. Report titled "The Closure Plan, Matawatchan Waste Disposal Site (A412204), Township of Greater Madawaska, County of Renfrew, Ontario" dated September 19, 2008 and prepared by Greenview Environmental Management".
2. Application for a Provisional Certificate of Approval for a Waste Disposal Site dated September 17, 2008 and signed by Ms. Maureen Brennan, Acting CAO/Clerk.
3. Letter dated January 14, 2010 from Tyler Peters, P.Eng., Greenview Environmental Management Limited, to Ranjani Munasinghe, Ministry of the Environment.

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

GENERAL

1. The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9) and (10) is to clarify the legal rights and responsibilities of the *Owner* under this Certificate of Approval.

2. The reasons for Condition 1(3) is to ensure that the *Site* is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the *Owner*, and not in a manner which the *Director* has not been asked to consider.
3. The reasons for Condition 1(11) are to ensure that the *Site* is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the *Director* is informed of any changes.
4. The reasons for Condition 1(12) are to restrict potential transfer or encumbrance of the *Site* without the approval of the *Director* and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Certificate of Approval.
5. The reason for Condition 1(13) is to ensure that the successor is aware of its legal responsibilities.
6. Conditions 1 (14) and (15) are included, pursuant to subsection 197(1) of the *EPA* , to provide that any persons having an interest in the *Site* are aware that the land has been approved and used for the purposes of waste disposal.

LANDFILL MONITORING

7. Condition 2(1) is included to provide the groundwater and surface water limits to prevent water pollution at the *Site*.
8. Conditions 2(2) is included to require the *Owner* to demonstrate that the *Site* is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.
9. The reasons for Conditions 2(3) and 2(4) are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.
10. Conditions 2(5), 2(6) and 2(7) are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.
11. Reasons for conditions 2(8), 2(9) and 2(10) are included to streamline the approval of the changes to the monitoring plan.

CLOSURE PLAN

12. The reasons for Condition 3 are to ensure that final closure of the *Site* is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term

protection of the health and safety of the public and the environment.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. A412204 dated April 2, 1980 as amended

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

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
MSG 1E5

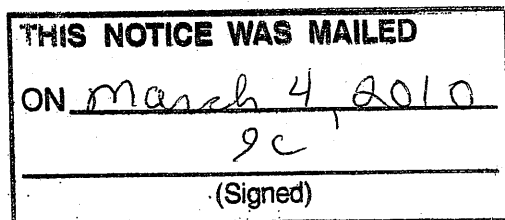
AND

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

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

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

DATED AT TORONTO this 26th day of February, 2010



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

RM/

c: District Manager, MOE Ottawa
Tyler Peters, P. Eng., Greenview Environmental Management Limited ✓



Ministry of the Environment

Provisional Certificate No. A 412204

PROVISIONAL CERTIFICATE OF APPROVAL WASTE DISPOSAL SITE

Under The Environmental Protection Act, 1971 and the regulations and subject to the limitations thereof, this Provisional Certificate of Approval is issued to:

Townships of Griffith and Matawachan R.R. # 3 Dacre, Ontario KOJ 1N0

MINISTRY OF THE ENVIRONMENT

APR 16 1980

for the use and operation of a 2.3 hectare landfilling site

PENBROKE

all in accordance with the following plans and specifications:

Located: Lot 13, Concession 5 Township of Matawachan County of Renfrew

which includes the use of the site only for the disposal of the following categories of waste (NOTE: Use of the site for additional categories of wastes requires a new application and amendments to the Provisional Certificate of Approval) domestic waste.

and subject to the following conditions:

- 1. No operation shall be carried out at the site after sixty days from this condition becoming enforceable unless this Certificate including the reasons for this condition has been registered by the applicant as an instrument in the appropriate Land Registry Office against title to the site and a duplicate registered copy thereof has been returned by the applicant to the Director.

THIS IS A TRUE COPY OF THE ORIGINAL CERTIFICATE MAILED

ON ... Apr. 19/80 ...

(Signed)

Dated this 2nd day of April 1980

[Signature] Director, Section 39, The Environmental Protection Act, 1971



Ontario

Ministry of the
Environment

NOTICE

TO: Townships of Griffith and Matawatchan
R.R. # 3
Dacre, Ontario
K0J 1N0

You are hereby notified that Provisional Certificate of Approval No. A 412204 has been issued to you subject to the conditions outlined therein.

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

The reason for the condition requiring registration of the Certificate is that Section 46 of The Environmental Protection Act, 1971 prohibits any use being made of the lands after they cease to be used for waste disposal purposes in order to protect future occupants of the site and the environment from any hazards which might occur as a result of waste being disposed of on the site. This prohibition and potential hazard should be drawn to the attention of future owners and occupants by the Certificate being registered on title.

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

The Secretary,
Environmental Appeal Board, AND
1 St. Clair Ave. West,
5th Floor,
Toronto, Ontario.
M4V 1K7

The Director,
Section 39
Ministry of the Environment,

DATED

this 2nd day of April , 19 80 .

A handwritten signature in cursive script, appearing to read "R. L. ...".
Director,



Ontario

Ministry
of the
Environment

133 Dalton St., Box 820
Kingston, Ontario
K7L 4X6

April 2, 1980

Townships of Griffith and Matawatchan
R.R. # 3
Dacre, Ontario
K0J 1N0

RE: Landfilling Site
Lot 13, Concession 5
Township of Matawatchan
County of Renfrew

The enclosed revised Provisional Certificate of Approval contains a condition requiring it be registered on title. The reason for this condition is attached to the Certificate.

Two copies of the Certificate and reasons are on long paper to facilitate registration. Both of these should be taken to the Land Registry Office and one returned to the Director with registration particulars.

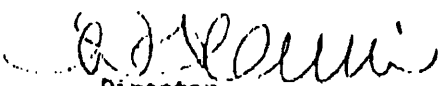
If your Certificate does not contain sufficient legal description for registration because you have not given one to the Director, you will have to provide one under Section 23(1) (e) of The Registry Act or in your application under The Land Titles Act.

In the event that the site including its buffer, is part of a larger parcel of land and you do not wish to prepare a new survey at this time, you may register the Certificate against the larger parcel of land. If you do so, the Director is prepared, if requested in the future.

1. In the case of land recorded under The Land Titles Act, to consent to an application to delete the registration from the title of lands not within the site including its buffer zone, and
2. In the case of land recorded under The Registry Act, to issue a Certificate that lands not used for the actual disposal of waste or buffer zone have not been so used.

Such documents would be issued after suitable draft documents including legal description were submitted by you or your successor. The purpose of such documents would be to assure subsequent purchasers that the lands in question were not affected by section 46 of the Environmental Protection Act.

Yours very truly


Director

The applicant(s) hereby applies to the Land Registrar.

yyyy mm dd

Page 1 of 3

Properties

PIN 57488 - 0008 LT

Description PT LT 13, CON 5, MATAWATCHAN, PT 1, 49R2184 ; T/W R301495 ; GRIFFITH & MATAWATCHAN

Address 3508 MATAWATCHAN ROAD
GRIFFITH

PIN 57488 - 0314 LT

Description PT LT 13 CON 5 MATAWATCHAN PT 1, 49R13546; T/W PT 2, 49R2184 ; TWP OF GREATER MADAWASKA

Address 3508 MATAWATCHAN ROAD
GRIFFITH**Party From(s)**

Name THE CORPORATION OF THE TOWNSHIP OF GREATER MADAWASKA

Address for Service P.O. Box 180
1101 Francis Street
Calabogie, Ontario, K0J 1H0

This document is not authorized under Power of Attorney by this party.

This document is being authorized by a municipal corporation Peter Emond, Mayor.

Party To(s)

Capacity

Share

Name THE MINISTRY OF THE ENVIRONMENT

Address for Service Director, Environmental Protection Act
2 St. Clair Avenue West, 12A
Toronto, Ontario, M4V 1L5**Statements**

Schedule: See Schedules

Signed By

Stephen Arthur Ritchie

92 Centrepointe Drive
Nepean
K1V 9K4acting for
Party From(s)

Signed

2013 03 05

Tel 6132246674

Fax 6137299105

I have the authority to sign and register the document on behalf of the Party From(s).

Submitted By

STEPHEN A. RITCHIE

92 Centrepointe Drive
Nepean
K1V 9K4

2013 03 05

Tel 6132246674

Fax 6137299105

Fees/Taxes/Payment

Statutory Registration Fee \$60.00

Total Paid \$60.00

The applicant(s) hereby applies to the Land Registrar.

File Number

Party From Client File Number : 3291

SCHEDULE "A"

CERTIFICATE OF REQUIREMENT

s. 197(2) of the *Environmental Protection Act*

This is to certify that pursuant to an AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL for WASTE DISPOSAL SITE NUMBER A412204, issued by TESHAYE GEBREZGHI, DIRECTOR, dated February 26, 2010 with respect to a Waste Disposal Site on:

FIRSTLY:

Pin No. 57488-0008 (LT)
Pt Lt 13, Con 5, Matawatchan, Pt 1, 49R2184; T/W R301495; Griffith & Matawatchan

SECONDLY:

Pin No. 57488-0314 (LT)
Pt Lt 13 Con 5 Matawatchan Pt1, 49R13546; T/W Pt 2, 49R2184 Twp of Greater Madawaska

The following person(s):

The Corporation of the Township of Greater Madawaska

and any other persons having an interest in:

FIRSTLY:

Pin No. 57488-0008 (LT)
PT Lt 13, Con 5, Matawatchan, Pt 1, 49R2184; T/W R301495; Griffith & Matawatchan

SECONDLY:

Pin No. 57488-0314 (LT)
Pt Lt 13 Con 5 Matawatchan Pt1, 49R13546; T/W Pt 2, 49R2184; Twp of Greater Madawaska

are required, before dealing with the land in any way, to give a copy of the Amendment to Provisional Certificate of Waste Disposal Site, No. A412204, including any amendments that may be made thereto to every person who will acquire an interest in the land as a result of the dealing. Under subsection 197(3) of the *Environmental Protection Act*, this requirement applies to each person who, subsequent to the registration of this certificate, acquires an interest in the land.

Appendix B



Appendix C



C.O.C.: G103256

REPORT No. B21-15226 (I)

Report To:

Greenview Environmental Management

13 Commerce Crt., PO Box 100

Bancroft Ontario K0L1C0

Attention: Riley Betson

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 18-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Client I.D.		91-2C	91-4A	95-2A	95-2B
			Reference Method	Date/Site Analyzed	B21-15226-1	B21-15226-2	B21-15226-3	B21-15226-4
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	03-Jun-21/O	416	280	223	212
Chloride	mg/L	0.5	SM4110C	28-May-21/O	7.4	2.5	1.7	1.6
Nitrite (N)	mg/L	0.05	SM4110C	28-May-21/O	0.08	0.07	< 0.05	0.09
Nitrate (N)	mg/L	0.05	SM4110C	28-May-21/O	0.12	0.41	0.26	0.38
Sulphate	mg/L	1	SM4110C	28-May-21/O	43	31	33	33
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	16-Jun-21/K	0.4	0.2	1.9	0.7
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	09-Jun-21/K	0.05	< 0.01	0.02	0.01
TDS (Calc. from Cond.)	mg/L	1	Calc.	04-Jun-21	433	291	242	234
Phenolics	mg/L	0.002	MOEE 3179	31-May-21/K	< 0.002	< 0.002	< 0.002	< 0.002
COD	mg/L	5	SM5220C	25-May-21/K	15	7	56	34
Boron	mg/L	0.005	SM 3120	27-May-21/O	0.232	0.184	0.218	0.170
Calcium	mg/L	0.02	SM 3120	27-May-21/O	123	82.7	65.5	63.4
Copper	mg/L	0.0001	EPA 200.8	04-Jun-21/O	0.0038	0.0023	0.0039	0.0047
Iron	mg/L	0.005	SM 3120	27-May-21/O	0.017	0.121	0.009	0.017
Magnesium	mg/L	0.02	SM 3120	27-May-21/O	23.1	16.1	10.3	9.31
Manganese	mg/L	0.001	SM 3120	27-May-21/O	0.722	0.053	0.003	0.002
Potassium	mg/L	0.1	SM 3120	27-May-21/O	12.0	6.0	3.0	3.1
Sodium	mg/L	0.2	SM 3120	27-May-21/O	16.7	11.0	15.5	14.8
Strontium	mg/L	0.001	SM 3120	27-May-21/O	0.808	0.359	0.162	0.146
Anion Sum	meq/L		Calc.	09-Jun-21/O	9.43	6.35	5.22	5.00
Cation Sum	meq/L		Calc.	09-Jun-21/O	9.10	6.09	4.87	4.65
% Difference	%		Calc.	09-Jun-21/O	1.79	2.05	3.48	3.61
Ion Ratio	AS/CS		Calc.	09-Jun-21/O	1.04	1.04	1.07	1.07
Conductivity (calc.)	µmho/cm		Calc.	09-Jun-21/O	820	566	469	450
TDS(ion sum calc.)	mg/L	1	Calc.	09-Jun-21/O	476	317	263	252



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
 Lab Manager

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

C.O.C.: G103256

REPORT No. B21-15226 (I)

Report To:

Greenview Environmental Management
 13 Commerce Ct., PO Box 100
 Bancroft Ontario K0L1C0

Attention: Riley Betson

Caduceon Environmental Laboratories

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

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 18-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

					Client I.D.	95-4	95-1	QA/QC (GW)	
					Sample I.D.	B21-15226-5	B21-15226-6	B21-15226-7	
					Date Collected	18-May-21	18-May-21	18-May-21	
Parameter	Units	R.L.	Reference Method	Date/Site Analyzed					
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	03-Jun-21/O	79	84	283		
Chloride	mg/L	0.5	SM4110C	28-May-21/O	0.7	0.7	2.8		
Nitrite (N)	mg/L	0.05	SM4110C	28-May-21/O	0.07	0.08	< 0.05		
Nitrate (N)	mg/L	0.05	SM4110C	28-May-21/O	0.17	0.10	0.41		
Sulphate	mg/L	1	SM4110C	28-May-21/O	23	40	31		
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	16-Jun-21/K	0.4	0.1	0.2		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	09-Jun-21/K	0.02	< 0.01	< 0.01		
TDS (Calc. from Cond.)	mg/L	1	Calc.	04-Jun-21	102	124	298		
Phenolics	mg/L	0.002	MOEE 3179	31-May-21/K	< 0.002	< 0.002	< 0.002		
COD	mg/L	5	SM5220C	25-May-21/K	22	< 5	5		
Boron	mg/L	0.005	SM 3120	27-May-21/O	0.010	0.005	0.180		
Calcium	mg/L	0.02	SM 3120	27-May-21/O	40.7	35.0	82.1		
Copper	mg/L	0.0001	EPA 200.8	04-Jun-21/O	0.0031	0.0011	0.0023		
Iron	mg/L	0.005	SM 3120	27-May-21/O	0.216	0.553	0.121		
Magnesium	mg/L	0.02	SM 3120	27-May-21/O	3.81	5.39	15.9		
Manganese	mg/L	0.001	SM 3120	27-May-21/O	0.057	0.085	0.053		
Potassium	mg/L	0.1	SM 3120	27-May-21/O	1.9	3.2	5.8		
Sodium	mg/L	0.2	SM 3120	27-May-21/O	1.5	1.2	10.8		
Strontium	mg/L	0.001	SM 3120	27-May-21/O	0.096	0.055	0.353		
Anion Sum	meq/L		Calc.	09-Jun-21/O	2.10	2.55	6.40		
Cation Sum	meq/L		Calc.	09-Jun-21/O	2.47	2.36	6.03		
% Difference	%		Calc.	09-Jun-21/O	8.14	3.97	2.97		
Ion Ratio	AS/CS		Calc.	09-Jun-21/O	0.849	1.08	1.06		
Conductivity (calc.)	µmho/cm		Calc.	09-Jun-21/O	231	251	566		
TDS(ion sum calc.)	mg/L	1	Calc.	09-Jun-21/O	120	137	318		



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill, B-Barrie

Michelle Dubien
 Lab Manager

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C.O.C.: G103256

REPORT No. B21-15226 (ii)

Report To:

Greenview Environmental Management

13 Commerce Crt., PO Box 100

Bancroft Ontario K0L1C0

Attention: Riley Betson

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 18-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	91-2C			
			Sample I.D.	B21-15226-1			
			Date Collected	18-May-21			
Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Acetone	µg/L	30	EPA 8260	21-May-21/R	< 30		
Benzene	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Bromobenzene	µg/L	0.4	EPA 8260	21-May-21/R	< 0.4		
Bromodichloromethane	µg/L	2	EPA 8260	21-May-21/R	< 2		
Bromoform	µg/L	5	EPA 8260	21-May-21/R	< 5		
Bromomethane	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Carbon Tetrachloride	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Chloroethane	µg/L	3	EPA 8260	21-May-21/R	< 3		
Chloroform	µg/L	1	EPA 8260	21-May-21/R	< 1		
Chloromethane	µg/L	2	EPA 8260	21-May-21/R	< 2		
Chlorotoluene, 2-	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Chlorotoluene, 4-	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Dibromo-3-Chloropropane, 1,2-	µg/L	0.6	EPA 8260	21-May-21/R	< 0.6		
Dibromochloromethane	µg/L	2	EPA 8260	21-May-21/R	< 2		
Dibromoethane, 1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Dibromomethane	µg/L	0.1	EPA 8260	21-May-21/R	< 0.1		
Dichlorobenzene, 1,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichlorobenzene, 1,3-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichlorobenzene, 1,4-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichlorodifluoromethane	µg/L	2	EPA 8260	21-May-21/R	< 2		
Dichloroethane, 1,1-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichloroethane, 1,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	21-May-21/R	0.6		
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichloroethylene, 1,1-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		



R.L. = Reporting Limit

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Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill, B-Barrie

Michelle Dubien
 Lab Manager

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C.O.C.: G103256

REPORT No. B21-15226 (ii)

Report To:

Greenview Environmental Management

13 Commerce Crt., PO Box 100

Bancroft Ontario K0L1C0

Attention: Riley Betson

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 18-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	91-2C			
			Sample I.D.	B21-15226-1			
			Date Collected	18-May-21			
Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	21-May-21/R	< 5		
Dichloropropane, 1,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichloropropane, 1,3-	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Dichloropropene, 1,1-	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Ethylbenzene	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Hexachlorobutadiene	µg/L	0.6	EPA 8260	21-May-21/R	< 0.6		
Hexane	µg/L	5	EPA 8260	21-May-21/R	< 5		
Isopropylbenzene	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Isopropyltoluene, 4-	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Methyl Butyl Ketone	µg/L	5	EPA 8260	21-May-21/R	< 5		
Methyl Ethyl Ketone	µg/L	20	EPA 8260	21-May-21/R	< 20		
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	21-May-21/R	< 20		
Methyl-t-butyl Ether	µg/L	2	EPA 8260	21-May-21/R	< 2		
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Naphthalene	µg/L	0.4	EPA 8260	21-May-21/R	< 0.4		
n-Butylbenzene	µg/L	0.4	EPA 8260	21-May-21/R	< 0.4		
n-Propylbenzene	µg/L	0.1	EPA 8260	21-May-21/R	< 0.1		
sec-Butylbenzene	µg/L	0.1	EPA 8260	21-May-21/R	< 0.1		
Styrene	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
tert-Butylbenzene	µg/L	0.1	EPA 8260	21-May-21/R	< 0.1		
Tetrachloroethane, 1,1,1,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Tetrachloroethane, 1,1,2,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Tetrachloroethylene	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Toluene	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
 Lab Manager

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C.O.C.: G103256

REPORT No. B21-15226 (ii)

Report To:

Greenview Environmental Management

13 Commerce Ct., PO Box 100

Bancroft Ontario K0L1C0

Attention: Riley Betson

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 18-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

			Client I.D.	91-2C			
			Sample I.D.	B21-15226-1			
			Date Collected	18-May-21			
Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Trichlorobenzene, 1,2,3-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Trichlorobenzene, 1,2,4-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Trichloroethane, 1,1,1-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Trichloroethane, 1,1,2-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Trichloroethylene	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Trichlorofluoromethane	µg/L	5	EPA 8260	21-May-21/R	< 5		
Trichloropropane, 1,2,3-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		
Trimethylbenzene, 1,2,4-	µg/L	1	EPA 8260	21-May-21/R	< 1		
Trimethylbenzene, 1,3,5-	µg/L	0.1	EPA 8260	21-May-21/R	< 0.1		
Vinyl Chloride	µg/L	0.2	EPA 8260	21-May-21/R	< 0.2		
Xylene, m,p-	µg/L	1.0	EPA 8260	21-May-21/R	< 1.0		
Xylene, o-	µg/L	0.5	EPA 8260	21-May-21/R	< 0.5		



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill, B-Barrie

Michelle Dubien
 Lab Manager

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

C.O.C.: G103256

REPORT No. B21-15225

Report To:

Greenview Environmental Management
 13 Commerce Crt., PO Box 100
 Bancroft Ontario K0L1C0

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

Attention: Riley Betson

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 16-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	R.L.	Client I.D.		SW-2	SW-3	QA/QC (SW)	
			Sample I.D.	Date Collected	B21-15225-1	B21-15225-2	B21-15225-3	
			Reference Method	Date/Site Analyzed	18-May-21	18-May-21	18-May-21	
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	03-Jun-21/O	134	129	135	
Chloride	mg/L	0.5	SM4110C	28-May-21/O	5.7	7.1	5.6	
Nitrite (N)	mg/L	0.05	SM4110C	28-May-21/O	0.07	0.06	0.06	
Nitrate (N)	mg/L	0.05	SM4110C	28-May-21/O	0.11	0.09	0.11	
Sulphate	mg/L	1	SM4110C	28-May-21/O	10	11	10	
BOD(5 day)	mg/L	3	SM 5210B	22-May-21/K	< 3	< 3	< 3	
Phosphorus-Total	mg/L	0.01	E3199A.1	14-Jun-21/K	0.04	0.14	0.03	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	14-Jun-21/K	0.2	0.6	0.2	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	08-Jun-21/K	< 0.01	0.01	< 0.01	
Total Dissolved Solids	mg/L	3	SM 2540D	04-Jun-21/O	147	144	146	
Phenolics	mg/L	0.001	MOEE 3179	31-May-21/K	< 0.001	< 0.001	< 0.001	
COD	mg/L	5	SM5220C	25-May-21/K	< 5	39	< 5	
Boron	mg/L	0.005	SM 3120	26-May-21/O	0.008	0.010	0.008	
Cadmium	mg/L	0.00015	EPA 200.8	04-Jun-21/O	< 0.00015	0.000053	< 0.00015	
Calcium	mg/L	0.02	SM 3120	26-May-21/O	49.5	46.3	48.7	
Copper	mg/L	0.0001	EPA 200.8	04-Jun-21/O	0.0009	0.0029	0.0009	
Iron	mg/L	0.005	SM 3120	26-May-21/O	0.080	0.874	0.078	
Manganese	mg/L	0.001	SM 3120	26-May-21/O	0.013	0.137	0.012	
Magnesium	mg/L	0.02	SM 3120	26-May-21/O	6.64	6.08	6.58	
Potassium	mg/L	0.1	SM 3120	26-May-21/O	1.4	1.7	1.4	
Sodium	mg/L	0.2	SM 3120	26-May-21/O	5.5	6.6	5.4	
Strontium	mg/L	0.001	SM 3120	26-May-21/O	0.100	0.108	0.098	
Zinc	mg/L	0.005	SM 3120	26-May-21/O	0.013	0.018	0.010	
Anion Sum	meq/L		Calc.	04-Jun-21/O	3.06	3.01	3.08	
Cation Sum	meq/L		Calc.	04-Jun-21/O	3.30	3.19	3.25	
% Difference	%		Calc.	04-Jun-21/O	3.70	2.97	2.65	
Ion Ratio	AS/CS		Calc.	04-Jun-21/O	0.929	0.942	0.948	

M. Dubien

R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
 Lab Manager

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

C.O.C.: G103256

REPORT No. B21-15225

Report To:

Greenview Environmental Management
 13 Commerce Cr., PO Box 100
 Bancroft Ontario K0L1C0

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

Attention: Riley Betson

DATE RECEIVED: 20-May-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 16-Jun-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.	SW-2	SW-3	QA/QC (SW)
					Sample I.D.	Date Collected		
Conductivity (calc.)	µmho/cm		Calc.	04-Jun-21/O	B21-15225-1	307	299	305
TDS(ion sum calc.)	mg/L	1	Calc.	04-Jun-21/O	B21-15225-2	159	157	159
					B21-15225-3			
					18-May-21			
					18-May-21			
					18-May-21			



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
 Lab Manager

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

C.O.C.: G101822

REPORT No. B21-37970

Report To:

Greenview Environmental Management
 13 Commerce Crt., PO Box 100
 Bancroft Ontario K0L1C0

Attention: Mike Grasby

Caduceon Environmental Laboratories

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

DATE RECEIVED: 19-Nov-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 14-Dec-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

Parameter	Units	R.L.	Client I.D.		95-1	95-4	91-2C	91-4A
			Reference Method	Date/Site Analyzed	B21-37970-1	B21-37970-2	B21-37970-3	B21-37970-4
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	02-Dec-21/O	83	88	414	497
Chloride	mg/L	0.5	SM4110C	24-Nov-21/O	0.6	0.9	7.3	4.3
Nitrite (N)	mg/L	0.05	SM4110C	24-Nov-21/O	< 0.05	< 0.05	< 0.05	< 0.05
Nitrate (N)	mg/L	0.05	SM4110C	24-Nov-21/O	< 0.05	0.12	< 0.05	0.65
Sulphate	mg/L	1	SM4110C	24-Nov-21/O	38	23	45	69
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	09-Dec-21/K	0.1	0.3	0.3	0.3
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	26-Nov-21/K	0.02	< 0.01	0.05	< 0.01
TDS (Calc. from Cond.)	mg/L	1	Calc.	03-Dec-21	115	111	430	521
Phenolics	mg/L	0.002	MOEE 3179	22-Nov-21/K	< 0.002	< 0.002	< 0.002	< 0.002
COD	mg/L	5	SM5220C	25-Nov-21/K	12	16	23	18
Boron	mg/L	0.005	SM 3120	22-Nov-21/O	0.010	0.013	0.241	0.370
Calcium	mg/L	0.02	SM 3120	22-Nov-21/O	37.7	43.2	139	163
Copper	mg/L	0.0001	EPA 200.8	25-Nov-21/O	0.0042	0.0048	0.0034	0.0046
Iron	mg/L	0.005	SM 3120	22-Nov-21/O	1.72	0.024	0.090	0.021
Magnesium	mg/L	0.02	SM 3120	22-Nov-21/O	5.60	3.46	24.6	29.9
Manganese	mg/L	0.001	SM 3120	22-Nov-21/O	0.136	0.025	0.536	0.044
Potassium	mg/L	0.1	SM 3120	22-Nov-21/O	3.8	2.2	13.1	9.4
Sodium	mg/L	0.2	SM 3120	22-Nov-21/O	1.7	1.5	15.8	23.1
Strontium	mg/L	0.001	SM 3120	22-Nov-21/O	0.060	0.093	0.868	0.564
Anion Sum	meq/L		Calc.	03-Dec-21/O	2.45	2.27	9.41	11.5
Cation Sum	meq/L		Calc.	03-Dec-21/O	2.61	2.56	10.0	11.8
% Difference	%		Calc.	03-Dec-21/O	3.12	5.97	3.11	1.31
Ion Ratio	AS/CS		Calc.	03-Dec-21/O	0.940	0.887	0.940	0.974
Conductivity (calc.)	µmho/cm		Calc.	03-Dec-21/O	255	244	861	1009
TDS(ion sum calc.)	mg/L	1	Calc.	03-Dec-21/O	139	127	494	597



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
 Lab Manager

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

C.O.C.: G101822

REPORT No. B21-37970

Report To:

Greenview Environmental Management
 13 Commerce Crt., PO Box 100
 Bancroft Ontario K0L1C0

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

Attention: Mike Grasby

DATE RECEIVED: 19-Nov-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 14-Dec-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

					Client I.D.	95-2B	GW QA/QC		
					Sample I.D.	B21-37970-5	B21-37970-6		
					Date Collected	16-Nov-21	16-Nov-21		
Parameter	Units	R.L.	Reference Method	Date/Site Analyzed					
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	02-Dec-21/O	297	414			
Chloride	mg/L	0.5	SM4110C	24-Nov-21/O	2.0	7.4			
Nitrite (N)	mg/L	0.05	SM4110C	24-Nov-21/O	< 0.05	< 0.05			
Nitrate (N)	mg/L	0.05	SM4110C	24-Nov-21/O	0.22	< 0.05			
Sulphate	mg/L	1	SM4110C	24-Nov-21/O	39	44			
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	09-Dec-21/K	0.5	0.4			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	26-Nov-21/K	0.01	0.05			
TDS (Calc. from Cond.)	mg/L	1	Calc.	03-Dec-21	312	427			
Phenolics	mg/L	0.002	MOEE 3179	22-Nov-21/K	< 0.002	< 0.002			
COD	mg/L	5	SM5220C	25-Nov-21/K	16	22			
Boron	mg/L	0.005	SM 3120	22-Nov-21/O	0.281	0.238			
Calcium	mg/L	0.02	SM 3120	22-Nov-21/O	101	137			
Copper	mg/L	0.0001	EPA 200.8	25-Nov-21/O	0.0055	0.0036			
Iron	mg/L	0.005	SM 3120	22-Nov-21/O	0.528	0.089			
Magnesium	mg/L	0.02	SM 3120	22-Nov-21/O	14.1	24.4			
Manganese	mg/L	0.001	SM 3120	22-Nov-21/O	0.009	0.528			
Potassium	mg/L	0.1	SM 3120	22-Nov-21/O	4.2	12.9			
Sodium	mg/L	0.2	SM 3120	22-Nov-21/O	21.5	15.5			
Strontium	mg/L	0.001	SM 3120	22-Nov-21/O	0.221	0.862			
Anion Sum	meq/L		Calc.	03-Dec-21/O	6.82	9.40			
Cation Sum	meq/L		Calc.	03-Dec-21/O	7.27	9.88			
% Difference	%		Calc.	03-Dec-21/O	3.20	2.46			
Ion Ratio	AS/CS		Calc.	03-Dec-21/O	0.938	0.952			
Conductivity (calc.)	µmho/cm		Calc.	03-Dec-21/O	640	855			
TDS(ion sum calc.)	mg/L	1	Calc.	03-Dec-21/O	361	491			



Michelle Dubien
 Lab Manager

R.L. = Reporting Limit

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C.O.C.: G101822

REPORT No. B21-37971

Report To:

Greenview Environmental Management

13 Commerce Crt., PO Box 100

Bancroft Ontario K0L1C0

Attention: Mike Grasby

Caduceon Environmental Laboratories

285 Dalton Ave

Kingston Ontario K7K 6Z1

Tel: 613-544-2001

Fax: 613-544-2770

DATE RECEIVED: 19-Nov-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 14-Dec-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	R.L.	Client I.D.		SW-2	SW-3	SW QA/QC	
			Sample I.D.	Date Collected	B21-37971-1	B21-37971-2	B21-37971-3	
			Reference Method	Date/Site Analyzed	16-Nov-21	16-Nov-21	16-Nov-21	
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	01-Dec-21/O	166	139	168	
Chloride	mg/L	0.5	SM4110C	24-Nov-21/O	5.7	17.9	5.6	
Nitrite (N)	mg/L	0.05	SM4110C	24-Nov-21/O	< 0.05	< 0.05	< 0.05	
Nitrate (N)	mg/L	0.05	SM4110C	24-Nov-21/O	0.10	< 0.05	0.09	
Sulphate	mg/L	1	SM4110C	24-Nov-21/O	11	22	11	
BOD(5 day)	mg/L	3	SM 5210B	19-Nov-21/K	< 3	< 3	< 3	
Phosphorus-Total	mg/L	0.01	E3199A.1	09-Dec-21/K	0.02	0.07	0.02	
Total Kjeldahl Nitrogen	mg/L	0.1	E3199A.1	09-Dec-21/K	0.2	0.5	0.2	
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	26-Nov-21/K	0.02	0.01	< 0.01	
Total Dissolved Solids	mg/L	3	SM 2540D	01-Dec-21/O	183	194	184	
Phenolics	mg/L	0.001	MOEE 3179	22-Nov-21/K	< 0.001	< 0.001	< 0.001	
COD	mg/L	5	SM5220C	25-Nov-21/K	6	25	12	
Boron	mg/L	0.005	SM 3120	23-Nov-21/O	< 0.005	< 0.005	0.005	
Cadmium	mg/L	0.000015	EPA 200.8	25-Nov-21/O	< 0.000015	0.000027	< 0.000015	
Calcium	mg/L	0.02	SM 3120	23-Nov-21/O	55.2	51.7	56.5	
Copper	mg/L	0.0001	EPA 200.8	25-Nov-21/O	0.0011	0.0019	0.0011	
Iron	mg/L	0.005	SM 3120	23-Nov-21/O	0.022	0.386	0.149	
Manganese	mg/L	0.001	SM 3120	23-Nov-21/O	0.009	0.048	0.045	
Magnesium	mg/L	0.02	SM 3120	23-Nov-21/O	9.35	9.17	9.61	
Potassium	mg/L	0.1	SM 3120	23-Nov-21/O	1.9	2.1	1.9	
Sodium	mg/L	0.2	SM 3120	23-Nov-21/O	4.1	8.7	4.1	
Strontium	mg/L	0.001	SM 3120	23-Nov-21/O	0.111	0.121	0.114	
Zinc	mg/L	0.005	SM 3120	23-Nov-21/O	0.010	0.014	0.006	
Anion Sum	meq/L		Calc.	02-Dec-21/O	3.71	3.74	3.76	
Cation Sum	meq/L		Calc.	02-Dec-21/O	3.75	3.79	3.85	
% Difference	%		Calc.	02-Dec-21/O	0.538	0.748	1.21	
Ion Ratio	AS/CS		Calc.	02-Dec-21/O	0.989	0.985	0.976	

Michelle Dubien
 Lab Manager

R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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C.O.C.: G101822

REPORT No. B21-37971

Report To:

Greenview Environmental Management
 13 Commerce Crt., PO Box 100
 Bancroft Ontario K0L1C0

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

Attention: Mike Grasby

DATE RECEIVED: 19-Nov-21

JOB/PROJECT NO.: Matawatchan WDS

DATE REPORTED: 14-Dec-21

P.O. NUMBER: 102.21.012

SAMPLE MATRIX: Surface Water

WATERWORKS NO.

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed	Client I.D.			
					SW-2	SW-3	SW QA/QC	
Conductivity (calc.)	µmho/cm		Calc.	02-Dec-21/O	354	371	360	
TDS(ion sum calc.)	mg/L	1	Calc.	02-Dec-21/O	187	195	190	



R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Michelle Dubien
 Lab Manager

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Appendix D



Appendix D-Monitoring and Screening Checklist General Information and Instructions

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

Instructions: A complete checklist consists of:

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

Definition of Groundwater CEP:

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

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

Definition of Surface water CEP:

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

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

Monitoring Report and Site Information

Waste Disposal Site Name: Matawatchan WDS

Location (e.g. street address, lot, concession): Part of Lot 13, Concession 5, geographic Township of Matawatchan, Township of Greater Madawaska

GPS Location (taken within the property boundary at front gate/front entry):

North American Datum (NAD83) are 333853.0 metres (m) East, 5002303.0 m North, in Zone 18T

Municipality: Township of Greater Madawaska

Client and/or Site Owner: Township of Greater Madawaska

Monitoring Period (Year): 2021

This Monitoring Report is being submitted under the following:

- Certificate of Approval No.: A412204
- Director's Order No.: _____
- Provincial Officer's Order No.: _____
- Other: _____

Report Submission Frequency: Annual Other specify : _____

The site is: active inactive closed

Closure Plan (September 2008)

If closed, specify C of A, control or authorizing document closure date: PC of A (A412204) - (February 26, 2010)

Has the nature of the operations at the site changed during this monitoring period? Yes No

If yes, provide details: _____

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

- 1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:

Yes No

If no, list exceptions:
See Report

- 2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):

Yes No Not applicable

If no, list exceptions below or attach information.

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

3) a) Some or all groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.

Yes No Not applicable

b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:

Yes No Not applicable

If no, list exceptions or attach additional information.

Groundwater Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
See Report		

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):

Yes No

If no, specify:

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

- 5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.

Yes No

If no, the potential design and operational concerns/exceptions are as follows:

See Report

- 6) The site meets compliance and assessment criteria.

Yes No

If no, list and explain exceptions

See report

- 7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.

Yes No

If no, list exceptions and explain reason for increase/change.

See Report

8) Is one or more of the following risk reduction practices in place at the site:

- (a) There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or
- (b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or
- (c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation):
 - i. The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and
 - ii. Seasonal and annual water levels and water quality fluctuations are well understood.

Yes Note which practice(s): (a) b) c)
 No

9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):

Yes No Not applicable

If yes, list value(s) that are/have been exceeded and follow-up action taken

See Report

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories*, or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated: _____.

Recommendations:

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

- No changes to the monitoring program are recommended
- The following change(s) to the monitoring program is/are recommended:

See Section 5.0 - Conclusions and Recommendations of 2021 Annual Report.

- No changes to the site design and operation are recommended
- The following change(s) to the site design and operation is/are recommended:

Name: Dan Hagan, P.Ge.

Seal:

Signature: 

Date: Mar21-22



CEP Contact Information:

Company: Greenview Environmental Address:

Telephone No.: 613-332-0057 Fax No. :

E-mail Address:

dan.hagan@greenview-environmental.ca

Co-signers for additional expertise provided:

Signature: _____ Date: _____

Signature: _____ Date: _____

Surface Water WDS Verification:

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

Name (s) Un-named intermittent creek

Distance(s) See report

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

Sampling and Monitoring Program Status:

- 1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:

Yes No

If no, identify issues.

See Report

- 2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):

Yes No Not applicable (No C of A, authorizing/control document applies)

If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
See Report		

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.

Yes No Not applicable

b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:

Yes No Not applicable

If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
See Report		

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):

Yes No

If no, specify:

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

Yes No

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

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
See report		

- 6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?

Yes No

If yes, specify

See report

- 7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.

Yes No

If no, list parameters and stations that is outside the expected range. Identify whether parameter concentrations show an increasing trend or are within a high historical range.

See Report

- 8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):

Yes No Not known Not applicable

If yes, provide details and whether remedial measures are necessary.

See report

- 9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):

Yes No Not applicable

If yes, list value(s) that are/have been exceeded and follow-up action taken.

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories*, or as amended from time to time by the ministry.


If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated: _____.

Recommendations:

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

- No changes to the monitoring program are recommended
- The following change(s) to the monitoring program is/are recommended:

- No changes to the site design and operation are recommended
- The following change(s) to the site design and operation is/are recommended:

_____  _____
 CEP Signature:: _____
 Relevant Discipline P.Geo. _____
 Date: (yyyy/mm/dd): Mar21-22 _____

CEP Contact Information:
 Company: Greenview Environmental Management Limited
 Address: 13 Commerce Court, Bancroft, Ontario, K0L 1C0
 Telephone No.: 613-332-0057
 Fax No. :
 E-mail Address: dan.hagan@greenview-environmental.ca

Appendix E



Statement of Service Conditions & Limitations

The following conditions and limitations shall form an integral part of any agreement between Greenview and the Client. In the event of duplication or conflict, the most stringent shall supercede the other.

Provision of Services and Payment

Upon documented acceptance of Greenview's proposed services and conditions in written form by the Client, Greenview may commence work on the proposed services directly.

Greenview's offers for services in the form of proposals, quotations, bids, tenders, or other like an offering to a Client are formulated upon available information at the time of the offer submission. In the event of discovery of unknown conditions, or any other unknown circumstance that may arise following the presentation of Greenview's offer to the Client, Greenview reserves the right to negotiate terms with the Client with respect to changes in scope, fees, disbursements, or the like as may be fair and reasonable considering the discovery.

Upon retention of Greenview's services related to any commission, the Client agrees to remit payment for the services rendered for the specified period within (30) days of the invoice date as invoiced by Greenview on a typical monthly basis, unless otherwise arranged between the Client and Greenview. In the event of non-payment by the Client, Greenview reserves the right, without external influence or expense, to discontinue services and retain any documentation, data, reports, or other project information until such time as payment is received by Greenview. Interest on any overdue accounts may be applied accordingly.

Warranty, Limitations, and Reliance

Greenview relies on background and historical information from the Client to determine the appropriate scope of services to meet the Client's objectives, in accordance with applicable legislation, guidelines, industry practices, and accepted methodologies.

Greenview provides its services under the specific terms and conditions of a specific proposal (and where necessary formal contract), in accordance with the above requirements and the *Limitations Act 2002*, as amended, only.

The hypotheses, results, conclusions, and recommendations presented in documentation authored by Greenview are founded on the information provided by the Client to Greenview in preparation for the work. Facts, conditions, and circumstances discovered by Greenview during the performance of the work requested by the Client are assumed by Greenview to be part of preparatory information provided by the Client as part of the proposal stage of the project. Greenview assumes that, until notified or discovered otherwise, that the information provided by, or obtained by Greenview from, the Client is factual, accurate, and represents a true depiction of the circumstances that exist related to the time of the work.

Greenview relies on its Clients to inform Greenview if there are changes to any related information to the work. Greenview does not review, analyze, or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Greenview will not be responsible for matters arising from incomplete, incorrect, or misleading information or from facts or circumstances that are not fully disclosed to, or that are concealed from Greenview during the period that proposals, services, work, or documentation preparation was performed by Greenview.

Facts, conditions, information, and circumstances may vary with time and locations and Greenview's services are based on a review of such matters as they existed at the time and location indicated in its documentation. No assurance is made by Greenview that the facts, conditions, information, circumstances or any underlying assumptions made by Greenview in connection with the work performed will not change after the work is completed and documentation is submitted. If any such changes occur or additional information is obtained, Greenview should be advised and

requested to consider if the changes or additional information affect its findings or results.

When preparing documentation, Greenview considers applicable legislation, regulations, governmental guidelines, and policies to the extent they are within its knowledge, but Greenview is not qualified to advise with respect to legal matters. The presentation of information regarding applicable legislation, regulations, not intended to and should not be interpreted as constituting a legal opinion concerning the work completed or conditions outlined in a report. All legal matters should be reviewed and considered by an appropriately qualified legal practitioner.

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