

2023 Annual Report

Final

Mount St. Patrick Waste Disposal Site

ECA No. A411901

March 26, 2024

Jp2g Project # 22-6213C





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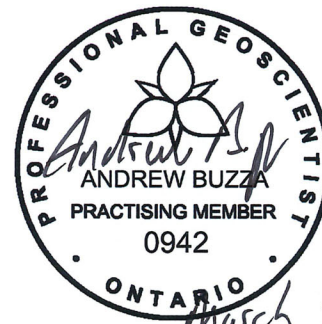
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March 26, 2024



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EXECUTIVE SUMMARY

Jp2g Consultants Inc. (Jp2g) was retained by the Township of Greater Madawaska to conduct the 2023 ground and surface water monitoring at the Mount St. Patrick Waste Disposal Site (WDS), located on part of Lot 4, Concession 14 within the geographic Township of Brougham, in the Township of Greater Madawaska.

The Mount St. Patrick site operates in accordance with Environmental Compliance Approval (ECA) A411901, as an active waste disposal site and transfer station, and has an approved waste disposal area of 1.2 hectares within a total property area of 38.25 hectares, owned by the Township of Greater Madawaska. The amended ECA approved the continued use of the site as a landfill for approved waste and the establishment of a transfer station for municipal mixed waste and recyclables.

The groundwater flow direction at the site in 2023 was interpreted to be generally consistent with historical interpretations, with the predominant direction of groundwater flow in the overburden unit being to the north towards the low-lying areas, and in the general direction of Constant Creek.

Groundwater immediately downgradient of the site at monitors MW06-3, and MW06-4 was not interpreted to be impacted by landfill-related activities, however, naturally occurring conditions within the low-lying area at the site (MW06-3), and winter road maintenance activities (MW06-4), were interpreted to be contributing factors to documented groundwater quality results in the vicinity of the Mount St. Patrick WDS.

Results from monitoring well MW06-2 were interpreted to most represent of leachate quality at the Mount St. Patrick WDS in 2023. New background monitoring well MW21-7 was documented to have insufficient water for sampling in 2023. Historically, previously existing background well MW08-1 has been documented to have naturally high concentrations of aluminum, dissolved organic carbon, iron, and manganese; however, in recent years groundwater quality results at MW08-1 have also been interpreted to display road salt impacts in results associated with the transfer station, Flat Road, and the Township's nearby winter sand storage area adjacent to the site.

In 2023, no Reasonable Use Concept (RUC) exceedances were documented in the results from downgradient monitoring wells MW09-5R and MW09-6R that were attributed to landfill-related factors. Based on the Reasonable Use Concept assessment, the Mount St. Patrick WDS was interpreted to meet the intent of Ministry Guideline B-7 at the downgradient northern CAZ boundary in 2023.

Results from surface water location SW-2 were interpreted to be representative of background surface water quality at the Mount St. Patrick WDS in 2023. Based on a review of 2023 surface water quality results for downstream surface water sampling locations SW-1 and SW-4, Constant Creek was not interpreted to be significantly impacted by landfill-related activities. Surface water sampling location SW-3, located near the landfill site and within the low-lying area, was dry in 2023 and historically was not interpreted to be significantly impacted by landfill-related activities.

Based on the calculated 2023 fill rate of 3500 m³ in comparison to the approved final contours at closure of the Mount St. Patrick WDS, and with consideration of all the grading and compaction operations conducted by the Township in 2023, the remaining site capacity as of December 20, 2023, was approximately 32,400 m³. Given the average (mean) five (5) year fill rate (2018 to 2022) of 881 m³, the estimated remaining site life for the Mount St. Patrick WDS is approximately thirty-six (36) years.



As processed C&D and bulky wastes are approved as alternative daily cover, no aggregate-based cover material (i.e. sand, etc.) was utilized as part of operations in 2023.

Based on Township records, approximately 3396 vehicles visited the Mount St. Patrick WDS in 2023 and accepted approximately 10,546 bags, 1 bin and 29 trailer-loads of municipal waste for disposal and/or transfer. Based on information supplied by the Township, 67 tonnes of municipal waste were collected at the Mount St. Patrick WDS in 2023 and transported for final disposal to the approved waste disposal facility of GFL in Moose Creek, Ontario.

Recycling tonnage records provided by the Township indicated that 25 tonnes of Blue Box recyclables were collected which included 10 tonnes of commingled containers, 10 tonnes of mixed fibres, and 5 tonnes of OCC. Additionally, approximately 422 m³ of C&D and bulky waste, and 124 m³ of leaf and yard waste, was accepted at the Mount St. Patrick sWDS in 2023.

According to Township records, 21 tonnes of scrap metal, 11 refrigerant appliances, no tires, and 1 tonnes of WEEE were diverted from the depots at the Mount St. Patrick Waste Disposal Site.

Based on the results of the 2023 environmental monitoring program, the Mount St. Patrick Waste Disposal Site was interpreted to be in compliance with all conditions of the Environmental Compliance Approval (A411901) and with the inspections, monitoring, and reporting requirements of the conditions therein.



1 INTRODUCTION

This report was prepared by Jp2g Consultants Inc. (Jp2g) for the purposes of presenting and interpreting the results of the 2023 ground and surface water monitoring completed at Mount St. Patrick Waste Disposal Site (WDS).

The long-term waste management planning in the Township, identified the Mount St. Patrick site for the establishment and operation of a waste transfer station. Accordingly, an application to amend the ECA was submitted on July 25, 2007 to the Ministry. The intent of the 2007 application was to recognize the future operation of a solid waste and recycling transfer station, as well as utilization of the remaining capacity at the site for disposal of municipal waste, C&D and bulky waste, and to maintain service to the entire Township. Regular municipal waste (i.e. bagged garbage) and Blue Box recycling that is received at the site is transported to GFL Environmental Inc. (GFL) which is located in Moose Creek Ontario for disposal and processing. Construction and demolition (C&D) and bulky wastes received at the Mount St. Patrick site is stockpiled, processed, and landfilled.

Jp2g Consultants Inc. completed the environmental monitoring program in 2023. This service was previously offered by Greenview Environmental and for consistency, many details in this report have been copied in part or in whole from previous reports including Greenview (2023).

1.1 Site Information

A detailed description of the site location is as follows:

- The site is located on part of Lot 4, Concession 14 within the geographic Township of Brougham, in the amalgamated Township of Greater Madawaska (Township) as shown on **Figure 1**.
- The site coordinates are NAD 1983 UTM Zone 18 – 351183E 5021553N.
- The Mount St. Patrick site is located approximately 1.6 kilometers (km) west of the Village of Mount St. Patrick, and access to the site is provided by Flat Road (**Figure 2**).
- The Mount St. Patrick Waste Disposal Site operates in accordance with Environmental Compliance Approval (ECA) A411901 issued March 28, 1980, and the most recent amendment dated October 11, 2013 (**Appendix A**).
- The site operates as an active waste disposal site and includes a waste and recycling transfer station.
- The site consists of a 1.2hectare (ha) landfill and transfer station within a total property area of 38.25 ha and is approved to accept municipal waste from the entire Township.
- A significant portion of the site area is located downgradient of the approved waste disposal area (AWDA) and is currently used for operational buffer and contaminant attenuation zone (CAZ) purposes.

1.2 Site Ownership and Key Personnel

Site operations are directed by the Township. Contacts for the municipality and the Competent Environmental Practitioner (CEP) for both groundwater and surface water as defined by the Ministry (2010) are as follows:



Municipal Contact

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CEP Contact

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Sr. Hydrogeologist
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1.3 Site Development of the Waste Disposal Site

The following section provides a general description of the site, including operational details:

Environmental Compliance Approval:

The site operates under ECA No. A411901 dated March 28, 1980as amended October 11, 2013 (**Appendix A**).

Site Status:

The site is currently operational.

Site Capacity:

Under Condition 18 of the current ECA the approved total waste disposal volume is 46,785m³.

Projected Site Life:

The remaining lifespan of the site based on a total remaining capacity of approximately 32,400m³ is approximately 36 years as of December 2023.

Area of current waste cell footprint and approved footprint:

The current ECA recognizes a 1.2 ha landfilling area within a total site area of 38.25 ha.

Dates when the site opened, operated and closed as applicable:

The site was opened in the 1960's and receives municipal solid waste and recyclable wastes.

Information on final cover, slopes and engineering controls:

Details are found in the Design and Operations Plan dated July 23, 2007 (Greenview 2007). Final cover was applied to portions of the landfill site and the side slopes.

Any Permits To Take Water associated with the site:

There are no permits to take water associated with the site.

Other authorizing and/or control instruments associated with the site:

There are no storm water management facilities associated with the site.



Description of any leachate collection systems; and any sewage works, including the C of A number of the works:

The Mount St. Patrick Waste Disposal Site is designed for the natural attenuation of leachate. There are no collection systems or sewage works at the site.

Any site developments which occurred during the year of the monitoring report:

None

Any new developments in the vicinity of the site of relevance from a monitoring perspective:

None.

Historical Site Overview

Environmental Baseline Investigations which were undertaken:

Investigations of the Mount St. Patrick Waste Disposal Site have been carried out since 1999. Reports have been submitted annually to the Ministry.

Design and Construction of the Site:

The site design, development and operational requirements for the current waste disposal site are outlined in Greenview (2007) listed as item 2 in Schedule A of the ECA.

Development of environmental monitoring systems:

Environmental monitoring is conducted annually in accordance with Condition 19 of the ECA and recent TSS review comments.

Conceptual site model:

Infiltrating groundwater at the site will migrate vertically through more porous overburden material until intersected by the shallow groundwater table over bedrock. Groundwater flow is governed by local topography predominantly to be downhill to the south.

Initial placement of waste materials:

Within the 1.2 landfilling area.

Filling, closure and placement of final cover over waste cells:

The C&D waste is ground on site and is applied to the waste mound as needed.

Problems associated with of final cover over waste:

There have been no documented issues with the final cover on the waste disposal site.

Date of site closure, actual or projected, including any closure plans:

There are no closure plans, projected closure 2061



1.4 Ministry Consultation

The Mount St. Patrick WDS was inspected by the Ministry on September 12, 2012, and the Township subsequently received a Solid Non-Hazardous Waste Disposal Site Inspection Report (Inspection Report), dated September 25, 2012, which detailed the findings. Action items were included in Sections 5.0 and 6.0 of the Inspection Report. The Township first provided a response to Section 6.0 regarding the volume of C&D and bulky waste stored at the site at the time of the Ministry inspection in electronic correspondence, dated October 11, 2012. Further, the Township submitted a response to the Ministry in the form of a Compliance Action Plan, dated November 29, 2012, which addressed the action items detailed in Section 5.0 of the Inspection Report. The Ministry notified the Township regarding the acceptance of the Compliance Action Plan in electronic correspondence, dated November 30, 2012 (Greenview, 2013). Further, the Township provided follow-up comments in the 2012 Annual Report (Greenview, 2013) regarding action items detailed in the Compliance Action Plan.

On October 31, 2012, the Ministry Technical Support Section (TSS) issued groundwater review comments (Greenview, 2013) for the 2011 Annual Report (Greenview, 2012). The Ministry TSS requested that leachate indicator parameters be included in the 2012 Annual Report (Greenview, 2013). Additionally, the Ministry TSS provided direction to compare groundwater samples collected from monitoring well MW09-6 to the Ministry Provincial Water Quality Objectives (PWQO; MINISTRY, 1994b) as the groundwater monitoring location was interpreted to best intercept groundwater which could potentially discharge to Constant Creek (Greenview, 2013).

The Mount St. Patrick WDS was inspected by the Ministry Ottawa District Office on December 1, 2016, and an Inspection Report dated January 25, 2017, was issued to the Township (Greenview, 2017). The Township responded with a Compliance Action Plan via electronic mail on February 6, 2017 (Greenview, 2017), which was approved by the Ministry Ottawa District Office on February 15, 2017 (Greenview, 2017).

On December 24, 2018, the Township received an Ministry TSS surface water review of the 2017 Annual Report (Greenview, 2019). In the review, the Ministry TSS surface water reviewer noted that there were no negative impacts to the surface water system (Constant Creek) located approximately 650 m north and downgradient of the Mount St. Patrick Waste Disposal Site. The reviewer also noted their recommendation to calculate background surface water quality in Constant Creek using the 75th percentile concentrations, rather than the median, for future Annual Reports. This recommendation was initiated in the 2018 Annual Report (Table 6; Greenview, 2019).

On October 16, 2019, the Township received an Inspection Report from the Ministry Ottawa District Office dated October 8, 2019 (Greenview, 2020a). The Inspection Report included action items to be addressed by the Township, which were addressed in an Action Plan prepared by Greenview dated November 25, 2019, and sent to the Ministry Ottawa District Office on November 26, 2019 (Greenview, 2020a). The Ministry Ottawa District Office acknowledged receipt of the Action Plan on November 27, 2019, and approval of the Action Plan and related compliance dates was received from the Ministry Ottawa District Office on December 3, 2019 (Greenview, 2020a). As part of the response, the Township was required to submit photographs to the Ministry in accordance with their request. The Township submitted their response to the Ministry Ottawa District Office on February 14, 2020, and the Ministry approved the submission in an electronic communication dated February 18, 2020 (Greenview, 2020a). The final action items related to the Inspection Report included the requirement to prepare an Emergency Response Plan (Greenview, 2020b) and Contingency Plan (Greenview, 2020c).



These two (2) documents were completed and submitted to the Ministry Ottawa District for their file on March 31, 2020.

Throughout 2021 and early 2022, the Township and Greenview prepared a Revised Design and Operations Plan (DOP) for the Mount St. Patrick Waste Disposal Site as part of a proposed application to amend the ECA for the site, with the intent of modifying transfer station operations and stockpiling quantities for various wastes and recyclables. On January 20, 2022, a Pre-Submission Meeting was held between representations of the Ministry, the Township, and Greenview to review the proposed Revised DOP and discuss whether the proposed Revised DOP generally met with Ministry expectations for the ECA Application. Based on the Pre-Submission Meeting, it was recommended by the Ministry that the Township wait to submit the ECA Application until the 2021 Annual Report (due for submission to the Ministry Ottawa District Office by March 31, 2022) was available for inclusion as an appendix to the Revised DOP. The Township submitted the ECA Application and Revised DOP to the Ministry for review and approval on May 03, 2022. Receipt of submission was received on May 30, 2022.

An Inspection Report dated November 21, 2022 was received by the Township which was not acknowledged in the 2022 Annual Report (Greenview, 2023). No issues of concerns were identified by the MECP, a copy is provided in **Appendix B**. Copies of the Quarterly Inspection Reports by the Township are also included in **Appendix B**.

1.5 Purpose and Scope

The purpose of this report is to provide an overview of the annual monitoring, environmental compliance, and operations at the Mount St. Patrick Waste Disposal Site, and to satisfy Condition 22 of the ECA, including the following:

- Groundwater quality assessment and RUC (Ministry Guideline B-7) compliance
- Surface water quality assessment
- Site operational overview and capacity assessment.
- Preparation of an annual report that summarises the results of the monitoring program and submitting the report to the Ministry.

1.6 Assumptions and Limitations

In preparing this report, Jp2g has relied on information provided by the Township of Greater Madawaska and details provided in the 2022 Annual Landfill Monitoring Report (Greenview Environmental, 2023).

2 SITE DESCRIPTION

The following sections present a summary of the physical characteristics for the Mount St. Patrick WDS and is based in part on the descriptions in the Annual Monitoring Reports 2008-2021 prepared by Greenview (2007-2021).



2.1 Topography and Drainage

The vicinity of the Mount St. Patrick site is bounded by a regional feature known as the Mount St. Patrick Mountains, which are a topographic divide for the region, located approximately 1.5 km to the west of the site. Surface water drainage from the eastern side of the Mount St. Patrick Mountains is directed by local topography north-easterly, towards Constant Creek and the Mount St. Patrick WDS (**Figure 2**).

Locally, topographic highs exist to the north and south of the waste mound, thereby influencing and directing local drainage in the general direction of Constant Creek to the north and northeast. There are no defined surface water drainage systems in close proximity to the waste footprint; however, low-lying areas where water collects during wet seasonal conditions exist within the property boundary. Additionally, approximately 450 metres (m) north of the site, a small, northeast trending creek is observed to transect the Township property with eventual discharge into Constant Creek. In 2007, the low-lying area to the northeast of the site was characterized by a natural heritage specialist, and the limits of the low-lying area were defined in the vicinity of the site (Greenview, 2007b). A poorly drained area existing within the low-lying area is sampled by surface water monitoring location SW-3 (**Figure 2**).

Constant Creek is located approximately 625 m north of the existing limit of waste at the site (adjacent to monitoring well MW09-6R), and flows west to east towards Calabogie Lake, approximately 11 km southeast of the site. Constant Creek is a permanent surface water system and is sampled upstream of the site at sampling location SW-2 (background), and downstream of the site at sampling location SW-1 (**Figure 2**). In 2009, an additional surface water location (SW-4) on Constant Creek was included as part of the environmental monitoring program at the Mount St. Patrick site, approximately mid-way between sampling locations SW-2 (background) and SW-1, near the eastern property boundary and adjacent to monitoring well MW09-6R. SW-4 was added to the environmental monitoring program in order to monitor surface water quality on Constant Creek near the downgradient property boundary.

2.2 Hydrogeological Conditions

As part of the 2006 environmental work program at the site, four (4) monitoring wells were installed at the site, one (1) was installed upgradient of the site to monitor background groundwater quality (MW06-1), while three (3) were installed downgradient of the site to monitor water quality downgradient of the site (MW06-2, MW06-3, and MW06-4).

During the groundwater well installations, the overburden geology in the low-lying area immediately adjacent to the site (MW06-2 and MW06-3) was noted to consist of fine to coarse sands, with some boulders and dispersed pockets of sand with some silt and gravel. The subsurface materials in the upland areas in the vicinity of the AWDA of the Mount St. Patrick site (MW06-1 (since decommissioned) and MW06-4) were observed to consist primarily of fine to coarse grained sand with gravel, with the bedrock interface interpreted to be located in the range of 4.21 m to 6.10 m below ground surface, at monitoring wells MW06-4 and MW06-1, respectively.

In August 2008, background monitoring well MW06-1 was decommissioned prior to construction of the site's waste transfer station. A new background well, MW08-1, was installed on August 18, 2008, within the property boundary, and upgradient of the waste mound (**Figure 2**). The overburden observed during the installation of MW08-1 (background) included fine to medium grained sand with small cobbles.



Further to Ministry TSS comments (November 5, 2007, Greenview, 2008) and the Amended ECA (July 16, 2008, **Appendix A**), two (2) additional drive-point groundwater monitoring wells were installed on June 23, 2009, along the northeast property boundary. Monitoring well MW09-5 was installed approximately 300 m northeast of the southeast corner of the AWDA, cross-gradient to the direction of groundwater flow at the site, and near the north-eastern property boundary (**Figure 2**). Monitoring well MW09-6 was installed approximately 600 m north of the northeast corner of the AWDA, near the downgradient north-eastern property boundary and adjacent to Constant Creek and surface water location SW-4 (**Figure 2**). The two (2) additional groundwater monitoring wells were installed in low-lying areas north and northeast of the site, in order to verify conformance with Ministry Guideline B-7 at the downgradient property boundary.

Based on documented groundwater quality results from drive-point monitoring wells MW09-5 and MW09-6 between 2009 and 2014, it became apparent that groundwater quality at both monitoring wells was impacted from drive-point monitoring well construction materials (Greenview, 2023). In summer 2014, replacement shallow groundwater monitoring wells MW09-5R and MW09-6R were installed by the Township, using a hand auger and 2-inch PVC well materials, adjacent to drive-point monitoring wells MW09-5 and MW09-6, and the PVC well screens were appropriately backfilled with well sand. During the installation of MW09-5R, dark brown organic material (peat) was observed from ground surface to approximately 1.02 m bgs, underlain by grey clay. Similarly, during the installation of MW09-6R, dark brown organic material (peat) was observed from ground surface to approximately 0.3 m bgs, underlain by fine to medium grained sand to approximately 1.02 m bgs, followed by grey clay. The existence of grey clay at approximately one (1) m bgs at both monitoring wells MW09-5R and MW09-6R was interpreted to be an important factor related to the poorly drained characteristics of the low-lying area north and east of the Mount St. Patrick site (**Figure 2**).

A new shallow, background monitoring well was installed at the Mount St. Patrick site in May 2021, designated as MW21-7. The new, shallow, background monitoring well MW21-7 was installed at the site given that recent historical groundwater results from the existing background well MW08-1 have been interpreted to be impacted by road salt use in the transfer station and along Flat Road.

Based on the historical groundwater elevations measured at the mini-piezometers (MP1 through MP7) and the on-site groundwater monitoring wells, groundwater flow at the Mount St. Patrick site in 2023 was interpreted to be predominantly to the north (**Figures 3a and 3b**).

Borehole logs for all monitoring wells are provided in **Appendix C**.

2.3 Land Use

The land use designation for the Mount St. Patrick WDS is Active Waste Disposal Site on Schedule "A" to the County's Official Plan. The property is bound to the south and north by vacant land. Immediately west of Flat Road, the DACA Centre (community hall and outdoor recreational facility) and a small Township Operations Yard are located. The WDS is zoned Waste Disposal Site (WD) and Extractive Industrial Reserve (EMR) on Schedule "B" to By-Law 22-2003. The properties across Flat Road are zoned Community Facility (CF).

The nearest residence to the Mount St. Patrick Waste Disposal Site is located approximately 150 m west and upgradient of the site on Flat Road.



2.4 Operational Setting

Currently, the Mount St. Patrick site operates as an active waste disposal site and transfer station and is approved to receive municipal waste and recyclables generated within the Township. Access to the site is provided by Flat Road. The site is surrounded by forested and agricultural lands and is bound to the north by Constant Creek (Greenview, 2007a).

On July 16, 2008, an Amended ECA was issued by the Ministry, approving the continued use of the site as a landfill for approved waste and for the establishment and operation of a waste and recycling transfer station (**Appendix A**). Construction of the transfer station at the Mount St. Patrick site was initiated in late 2009, with operations commencing on August 18, 2010.

On October 11, 2013, an Amendment to the ECA was issued by the Ministry, approving the burning of clean wood and brush at the site. Additionally, the Amendment to the ECA updated the approved maximum waste storage capacities at the site's transfer station (**Appendix A**).

3 ENVIRONMENTAL MONITORING PROGRAM 2023

3.1 Monitoring Locations

Table 1 summarizes the location of monitoring wells and surface water monitoring stations. All monitoring locations including groundwater wells and the surface water monitoring stations are provided in **Figure 2**. Borehole logs are provided in **Appendix C**, and **Appendix D** contains photographs of the wells and surface water monitoring stations in summer 2023.

3.1.1 Groundwater Monitoring Locations

Seven groundwater wells and five mini piezometers were installed at and around the Mount St. Patrick WDS between 1991 and 2012. Details are as follows:

- **Monitoring Well MW06-2**
Located approximately 20 m east of the eastern AWDA boundary, in the low-lying area.
- **Monitoring Well MW06-3**
Located in the low-lying area approximately 25 m northeast of the northeastern corner of the AWDA.
- **Monitoring Well MW06-4**
Monitoring well MW06-4 is located within the AWDA limits and approximately 10 m northwest of the existing limit of waste.
- **Monitoring Well MW08-1**
Located approximately 25 m west and upgradient of the of the existing limit of waste.
- **Monitoring Well MW09-5R**
Located approximately 300 m east of the AWDA.
- **Monitoring well MW09-6R**
located approximately 560 m northeast of the AWDA.
- **Monitoring Well MW21-7**
Located approximately 70 m south of the AWDA.



- **Monitoring station MP3R**
A monitoring piezometer Located approximately 30 m northeast of the existing limit of waste.
- **Monitoring station MP4**
A monitoring piezometer Located approximately 15 m northwest of the existing limit of waste.
- **Monitoring station MP5**
A monitoring piezometer Located approximately 150 m northeast of the existing limit of waste.
- **Monitoring station MP6**
A monitoring piezometer Located approximately 60 m east of the existing limit of waste.
- **Monitoring station MP7**
A monitoring piezometer Located approximately 100 m northeast of the existing limit of waste.

Historically, background groundwater quality at the Mount St. Patrick site was assessed at monitoring well MW06-1, which was located approximately 45 m south and upgradient from the AWDA at the site. In 2008, MW06-1 was decommissioned in advance of construction of the waste and recycling transfer station at the site. Following the decommissioning of MW06-1, a replacement background groundwater monitoring well, MW08-1, was installed upgradient of the waste mound and 70 m north of MW06-1 (**Figure 2**).

New background monitoring well MW21-7 was installed on May 06, 2021, approximately 30 m east and upgradient of the transfer station at the Mount St. Patrick site (**Figure 2**). Monitoring well MW21-7 was installed using a hand auger to the total depth of 1.08 m below ground surface (bgs).

3.1.2 Surface Water Monitoring Locations

In summer 2023, surface water samples were collected at three locations:

- **Monitoring Location SW1**
Located on Constant Creek, approximately 700 m northeast and downstream of the existing limit of waste at the Mount St. Patrick site.
- **Monitoring Location SW2**
Located on Constant Creek, approximately 700 m northwest and upstream of the existing limit of waste at the Mount St. Patrick site.
- **Monitoring Location SW3**
Located on a low-lying area north of, and in close proximity to, the waste mound.
- **Monitoring Location SW4**
Downstream surface water quality is located adjacent to the downgradient property boundary and along Constant Creek.

3.2 Monitoring Procedures and Methods

All sampling was completed in general accordance with Jp2g Consultants Inc. standard operating procedures. Sampling methods and quality assurance measures are summarized and provided in **Appendix E**.



3.3 Groundwater Monitoring Program 2023

Two (2) groundwater monitoring events were completed by Jp2g in the spring and fall 2023 (July 4 and November 1). The monitoring program included the collection of groundwater levels and the collection of water quality samples from selected groundwater stations. **Table 1** summarizes the location of all monitoring wells, and **Table 2** summarizes the sampling activities that were completed during the spring and fall of 2023 monitoring program.

During the 2023 spring and fall sampling events, groundwater elevations were measured at each monitoring well using an electronic water level tape prior to sampling. Groundwater elevations were also measured at the mini piezometers on-site, using an electronic water level tape (**Appendix G**).

During the spring and fall 2023 sampling events, the new background monitoring well MW21-7 was observed to have insufficient water for sampling purposes and a groundwater sample could not be collected. Monitoring wells MW09-5R and MW09-6R were not sampled during spring and fall 2023 sampling events. Only mini piezometers MP6 and MP7 were observed to have sufficient groundwater for groundwater elevation measurements during both sampling events (**Table 2**).

Residential groundwater quality is historically monitored during both the spring and fall sampling events at location GLL7, which is located at 199 Mount St. Patrick Road and approximately 550 m east of the existing limit of waste at the Mount St. Patrick site. In the spring 2023, residential groundwater sample was not collected at the GLL7 location, however, in the fall 2023, the residential groundwater sample was collected.

Duplicate groundwater samples were collected for Quality Assurance and Quality Control (QA/QC) purposes from monitoring well MW08-1 during both 2023 sampling events.

Data collected for this annual report is included as appendices, namely, borehole logs (**Appendix C**), photo album (**Appendix D**), groundwater elevations (**Appendix G**), and laboratory analytical results (**Appendix H**), groundwater and surface water results (**Appendix I**).

3.4 Surface Water Monitoring Program 2023

Two (2) surface water monitoring events were completed by Jp2g in the spring and fall 2023 (July 4 and November 1). The monitoring program included the collection of water quality samples from selected surface water stations. **Table 1** summarizes the location of all monitoring stations, and **Table 2** summarizes the sampling activities that were completed during the spring and fall of 2023 monitoring program.

Samples were not collected from SW-3 during the spring and fall 2023 monitoring events as the sampling location was observed to have insufficient water for sampling purposes.

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.

Data collected for this annual report is included as appendices, namely, photo album (**Appendix D**), laboratory analytical results (**Appendix H**), and groundwater and surface water results (**Appendix I**).



3.5 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 Ministry to perform analysis on drinking water in Ontario in accordance with the Safe Drinking Water Act.

3.6 Landfill Gas Monitoring

Landfill gas monitoring is not part of the current environmental monitoring program for the site. The waste mound at the Mount St. Patrick site is covered with porous soil materials, allowing natural gas flux to the atmosphere. Overburden geology at the site is characterized by fine to coarse sands, with some boulders and dispersed pockets of sand with some silt and gravel, overlying a dense bedrock unit. These overburden characteristics, coupled with the extended distance to the nearest residence, provide a minimal risk of landfill gases impinging off-site receivers.

3.7 Operational Monitoring

Operational monitoring at the Mount St. Patrick Waste Disposal Site was conducted regularly to document routine waste disposal and recycling activities at the site.

A topographic survey was conducted at the Mount St. Patrick WDS on December 20, 2023, to determine the current capacity status for continued disposal operations at the site and to update site features (**Drawing 1**).

Daily waste records (summary forms) were completed at the Mount St. Patrick WDS as part of regular operations at the site to monitor landfilling activities, vehicular traffic, and transfer station operations.

The Township submits annual waste diversion reports in accordance with the Municipal Datacall, inclusive of the Mount St. Patrick WDS, to the Resource Productivity and Recovery Authority (RPRA).



4 ENVIRONMENTAL MONITORING RESULTS

4.1 Historical Data

Historical static water level and sampling results are presented in earlier reports completed by Greenview Environmental and are summarized in **Appendix F** of this report.

4.2 Groundwater Flow Monitoring

Static water levels were measured in July and November 2023, and are summarized in **Appendix G**. Groundwater flow patterns are provided in **Figures 3a** and **3b**. The water levels were referenced to a local datum. In 2023, and consistent with the historical results, the groundwater flow at the site was interpreted to flow towards the north and northeast, away from the waste mound, and in the general direction of the low-lying areas north of the site.

4.3 Groundwater Quality Assessment

4.3.1 Groundwater Assessment Criteria

Groundwater at landfill sites is generally assessed with regard to the criteria specified in the Ontario Drinking Water Quality Standards (ODWQS). The ODWQS is split into health and non-health related parameters. Non-health related parameters are in turn split into aesthetic objectives and operational guidelines.

In accordance with Ministry TSS hydrogeological review comments, dated October 31, 2012 (Greenview, 2013), for the 2011 Annual Report (Greenview, 2012), groundwater samples from monitoring well MW09-6 were also compared to the PWQO criteria as MW09-6 was interpreted to best intercept groundwater which would potentially discharge to Constant Creek (Greenview, 2023). As MW09-6 was replaced with new shallow groundwater monitoring well MW09-6R in summer 2014, results from MW09-6R were compared to the PWQO in 2023. The downgradient groundwater quality results were compared to PWQO. Given that monitoring well MW09-6R is located approximately 560 m northeast and downgradient of the northeastern corner of the AWDA at the Mount St. Patrick site.

It was requested in the October 31, 2012, Ministry TSS hydrogeological review comments (Greenview, 2013), that typical leachate parameters for the Mount St. Patrick site be defined in future reports. Further to a review of the current parameter list for the site, and excluding parameters deemed to be naturally-occurring upgradient of the site, naturally-elevated within the adjacent low-lying area, or have alternative sources (i.e. winter road maintenance activities), the parameters identified to best represent leachate indicators for a municipal waste disposal site of this size and operational practices (i.e. processed C&D and bulky waste disposal) are barium, boron, copper, nitrate, and sulphate.

New background monitoring well MW21-7 was installed on May 06, 2021, approximately 30 m east and upgradient of the transfer station at the Mount St. Patrick site.



Historically, background groundwater quality was calculated using the median of a minimum of the previous ten (10) sampling events results from background monitoring wells MW08-1 and MW21-7, however, it was recommended that median background groundwater quality at the site be solely calculated based on MW21-7 results once sufficient database of groundwater analytical results is available for the new background well MW21-7.

In future sampling events, new background monitoring well MW21-7 is anticipated to better represent background groundwater conditions at the Mount St. Patrick site than monitoring well MW08-1. Additional results in future groundwater monitoring events for MW21-7 are required in order to establish typical (median) background groundwater quality. Once a sufficient database of results is available (i.e. after five [5] sampling events), then it is recommended that median background groundwater quality for the Mount St. Patrick Waste Disposal Site be calculated solely based on results from MW21-7.

In 2023, and until sufficient database from MW21-7 is available, background groundwater quality was calculated using the median of a minimum of the previous ten (10) sampling events results from background monitoring wells MW08-1.

4.3.2 Groundwater Quality 2023

The accredited laboratory Certificates of Analysis are presented in **Appendix H**, and the results of the 2023 groundwater monitoring program are presented in **Appendix I**. Analytical data were compared to the Ontario Drinking Water Standards (ODWS) and MINISTRY Guideline B-7 and RUC.

Background Monitoring Well MW08-1

In 2023, all parameters met the ODWQS criteria for monitoring well MW08-1. Groundwater results at MW08-1 are not interpreted to be impacted by landfill-related activities in 2023. Historically, aluminum, dissolved organic carbon (DOC), hardness, iron, manganese, and total dissolved solids (TDS) have been observed at high concentrations in the background, and based on recent groundwater quality results at MW08-1 it appears that groundwater quality at this monitor has been impacted by winter road maintenance activities from the transfer station and Flat Road, and by winter sand storage at the municipal depot located on the west side of Flat Road.

Monitoring Well MW21-7

The new background well MW21-7 was dry during the spring and fall 2023 sampling events and samples could not be collected. Based on preliminary results (2021-2022) from new background well MW21-7, background groundwater quality in the vicinity of MW21-7 is interpreted to have naturally high concentrations of aluminum, DOC, iron, and manganese.

Monitoring Well MW06-2

Located approximately 20 m east of the eastern AWDA boundary, in the low-lying area, and was used to establish groundwater quality downgradient and northeast of the waste mound (**Figure 2**). In 2023, all parameters met the ODWQS criteria except TDS, manganese, and iron (fall only). Historically, manganese was interpreted to be naturally elevated in the background groundwater at the site, while concentrations of TDS and iron were also noted to be elevated in historical background groundwater quality results at MW08-1 (**Appendix F**). In 2023, results from monitoring well MW06-2 were interpreted to be most representative of leachate quality at the site.



Monitoring Well MW06-3

Groundwater quality downgradient and north of the site is characterized using monitoring well MW06-3, located in the low-lying area approximately 25 m northeast of the northeastern corner of the AWDA (**Figure 2**). In 2023, all parameters met the ODWQS criteria except DOC, manganese, and TDS (fall only). Recent groundwater quality results at MW06-3 were interpreted to suggest that impacts related to winter road maintenance activities at the site have been diminishing in the vicinity of monitoring well MW06-3 (**Appendix F**).

Monitoring Well MW06-4

Monitoring well MW06-4 is located within the AWDA limits and approximately 10 m northwest of the existing limit of waste at the site (**Figure 2**). In 2023, all parameters met the ODWQS criteria except TDS, chloride (spring only), and hardness (spring only). Groundwater quality at MW06-4 was not interpreted to be impacted by landfill-related activities. Consistent with results at MW08-1, groundwater quality at MW06-4 was interpreted to be impacted from winter road maintenance activities, likely related to winter sand stockpiles at the municipal depot located upgradient and on the west side of Flat Road.

Monitoring Well MW09-5R

Monitoring well MW09-5R is located approximately 300 m east of the AWDA and is used to establish groundwater quality near the northeastern property boundary at the site (**Figure 2**). In 2023, monitoring well MW09-5R was not sampled during both sampling events. In the previous monitoring year (2022), all parameters met the ODWQS criteria except DOC, iron, and manganese. Given that MW09-5R was installed in approximately 1 m of dark brown organic peat material (**Appendix C**), the historical exceedances of DOC, iron and manganese were interpreted to be result of naturally occurring conditions within the low-lying area (**Appendix F**).

Monitoring Well MW09-6R

Monitoring well MW09-6R is located approximately 560 m northeast of the AWDA at the Mount St. Patrick site and adjacent to a small creek draining from the upland and low-lying areas to the southwest and transecting Flat Road, and near Constant Creek, and used in order to establish groundwater quality at the downgradient property boundary (**Figure 2**). In 2023, monitoring well MW09-6R was not sampled during both sampling events. In the previous monitoring year (2022), all parameters met the ODWQS criteria except DOC, iron, and manganese (fall only). Given that MW09-6R was installed into approximately 0.3 m of dark brown organic peat material and 0.62 m of fine to medium grained sand (**Appendix C**), the high historical concentrations of DOC, iron, and manganese were anticipated and were interpreted to be resultant of naturally occurring conditions within the low-lying area (**Appendix F**).

Monitoring Well GLL7

In the spring 2023, residential groundwater sample was not collected from GLL7. In the fall 2023, all parameters met the ODWQS criteria. Based on the interpreted direction of groundwater flow in the vicinity of the Mount St. Patrick site, and the distance of residential sampling location GLL7 from the waste mound, and historical results, the likelihood of groundwater at residential location GLL7 being impacted by landfill-related factors associated with the Mount St. Patrick Waste Disposal Site was interpreted to be minimal.



4.3.3 Reasonable Use Concept Assessment

The Reasonable Use Concept was developed by the Ministry to address the levels of off-site contaminants that are considered acceptable. The Reasonable Use Criteria allows for the definition of the level of contamination in the groundwater beyond which mitigative action should be undertaken. The acceptability of the landfill in terms of its impact on groundwater has been assessed in terms of the Reasonable Use Criteria (RUC). The RUC established the acceptability of change in groundwater quality (C_m) as follows:

Aesthetic Parameters

Degradation of less than 50% of the difference between the background quality and the established objective for the particular health related parameter.

Health Related Parameters

Degradation of less than 25% of the difference between the background quality and the established objective for the particular health related parameter. Acceptable concentrations are based on background levels and water quality guidelines (i.e. drinking water objectives).

The chosen background values are utilized to calculate the RUC allowable concentrations for specific parameters, as per the following formulas:

Health Related:

$$C_{\text{allow}} = P_b + (C_m - P_b) \times 25\%$$

Non-Health Related:

$$C_{\text{allow}} = P_b + (C_m - P_b) \times 50\%$$

where:

C_{allow} = Maximum allowable concentration of parameter as per the RUC guidelines.

C_m = Maximum acceptable concentration (MAC) of parameter as per the ODWS/OG.

P_b = Chosen background value of parameter

Historically, background groundwater quality was calculated using the median of a minimum of the previous ten (10) sampling event results from background monitoring wells MW08-1, however, it was recommended that median background groundwater quality at the site be solely calculated based on the new monitoring well MW21-7 results once sufficient database of groundwater analytical results is available for well MW21-7. In 2023, background groundwater quality was calculated using the median of a minimum of the previous ten (10) sampling events results from background monitoring wells MW08-1.

Groundwater monitoring wells MW09-5R and MW09-6R were used for monitoring potential impacts along the north-eastern property boundary downgradient and cross-gradient of the AWDA at the Mount St. Patrick site, and for assessing site compliance with the RUC (**Figure 2**).

Table 3 outlines the median calculation for background concentrations, and **Table 4** outlines the Reasonable Use Criteria.

4.3.4 Reasonable Use Conclusions - 2023

The reasonable use conclusions and the indicator parameters that exceed the RUC for the 2023 sampling events are presented in **Table 5**.

**Monitoring Well MW09-5R**

This well was not sampled in 2023. The results from Previous monitoring year (2022) indicate that all parameters met the RUC criteria except for DOC, iron, and manganese during both 2022 sampling events.

Monitoring Well MW09-6R

This well was not sampled in 2023. The results from Previous monitoring year (2022) indicate that all parameters met the RUC criteria except for DOC, iron, and manganese during both 2022 sampling events.

The RUC values for individual parameters should be generated each year based on analytical results obtained from the groundwater monitoring program. If RUC non-conformances 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 Ministry office should be held to develop an appropriate contingency plan, as necessary and appropriate for the particular site.

High iron and manganese concentrations in 2023 were interpreted to be related to naturally occurring conditions within the low-lying area and off-site sources in the vicinity of Flat Road, and not to landfill-related activities.

Based on the above results, the Mount St. Patrick site was interpreted to be in compliance with RUC and conformance with Ministry Guideline B-7 in 2023.

In 2023, the total property area of 38.25 ha owned by the Township was considered sufficient for operational buffer and CAZ purposes at the Mount St. Patrick site. Further groundwater monitoring as part of future annual monitoring programs at monitoring wells MW09-5R and MW09-6R is anticipated to assist in verifying the suitability of the CAZ lands for future RUC assessments and conformance with Ministry Guideline B-7.

4.4 Surface Water Quality Assessment

4.4.1 Surface Water Assessment Criteria

Surface water at landfill sites is generally assessed with regard to the criteria specified in the Provincial Water Quality Objectives (PWQO). The PWQOs are a set of ambient surface water quality criteria. In addition to the PWQOs, surface water quality results are, where relevant, compared to select Canadian Water Quality Guidelines (CWQGs).

4.4.2 Surface Water Monitoring 2023

Photos of the monitoring stations are included in **Appendix D**, laboratory results are included in **Appendix H**, and the results of the surface water analysis for 2023 are included in **Appendix I**. **Figure 2** illustrate the locations of all surface water monitoring stations. Consistent with historical surface water quality assessments, background surface water quality at the Mount St. Patrick site was evaluated at surface water location SW-2 (Greenview, 2023). Background surface water quality was established as the 75th percentile of a minimum of the previous ten (10) sampling events results from background surface water monitoring location SW-2.



Surface Water Station SW2 - Background

located on Constant Creek, approximately 700 m northwest and upstream of the existing limit of waste at the Mount St. Patrick site (**Figure 2**). In 2023, all parameters met the PWQO criteria and other ambient surface water criteria. Results from SW-2 were interpreted to be representative of background surface water quality at the Mount St. Patrick site in 2023.

Surface Water Station SW1

Surface water quality downstream of SW-4 on Constant Creek is monitored at surface water location SW-1 (**Figure 2**). In spring 2023, SW1 was dry, and samples could not be collected. In fall 2023, all parameters met the PWQO criteria and other ambient surface water criteria. No parameter concentrations were above the 75th percentile background surface water quality except for barium and sodium during the fall 2023 sampling event (see **Table 6**).

Surface Water Station SW3

Surface water quality in the low-lying area north of, and in close proximity to, the waste mound is assessed at surface water sampling location SW-3 which is not hydrologically connected to Constant Creek or the sampling station (SW-1, SW-2, and SW-4). Historically, SW-3 has been observed to be a small, poorly drained area with leaves and other submerged organic debris, existing within the low-lying area (**Figure 2**). In 2023, SW3 was dry, and samples could not be collected. SW-3 was last sampled in spring 2021 and the sampling area was observed to be a shallow, pooled area of standing water with no discernible flow conditions.

Surface Water Station SW4

Surface water station SW4 was established in 2009 and is located in Constant Creek along the downgradient property boundary (**Figure 2**). In 2023, all parameters met the PWQO criteria and other ambient surface water criteria. No parameter concentrations were above the 75th percentile background surface water quality except for barium and sodium (fall only) during spring and fall 2023 sampling events (see **Table 6**).

Based on the results of the 2023 surface water monitoring program, the surface water system in the vicinity of the Mount St. Patrick site was not interpreted to be significantly impacted from landfill-related activities.

4.5 Operations Summary

A summary of 2023 waste management operations at the Mount St. Patrick Waste Disposal Site is presented below.

4.5.1 Site Operations

The site is currently operating as a municipal solid waste landfill and transfer station, accepting municipal waste and recyclables from ratepayers of the Township. Accepted regular municipal waste (i.e. bagged garbage) and Blue Box recycling is transferred to GFL in Moose Creek, Ontario for disposal and processing. The Mount St. Patrick WDS currently services the Township of Greater Madawaska and operates in accordance with ECA A411901 (**Appendix A**). C&D and bulky waste is accepted for stockpiling, processing, and landfilling (**Figure 2**). In 2023, C&D and bulky waste materials were processed on-site in fall 2023 and disposed of in the landfill area. A quantity of unprocessed C&D and bulky waste was stockpiled on-site and within the landfilling area at the time of the annual waste capacity survey on December 20, 2023. As part of site operations, the Mount St. Patrick WDS is approved for accepting and diversion of the following waste and recyclable materials:



Waste/Recyclable Material	Quantity (units)
Regular Municipal Waste (Residential & IC&I)	80 m ³
Organic Waste	20 m ³
Waste Electronic and Electrical Equipment (WEEE)	40 m ³
Blue Box Recyclables (mixed fibers/commingled containers/old corrugated cardboard)	325 m ³
Tires	100 m ³
Leaf and Yard Waste	200 m ³
C&D and Bulky Waste	60 m ³
Refrigerants	25 units

A sign is posted at the entrance to the site in accordance with Condition 13.4 of the ECA. The sign provides the ECA number for the site, hours of operation, permitted users, accepted waste and recycling materials, emergency and Township contact information, and a warning against dumping waste outside of the site. The Mount St. Patrick site is located approximately 1.6 km west of the village of Mount St. Patrick, and access to the site is provided by Flat Road.

The hours of operation at the Mount St. Patrick WDS in 2023 were as follows:

Day of the Week	Hours of Operation
Wednesday	8:00 am – 12:00 pm
Saturday	8:00 am – 12:00 pm
Sunday	8:090 am – 12:00 pm
Holiday Monday	Closed

Access to the Mount St. Patrick 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 from the maintained site entrance way.

The site access road extending from Flat Road has sufficient width at the entrance and within the site to allow for unimpeded winter travel and access for emergency and snow removal equipment. The site access road was observed to be in serviceable condition during the routine site inspections conducted by Greenview in 2023.

4.5.2 Waste Disposal/ Transfer Summary

The Mount St. Patrick WDS currently receives municipal waste and recyclables from the Township of Greater Madawaska which is transferred to GFL Environmental. C&D and bulky waste processing operations were completed in fall 2023. The volume of waste disposed of at the Mount St. Patrick WDS in 2023 was determined by survey and using civil 3D to compare two topographic surfaces to calculate volumetric difference. As well as algebraic calculation to subtract the Greenview remaining volume from 2023 annual volume.



To calculate the volume of processed C&D and bulky waste disposed, graded, and compacted at the site in 2023, the Jp2g topographic survey conducted on December 20, 2023, was compared to previous Greenview survey plans. As AutoCAD files were not provided there is some lack of accuracy. Based on the topographic survey calculations for the Mount St. Patrick WDS, the 2023 fill rate was calculated to be approximately 3500 cubic meters (m³) of waste.

The Jp2g December 2023 survey compared to the approved final contours at closure of the Mount St. Patrick WDS resulted in a remaining site capacity as of December 20, 2023 of approximately 32,400 m³. Given the average (mean) five (5) year fill rate (2018 to 2022) of 881 m³, the estimated remaining site life for the Mount St. Patrick WDS is approximately thirty-six (36) years.

As processed C&D and bulky wastes are approved as alternative daily cover for the Mount St. Patrick WDS, no aggregate-based cover material (i.e. sand, etc.) was utilized as part of operations in 2023.

Based on Township records, approximately 3396 vehicles visited the Mount St. Patrick WDS in 2023 and accepted approximately 10,546 bags, 1 bin and 29 trailer-loads of municipal waste for disposal and/or transfer. Based on information supplied by the Township, 67 tonnes of municipal waste were collected in 2023 and transported for final disposal to the approved waste disposal facility of GFL in Moose Creek, Ontario.

Recycling tonnage records provided by the Township indicated that 25 tonnes of Blue Box recyclables were collected which included 10 tonnes of commingled containers, 10 tonnes of mixed fibres, and 5 tonnes of OCC. Additionally, approximately 422 m³ of C&D and bulky waste, and 124 m³ of leaf and yard waste, was accepted at the Mount St. Patrick WDS in 2023.

According to Township records, 21 tonnes of scrap metal, 11 refrigerant appliances, no tires, and 1 tonne of WEEE were collected from the Mount St. Patrick WDS.

4.5.3 Site Inspections and Maintenance

Site inspections of the AWDA and property at the Mount St. Patrick site were conducted by Jp2g on July 4, 2023 and November 1, 2023 during the spring and fall sampling events, and on December 20, 2023, during the topographic survey of the site. The Township also conducted periodic investigations to verify the compliance status of the site.

4.5.4 Monitoring and Screening Checklist

The monitoring and screening checklist is provided in **Appendix J** and based on the 2023 results no contingency measures are required to be implemented.



5 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the 2023 environmental monitoring program completed for the Mount St. Patrick Waste Disposal Site, the following conclusions are provided:

- The groundwater flow direction at the site in 2023 was interpreted to be similar to historical interpretations with the direction of groundwater flow to the north towards the low-lying area, and in the general direction of Constant Creek.
- Groundwater immediately downgradient of the site at monitoring wells MW06-2, MW06-3, and MW06-4 was not interpreted to be impacted by landfill-related activities, however, naturally-occurring conditions within the low-lying area at the site (MW06-2 and MW06-3), and winter road maintenance activities (MW06-4), were interpreted to be contributing factors to documented groundwater quality results in the vicinity of the Mount St. Patrick WDS.
- In 2023, no Reasonable Use Concept (RUC) exceedances were documented in the results from downgradient monitoring wells MW09-5R and MW09-6R that were attributed to landfill-related factors. Based on the above, the Mount St. Patrick WDS was interpreted to meet the intent of Ministry Guideline B-7 at the downgradient northern CAZ boundary in 2023.
- Results from surface water location SW-2 were interpreted to be representative of background surface water quality at the Mount St. Patrick WDS. Based on a review of 2023 surface water quality results for downstream surface water sampling locations SW-1 and SW-4, Constant Creek was not interpreted to be impacted by landfill-related activities of the Mount St. Patrick WDS. Surface water sampling location SW-3, located near the Mount St. Patrick WDS and within the low-lying area, was dry in 2023. Historically, SW-3 was not interpreted to be significantly impacted by landfill-related activities.

5.1 Groundwater Monitoring 2024

No changes to groundwater monitoring are recommended for 2024. Groundwater monitoring should continue to occur twice per year (May/June and October/November) and consist of the following (see **Table 7**):

- Water levels at all locations should be collected.
- Any wells that are found to be damaged should be repaired or replaced.
- Groundwater samples should be collected from all locations in May/June and October /November and include appropriate duplicate samples; and
- Samples should be analyzed for the parameters listed in **Table 7**.

5.2 Surface Water Monitoring 2024

No changes to surface water monitoring are recommended for 2024. Surface water monitoring should continue to occur three times per year (May/June and October/November) and consist of the following (see **Table 7**):

- Collect surface water from SW1, SW2, SW3 and SW4.
- Collect samples in May/June and October/November.
- Samples should be analyzed for the parameters listed in **Table 7**.
- Un-ionized ammonia should be calculated using field results.



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LIMITATIONS AND USE OF THE REPORT

This report was prepared for the exclusive use of the Township of Greater Madawaska. Any use which a third party makes of this report, or and reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Jp2g Consultants Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This landfill impact report involves a limited sampling of locations to assess the probability of contamination on site. The test data, chemical analyses, and conclusions given herein are the results of analyzing the groundwater encountered during the sampling programs. Based upon the total number of test holes performed, these are considered to be fairly representative of the groundwater conditions within each area tested. It should be noted, however, that any assessment regarding the presence of contamination on the property is based on interpretation of conditions determined at specific locations and depths. Chemical results are limited to those parameters tested.



Tables

**Groundwater Monitoring Well and Surface Water Sampling Locations
Mount St. Patrick Waste Disposal Site**

Groundwater			
Monitor	Zone	Northing	Easting
MW06-2	18T	5021685	351295
MW06-3	18T	5021738	351260
MW06-4	18T	5021687	351201
MW08-1	18T	5021601	351209
MW09-5	18T	5021831	351480
MW09-5R	18T	5021831	351480
MW09-6	18T	5022284	351377
MW09-6R	18T	5022278	351375
MW21-7	18T	5021559	351308

Surface Water			
Monitor	Zone	Northing	Easting
SW-1	18T	5022270	351742
SW-2	18T	5022324	351013
SW-3	18T	5021777	351212
SW-4	18T	5022286	351369

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

Table 2: Monitoring Program 2023

Station ID	Monitorign Location	Spring 2023	Fall 2023	Notes
Groundwater				
MW06-2	Approximately 20 m east of the eastern AWDA boundary	√	√	
MW06-3	Approximately 25 m northeast of the northeastern corner of the AWDA	√	√	
MW06-4	Approximately 10 m northwest of the existing limit of waste	√	√	
MW08-1	Approximately 25 m west of the of the existing limit of waste	√ + DUP	√ + DUP	
MW09-5R	Approximately 300 m east of the AWDA	NS	NS	
MW09-6R	Approximately 560 m northeast of the AWDA.	NS	Dry	
MW21-7	Approximately 70 m south of the AWDA	Dry	Dry	
GLL7	Residential	NS	√	
MP 3R	Approximately 30 m northeast of the existing limit of waste	NM	NM	Water level only
MP 4	Approximately 15 m northwest of the existing limit of waste	Destroyed	Destroyed	Water level only
MP 5	Approximately 150 m northeast of the existing limit of waste	NM	Dry	Water level only
MP 6	Approximately 60 m east of the existing limit of waste	√	√	Water level only
MP 7	Approximately 100 m northeast of the existing limit of waste	√	√	Water level only
Surface Water				
SW1	Approximately 700 m northeast and downstream of the existing limit of waste	NS	√	
SW2	Approximately 700 m northwest and upstream of the existing limit of waste	√	√	
SW3	Located on a low-lying area north of the waste mound	Dry	Dry	
SW4	Located adjacent to the downgradient property boundary and along Constant Creek	√	√	

Notes:

1. √ = sampled for the required parameters, field parameters and water level
2. DUP = Duplicate Sample taken
3. NS: Not sampled
3. NS: Not measured

Table 3: Median Background Concentrations (Using MW08-1 Results)

Parameters (mg/L)	May 19	Oct 19	Apr 20	Oct 20	May 21	Nov 21	May 22	Nov 22	Jul 23	Nov 23	Median
Alkalinity	249	310	236	275	248	299	241	307	267	321	271
Chloride	301	55.2	41.9	63.8	16.1	78.4	16.6	67.3	20.2	40	48.6
Nitrate	1.5	0.4	0.84	0.5	0.9	0.5	1.09	0.33	0.66	0.49	0.6
Sulphate	28	16	11	12	9	12	9	13	9	17	12
TDS	818	411	316	404	290	440	279	403	300	398	401
DOC	2.7	2	2	1	2.5	1.4	1.9	0.3	1.5	2.6	1.95
Barium	0.231	0.147	0.101	0.141	0.088	0.163	0.103	0.127	0.1	0.134	0.13
Boron	0.008	0.011	0.006	0.015	0.009	0.013	0.005	0.013	0.012	0.014	0.012
Iron	0.052	0.695	0.019	<0.005	0.099	0.447	0.021	0.455	0.028	<0.005	0.08
Manganese	0.003	0.049	0.001	<0.001	0.007	0.038	0.002	0.021	<0.001	<0.001	0.01
Sodium	83.5	44.2	31.4	43.3	20.3	47.2	20.4	43.6	37.3	38.2	40.8

Table 4: Reasonable Use Determination 2023 (Using MW08-1 results)

Parameter (mg/L)	Pb	Cm	F	Callow
Alkalinity	271	500	0.5	386
Chloride	48.6	250	0.5	149
Nitrate	0.6	10	0.25	3.0
Sulphate	12	500	0.5	256
TDS	401	500	0.5	451
DOC	1.95	5	0.5	3.5
Barium	0.13	1	0.25	0.3
Boron	0.012	5	0.25	1.26
Iron	0.08	0.3	0.5	0.19
Manganese	0.01	0.05	0.5	0.03
Sodium	40.8	200	0.5	120

Table 5: Reasonable Use Conclusions 2023

Parameters	ODWS	C _{allow}	MW09-5R		MW09-6R	
			May-22	Nov-22	May-22	Nov-22
Health Related						
Nitrate	10	3.00	0.17	0.06	0.08	0.06
Barium	1	0.30	0.128	0.136	0.145	0.172
Boron	5	1.26	0.011	0.008	0.007	0.01
Aesthetic Parameters						
Alkalinity	500	386	192	250	222	257
Chloride	250	149	13.4	17.3	65.1	98.4
Sulphate	500	256	5	3	18	23
TDS	500	451	226	265	348	423
DOC	5	3.5	18.6	16.9	17.2	7.3
Iron	0.3	0.19	0.432	0.364	0.658	1.04
Manganese	0.05	0.03	0.071	0.071	0.035	0.052
Sodium	200	120	8	9.3	33.5	37.6

NS : Not Sampled

Exceeds Resonable Use Criteria

Table 6: Surface Water Triggers Assessment 2023

Parameters	PWQO (CWQG)	SW2 75th Percentile	SW1		SW4	
			Jul-23	Nov-23	Jul-23	Nov-23
Primary Surface Water Trigger Parameter¹						
Chloride	120	NA	NS	9.3	9.4	9.4
Nitrate	13	NA		0.07	0.1	0.08
Phosphorus	0.03	NA		0.03	0.02	0.02
Boron	1.5	NA		0.006	0.01	0.006
Iron	0.3	NA		0.126	0.101	0.073
Zinc	0.03	NA		0.014	<0.005	0.022
Secondary Surface Water Trigger Parameter²						
Barium	NV	0.073		0.082	0.077	0.081
Chromium	NV	<0.001		<0.001	<0.001	<0.001
Chemical Oxygen Demand (COD)	NV	22.5		17	22	19
Sodium	NV	5.5		6.1	5.4	6
Sulphate	NV	6.80		6	5	6
Total Kjeldahl Nitrogen (TKN)	NV	0.50		0.4	0.4	0.5

NA : Not Applicable NV: No Value

Exceeds PWQO/CWQO Trigger Criteria

¹ Primary Surface Water Trigger uses the Provincial Water Quality Objective (PWQO)

- Since there is no PWQO for Chloride, the Canadian Water Quality Guideline (CWQG) of 120 mg/L is used
- For Boron, the CWQG of 1.5 mg/L is used since it is based on more up to date literature

² Secondary Surface Water Trigger parameters do not have a PWQO.

- The running 75th Percentile of the (2019-2023) sampling events of the background (SW2) concentration is used as the trigger

Table 7 : Proposed Monitoring Program 2024

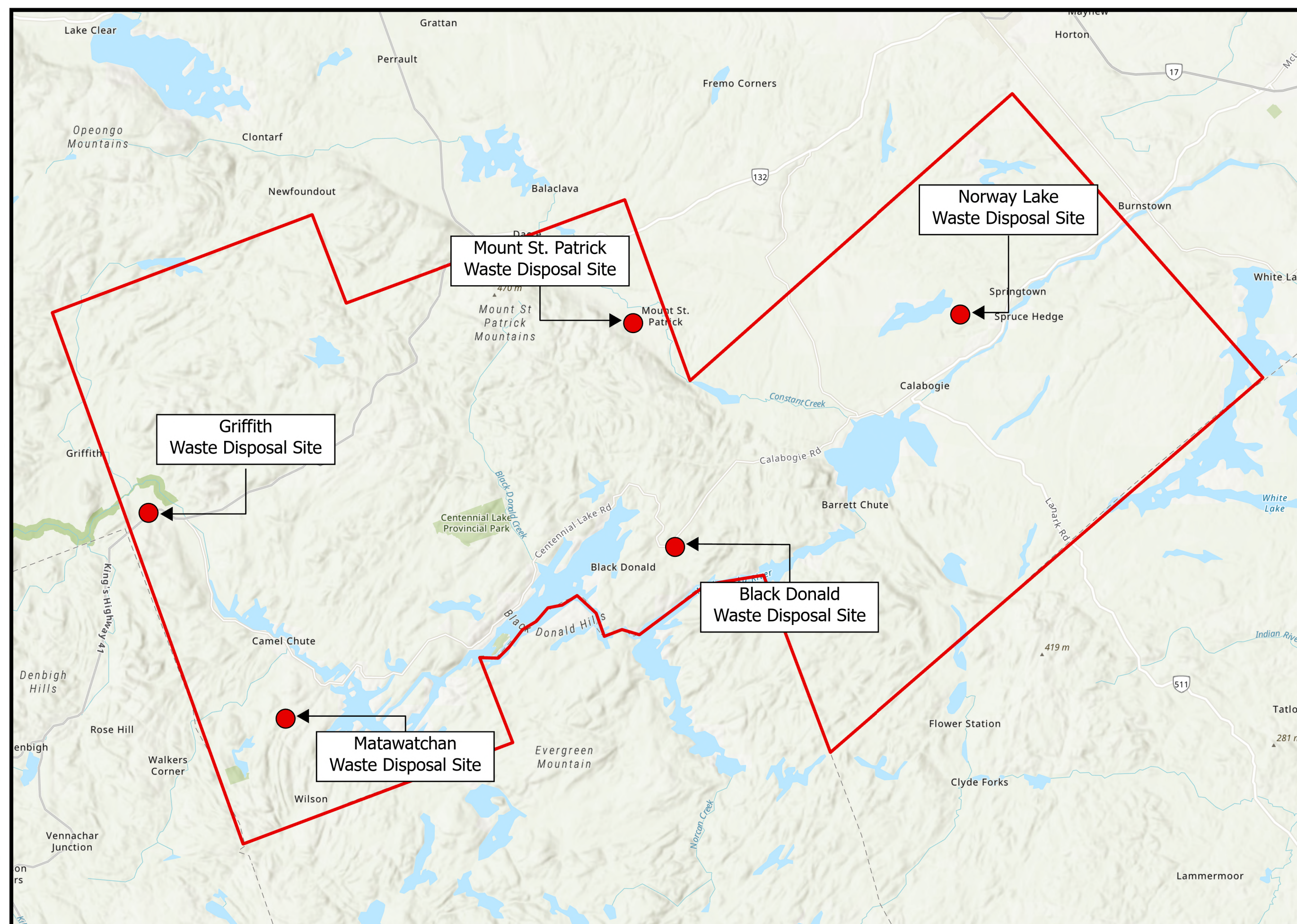
Station ID	Task	Spring 2024	Fall 2024	Analytical Parameters
Groundwater				
MW06-2	Measure water levels / Sample groundwater	√	√	<ul style="list-style-type: none"> - Major and minor ions (Ca, Na, Cl, SO4, B, K, Mg, Ba) - Trace metals (Fe, Mn, Cu, Sr, Al, Cd, Cr, Co, Si, Zn) - Nitrogen species (NO3, NO2, NH3, TKN) - General parameters (alkalinity, COD, total dissolved solids, phosphorous, hardness, dissolved organic carbon) - Field measurements of pH, conductivity, Dissolved Oxygen, and water temperture - EPA 624 Volatile Organic Compounds VOC sample collected every Five years from BH1. Next VOCs sampling will be in Spring 2028
MW06-3	Measure water levels / Sample groundwater	√	√	
MW06-4	Measure water levels / Sample groundwater	√	√	
MW08-1	Measure water levels / Sample groundwater	√	√	
MW09-5R	Measure water levels / Sample groundwater	√	√	
MW09-6R	Measure water levels / Sample groundwater	√	√	
MW21-7	Measure water levels / Sample groundwater	√	√	
GLL7	Measure water levels / Sample groundwater	√	√	
MP3R, MP4, MP5, MP6, and MP7	Measure water levels	√	√	
Surface Water				
SW1	Sample Surface water	√	√	<ul style="list-style-type: none"> - Major and minor ions (Ca, Na, K, Cl, total phosphorous, Ba, B, Mg, SO4) - Trace metals (Fe, Mn, Cu, Cd, Cr, Co, Sr, Zn) with detection limits to PWQO - Nitrogen species (NH3, TKN) - General parameters (alkalinity, COD, Total suspended solids, phenols, total dissolved solids, hardness, biochemical oxygen demand) - Field measurements of dissolved oxygen, pH, conductivity, water temperature, and Un-ionized ammonia (calculation)
SW2	Sample Surface water	√	√	
SW3	Sample Surface water	√	√	
SW4	Sample Surface water	√	√	

Notes:

One Duplicate Sample to be collected during each sampling event.



Figures



Township of Greater Madawaska

Waste Disposal Sites

LEGEND

- Waste Disposal Site
- Township Boundary

1:250 000



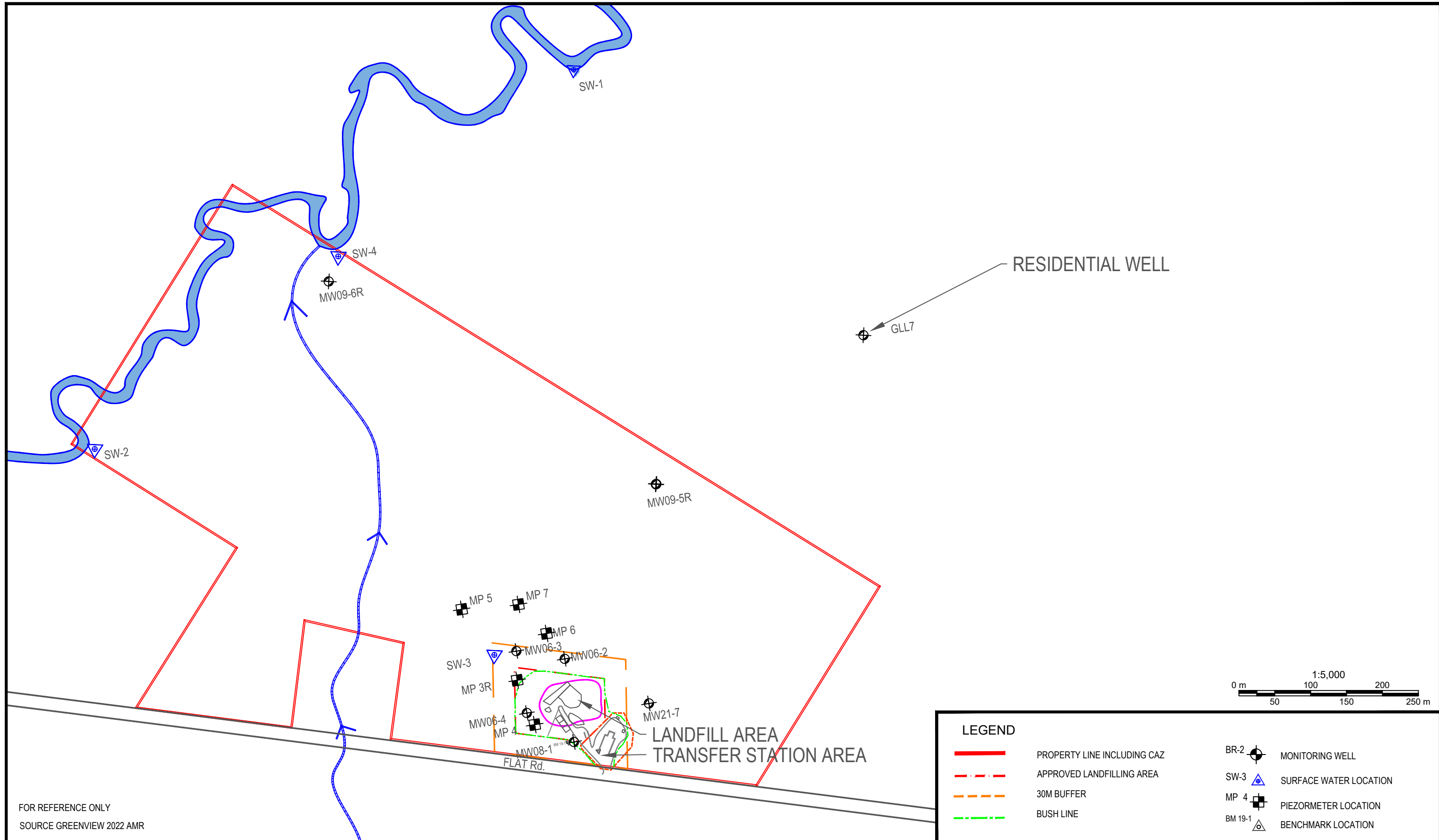
Regional Location Plan

Project No. 22-6213C Greater Madawaska

Date: 3/12/2024	Drawn By: HV
	Checked By: KM

Notes:
 Map Layers Obtained from LIO
 Waste Disposal Site Locations Sourced from Greenview Environmental Management (2023)





RESIDENTIAL WELL

GLL7

MW09-5R

MP 5

MP 7

MP 6

SW-3

MW06-3

MW06-2

MP 3R

MW06-4

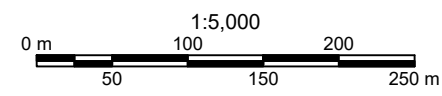
MP 4

MW08-1

MW21-7

LANDFILL AREA
TRANSFER STATION AREA

FLAT Rd.

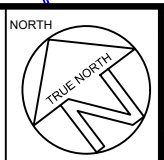


LEGEND

- PROPERTY LINE INCLUDING CAZ
- - - APPROVED LANDFILLING AREA
- - - 30M BUFFER
- - - BUSH LINE
- BR-2 MONITORING WELL
- SW-3 SURFACE WATER LOCATION
- MP 4 PIEZOMETER LOCATION
- BM 19-1 BENCHMARK LOCATION

FOR REFERENCE ONLY
SOURCE GREENVIEW 2022 AMR

No.	DATE	BY	REVISIONS



J2j Jp2g Consultants Inc.
ENGINEERS • PLANNERS • PROJECT MANAGERS

1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON K2H 8S9
PHONE: 613-828-7800 FAX: 613-828-2600

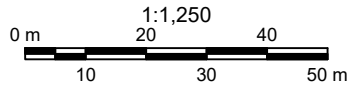
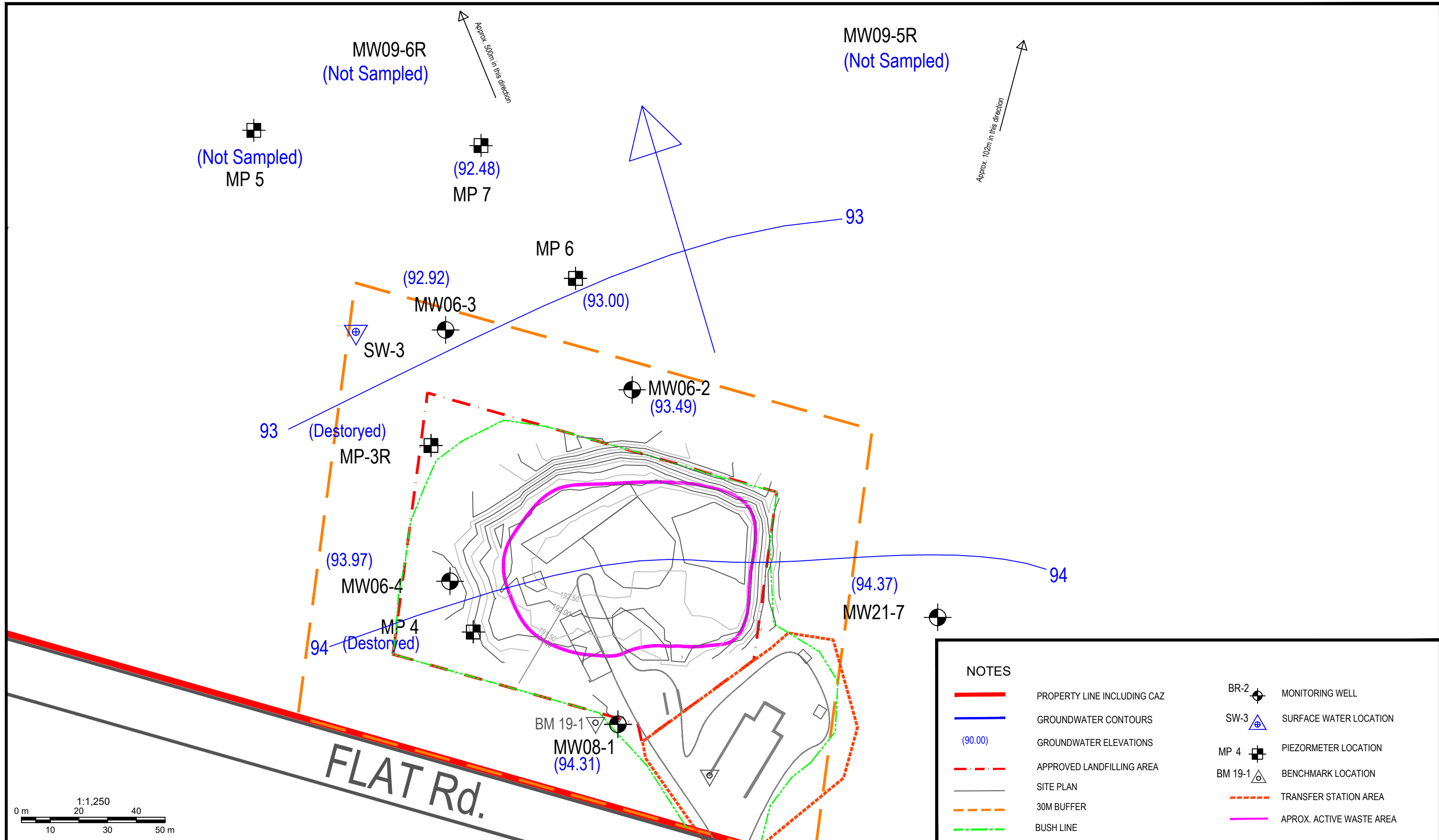
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DRAWN	QS
CHECKED	KM
APPROVED	KM
SCALE	1:5000

TOWNSHIP OF GREATER MADAWASKA

ML SL PATRICK WASTE DISPOSAL SITE

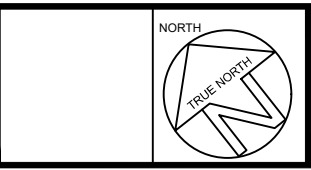
SITE PLAN WITH MONITORING LOCATIONS

DATE	10-FEB-2024
PROJECT	22-6213C
PLOTTED	10-FEB-2024
REF	FIG 2



NOTES			
	PROPERTY LINE INCLUDING CAZ		MONITORING WELL
	GROUNDWATER CONTOURS		SURFACE WATER LOCATION
	GROUNDWATER ELEVATIONS		PIEZORMETER LOCATION
	APPROVED LANDFILLING AREA		BENCHMARK LOCATION
	SITE PLAN		TRANSFER STATION AREA
	30M BUFFER		APROX. ACTIVE WASTE AREA
	BUSH LINE		

NO.	DATE	BY	REVISIONS

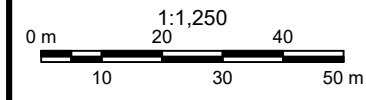
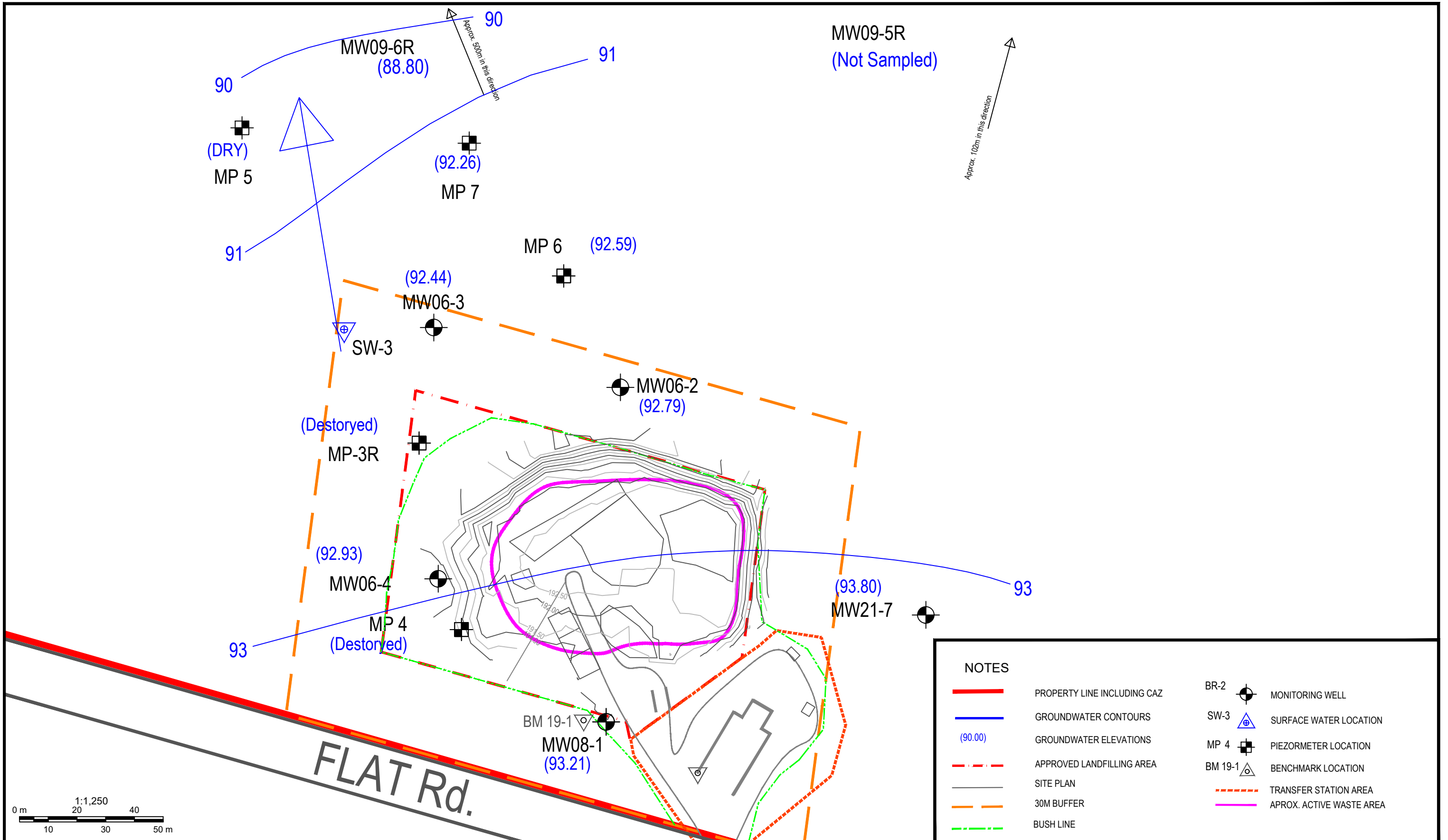


Jp2g Consultants Inc.
 ENGINEERS • PLANNERS • PROJECT MANAGERS
 1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON K2H 8S9
 PHONE: 613-828-7800 FAX: 613-828-2600

DESIGNED	QS
DRAWN	QS
CHECKED	KM
APPROVED	KM
SCALE	1:1250

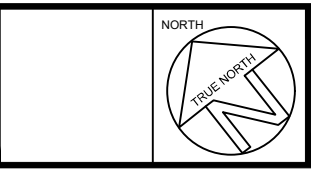
TOWNSHIP OF GREATER MADAWASKA
 St. PATRICK WASTE DISPOSAL SITE
 Spring Flow - JULY 2023

DATE	22-JAN-2024
PROJECT	22-6213C
PLOTTED	22-JAN-2024
REF	FIG 3A



NOTES	
	PROPERTY LINE INCLUDING CAZ
	GROUNDWATER CONTOURS
	GROUNDWATER ELEVATIONS
	APPROVED LANDFILLING AREA
	SITE PLAN
	30M BUFFER
	BUSH LINE
	MONITORING WELL
	SURFACE WATER LOCATION
	PIEZORMETER LOCATION
	BENCHMARK LOCATION
	TRANSFER STATION AREA
	APROX. ACTIVE WASTE AREA

No.	DATE	BY	REVISIONS



Jp2g Consultants Inc.
 ENGINEERS • PLANNERS • PROJECT MANAGERS
 1150 MORRISON DRIVE, SUITE 410, OTTAWA, ON K2H 8S9
 PHONE: 613-828-7800 FAX: 613-828-2600

DESIGNED	QS
DRAWN	QS
CHECKED	KM
APPROVED	KM
SCALE	1:1250

TOWNSHIP OF GREATER MADAWASKA
 ML ST PATRICK WASTE DISPOSAL SITE
 Fall Flow - November 2023

DATE	22-JAN-2024
PROJECT	22-6213C
PLOTTED	22-JAN-2024
REF	FIG 3B



Appendix A

Environmental Compliance Approval and Certificate of Requirement

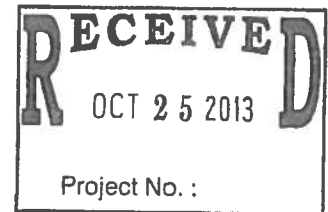
AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER A411901

Notice No. 1

Issue Date: October 11, 2013

The Corporation of the Township of Greater Madawaska
19 Parnell Street
Post Office Box, No. 180
Calabogie, Ontario
K0J 1H0



Site Location: Mount St. Patrick Waste Disposal Site
134 Flat Rd
Township of Madawaska Township, County of Renfrew

You are hereby notified that I have amended Approval No. A411901 issued on July 16, 2008 for the use and operation of a 38.25 hectare Waste Disposal Site consisting of a 1.2 hectare Landfill and a Transfer Station , as follows:

The following Definition is hereby amended/added to the ECA:

"Approval " or *"Certificate "* or *"ECA "* means this entire provisional Environmental Compliance Approval document, issued in accordance with Section 20.3 of the *EPA* , and includes any schedules to it, the application and the supporting documentation listed in Schedule "A";

"white goods which contain refrigerants " or *"refrigerant appliances "* means white goods which contain, or may contain refrigerants, and which include, but is not restricted to, refrigerators, freezers and air-conditioning systems.

The following Condition is hereby added to the ECA:

Burning of Waste

- 15.14 (1) Burning of waste is not permitted at the *Site* with the exception of the material under Condition 15.14 (2).
- (2) Only clean wood and brush shall be permitted for burning. Burning of the materials shall be completed as per the Ministry of the Environment Guideline C-7 (Burning at landfill Sites).

- (3) The *Owner* shall ensure that the final maximum storage capacity of the Leaf and Yard Burn Storage Area pile does not exceed 200 m³.

The following Condition is hereby amended as follows:

16.4 The *Owner* shall ensure that the final maximum capacities are not exceeded:

(a) waste destined for final disposal	80 m ³
(b) <i>organic waste</i>	20 m ³
(c) <i>waste electrical and electronic equipment</i>	40 m ³
(d) <i>blue box waste</i>	325 m ³
(e) tires	100 m ³
(f) <i>leaf and yard waste</i>	200 m ³
(g) <i>construction and demolition waste</i>	200 m ³
(h) scrap metal	60 m ³
(i) <i>white goods that contain refrigerants</i>	25 units

16.5 The *Owner* shall ensure that waste is stored in the following manner:

- (a) waste destined for final disposal shall be collected in roll-off containers or equivalent and may be mechanically compacted;
- (b) *blue box waste* shall be collected in roll off containers or equivalent except as noted elsewhere;
- (c) scrap metal shall be collected in a segregated area;
- (d) the tire stockpile shall be located a minimum of 15 metres from the property line, any buildings and the active landfilling area and an area around stockpiles of no less than 4.5 metres shall be kept free of vegetation;
- (e) *organic waste* shall be collected in vector resistant containers;
- (f) *white goods which contain refrigerants* shall be stored in a segregated area in an upright position and in such a manner to allow for the safe handling and removal from the *Site* for removal of refrigerants as required by *Ontario Regulation 189*;
- (g) *waste electrical and electronic equipment* shall be collected in roll-off containers or segregated area.

The following Item is hereby added to Schedule "A":

9. Letter dated May 21, 2013 and supporting documentation addressed to Mr. Ian Parrott, Director, Environmental Approvals Branch from Mr. Dan Hagan, Greenview Environmental Management Ltd. submitting an application to amend the volume of SSO and leaf and yard waste and permit the burning of leaf and yard waste. The supporting documentation includes:

- i. Environmental Compliance Approval Application dated May 2, 2013 and signed by Ms.

Alison Haltzauer, CAO/Clerk - Treasurer, Township of Greater Madawaska Valley.

- ii. Figure No. 1 entitled "Mount St. Patrick Waste Disposal Site - Proposed Site Design" prepared by Greenview Environmental Management Ltd. (Project No. 102.13.015) dated May 2013 (saved May 22, 2013)

10. Email dated September 24, 2013 at 5:10 p.m. to Mr. Dale Gable, Ministry of the Environment from Mr. Dan Hagan, Greenview Environmental Management Ltd. providing details and photos of the storage container for organic waste.
11. Email dated September 30, 2013 at 4:10 p.m. to Mr. Dale Gable, Ministry of the Environment from Mr. Dan Hagan, Greenview Environmental Management Ltd. requesting the increase to the storage volume of scrap metals and identifying a storage limit on white goods that contain refrigerants.

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

1. *The reason for Condition 15.14 is to ensure that no waste is burned at the Site other than leaf and yard waste. This is to ensure the leaf and yard waste is managed in a acceptable manner.*
2. *The reason for the amendment to Condition No. 16.4 and 16.5 is to amend the storage volumes at the transfer station.*

This Notice shall constitute part of the approval issued under Approval No. A411901 dated July 16, 2008

In accordance with Section 139 of the Environmental Protection Act, 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 environmental compliance approval or each term or condition in the environmental compliance 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

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in

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, Suite 1500
Toronto, Ontario
MSG 1E5

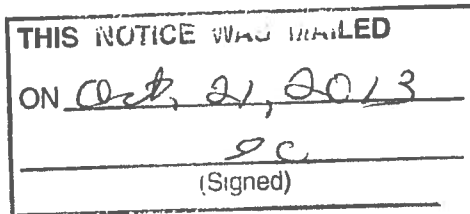
AND

The Director appointed for the purposes of
Part II.1 of the 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) 212-6349, Fax: (416) 314-3717 or www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 11th day of October, 2013



Tesfaye Gebrezghi, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

DG/

c: District Manager, MOE Ottawa
Dan Hagan, Greenview Environmental Management Limited ✓

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A411901
Issue Date: July 16, 2008

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

Site Location: Mount St. Patrick Waste Disposal Site
134 Flat Road
Part Lot 4, Concession 14, former geographic Township of Brougham
Township of Greater Madawaska, County of Renfrew

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

the use and operation of a 38.25 hectare Waste Disposal Site consisting of a 1.2 hectare Landfill and a Transfer Station.

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

- (a) "Act" means the *Environmental Protection Act*, R.S.O. 1990, C.E-19, as amended;
- (b) "blue box waste" means municipal waste that consists solely of waste in one or more of the categories set out in Ontario Regulation 101/94, Schedules 1 and 2, as amended;
- (c) "bulky waste" means large items such as carpet, stumps, furniture, mattresses and other waste of a similar nature;
- (d) "Certificate" means this entire provisional Certificate of Approval document, issued in accordance with section 39 of the *Act*, and includes any schedules to it, the application and the supporting documentation listed in Schedule "A";
- (e) "construction and demolition waste" means waste produced from the construction, renovation or demolition of an industrial, commercial, institutional or residential building;
- (f) "Director" means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the *Act* as a Director for the purposes of Part V of the *Act*;

- (g) **"District Manager"** means the District Manager of the local district office of the Ministry in which the *Site* is geographically located;
- (h) **"landfill"** means the 1.2 hectare area of the *Site* approved for final disposal of waste;
- (i) **"leaf and yard waste"** means waste consisting of natural Christmas trees and other plant materials but not tree limbs or other woody materials in excess of 7 centimetres in diameter;
- (j) **"limit of fill"** means the area in which waste is approved for final disposal according to this *Certificate*;
- (k) **"Ministry"** and **"MOE"** means the Ontario Ministry of the Environment;
- (l) **"Ontario Regulation 189"** means Ontario Regulation 189/94, Refrigerants, or as amended, made under the *Act*;
- (m) **"Ontario Regulation 347"** means Ontario Regulation 347, R.R.O. 1990, General - Waste Management, made under the *Act*, as amended from time to time;
- (n) **"Ontario Regulation 903"** means Ontario Regulation 903 – R.R.O. 1990, Wells, amended to Ontario Regulation 128/03, made under the *OWRA*;
- (o) **"Operator"** means any person, other than the *Owner's* employees, authorized by the *Owner* as having the charge, management or control of any aspect of the *Site*;
- (p) **"organic waste"** means waste from kitchens, restaurants, food processing operations, waste of vegetable and animal origin, packaging materials that have been in direct contact with and are contaminated by these wastes and waste of a similar nature and characteristics, including waste that is liable to become putrid, rotten or decayed;
- (q) **"Owner"** means any person that is responsible for the establishment or operation of the *Site* being approved by this *Certificate*, and includes the Township of Greater Madawaska, its successors and assigns;
- (r) **"OWRA"** means the *Ontario Water Resources Act*, R.S.O. 1990, c. O.40, as amended;
- (s) **"PA"** means the *Pesticides Act*, R.S.O. 1990, c. P-11, as amended from time to time;
- (t) **"Provincial Officer"** means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the *OWRA* or section 5 of the *Act* or section 17 of *PA*;

- (u) "PWQO" means the 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;
- (v) "RUP" means the Reasonable Use Policy (Guideline B-7) of the Ministry of the Environment;
- (w) "Site" means the entire 38.25 hectare waste disposal site, including the 1.2 hectare *landfill*, buffer lands and *transfer station* located at 134 Flat Road, legally described as Part Lot 4, Concession 14, Township of Greater Madawaska, County of Renfrew, approved by this *Certificate*;
- (x) "transfer station" means the area of the *Site* approved for the temporary storage of waste destined for final disposal and/or recycling or other waste diversion facilities;
- (y) "waste electrical and electronic equipment" means devices listed in Schedules 1 through 7 of Ontario Regulation 393/04, Waste Electrical and Electronic Equipment made under the *Waste Diversion Act* 2002; and
- (z) "white goods which contain refrigerants" means white goods which contain, or may contain refrigerants, and which include, but is not restricted to, refrigerators, freezers and air-conditioning systems.

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

TERMS AND CONDITIONS

1.0 Revoke and Replace

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

2.0 Compliance

- 2.1 The *Owner* 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.
- 2.2 Any person authorized to carry out work on or operate any aspect of the *Site* shall comply with the conditions of this *Certificate*.

3.0 In Accordance

- 3.1 Except as otherwise provided for in this *Certificate*, the *Site* shall be designed, developed, built, operated and maintained in accordance with the application for this *Certificate*, dated July 16, 2007, and the supporting documentation listed in Schedule "A".

4.0 Interpretation

- 4.1 Where there is a conflict between a provision of any document, including the application, referred to in this *Certificate*, and the conditions of this *Certificate*, the conditions in this *Certificate* shall take precedence.
- 4.2 Where there is a conflict between the application and a provision in any documents 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.
- 4.3 Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.
- 4.4 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.

5.0 Other Legal Obligations

- 5.1 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* to furnish any further information related to compliance with this *Certificate*.
- 5.2 All wastes at the *Site* shall be managed and disposed in accordance with the *Act* and *Ontario Regulation 347*.
- 5.3 The *Owner* shall ensure that:
- (a) all equipment discharging to air operating at the *Site* are approved under Section 9 of the *Act*; and
 - (b) all effluent is discharged in accordance with *OWRA*.

6.0 Adverse Effect

- 6.1 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.
- 6.2 Despite an *Owner*, *Operator* 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.

7.0 Change of Owner

- 7.1 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) appointment of, or a change in, the *Operator* of the *Site*;
 - (c) the name or address of the *Owner*;
 - (d) the partners, where the *Owner* 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.
- 7.2 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.
- 7.3 In the event of any change in ownership of the works, other than change to a successor municipality, 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*.

8.0 Certificate of Requirement

- 8.1 Pursuant to Section 197 of the *Act*, no person having an interest in the *Site* shall deal in any way with the *Site* without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.
- 8.2 Two copies of a completed Certificate of Requirement, containing a registerable description of the *Site*, shall be submitted to the *Director* for the *Director's* signature within 60 calendar days of the date of this *Certificate*.

8.3 The Certificate of Requirement shall be registered in the appropriate land registry office on title to the *Site* by the *Owner* within 10 calendar days of receiving the Certificate of Requirement signed by the *Director*, and a duplicate registered copy shall be submitted to the *Director*.

9.0 Inspections

- 9.1 No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA*, the *Act*, or the *PA*, of any place to which this *Certificate* relates, and without limiting the foregoing:
- (a) to enter upon the premises where the approved works are located, or the location where the records required by the conditions of this *Certificate* are kept;
 - (b) to have access to, inspect, and copy any records required to be kept by the conditions of this *Certificate*;
 - (c) to inspect the *Site*, related equipment and appurtenances;
 - (d) to inspect the practices, procedures, or operations required by the conditions of this *Certificate*; and
 - (e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this *Certificate* or the *Act*, the *OWRA* or the *PA*.

10.0 Information and Record Retention

- 10.1 Any information requested, by the *Ministry*, concerning the *Site* and its operation under this *Certificate*, including but not limited to any records required to be kept by this *Certificate* shall be provided to the *Ministry*, upon request, in a timely manner.
- 10.2 The receipt of any information by the *Ministry* or the failure of the *Ministry* to prosecute any person or to require any person to take any action, under this *Certificate* or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:
- (a) an approval, waiver, or justification by the *Ministry* of any act or omission of any person that contravenes any term or condition of this *Certificate* or any statute, regulation or other legal requirement; or
 - (b) acceptance by the *Ministry* of the information's completeness or accuracy.
- 10.3 Any information relating to this *Certificate* and contained in *Ministry* files may be made available to the public in accordance with the provisions of the *Freedom of Information and Protection of Privacy Act*, R.S.O. 1990, C. F-31.
- 10.4 All records and monitoring data required by the conditions of this *Certificate* must be kept on the *Owner's* premises for a minimum period of five (5) years from the date of their creation.

11.0 Service Area

11.1 This *Site* is approved to receive waste generated in the Township of Greater Madawaska.

12.0 Hours of Operation

- 12.1 (a) The *Owner* shall set hours of operation any day of the week, during daylight hours.
- (b) Hours of operation may be changed by the *Owner* at any time provided that users of the *Site* have been adequately notified of any change.

13.0 Security and Signage

- 13.1 The *Owner* shall ensure that access to the *Site* is restricted by fencing and/or natural features and that fencing and lockable gate are kept in a state of good repair.
- 13.2 (a) Access to the *landfill* shall be restrict to the *Owner* and *Owner* authorized commercial vehicles; and
- (b) Access to the *transfer station* shall be permitted only under the supervision of a competent attendant.
- (c) During non-operating hours, the *Site* shall be secured to prevent entry by unauthorized persons.
- 13.3 Scavenging or burning of waste at the *Site* are prohibited.
- 13.4 The *Owner* shall post a sign at the entrance gate of the *Site* with the following information:
- (a) name of the *Site* and *Owner*;
 - (b) Certificate of Approval Number for the *Site*;
 - (c) days and hours of operation;
 - (d) allowable and prohibited wastes;
 - (e) contact telephone number(s) to reach the *Owner* on a 24 hour - 7 day per week basis in the event of a complaint or emergency; and
 - (f) a warning against unauthorized access and against dumping outside the *Site*.

14.0 Inspections

- 14.1 The *Owner* shall ensure that the following inspection schedule is adhered to:
- (a) on each operating day, an inspection of the *landfill* working face, *transfer station* storage areas, facilities, signage, fencing and gate;
 - (b) on a monthly basis, an inspection of the areas under final cover for erosion, inspection of the *landfill* for signs of leachate generation, assessment of road condition and property litter inspection; and

- (c) on an annual basis, an inspection of the monitoring wells and a field survey of the *limit of fill* area.
- 14.2 A record of the inspections shall kept in a daily log book that includes:
- (a) the name and signature of person that conducted the inspection;
 - (b) the date and time of the inspection;
 - (c) the list of any deficiencies discovered;
 - (d) the recommendations for remedial action; and
 - (e) the date, time and description of actions taken.
- 15.0 Operations - Landfill**
- 15.1 The *landfill* shall be developed and operated in seven (7) phases as described in Item 5 of Schedule "A".
- 15.2 The operational life of the *landfill* shall be limited to the time until final contours, as shown on Item 6 (new Figure 4) of Schedule "A", have been reached.
- 15.3 Waste shall be deposited in a manner that minimizes the exposure of the working face of the landfilling area and shall be compacted before cover material is applied.
- 15.4 The *Owner* shall mark the boundaries of the *limit of fill*, the current active cell and the working face, so as to be visible throughout the year, to ensure that waste is deposited in accordance with Item 5 of Schedule "A".
- 15.5
- (a) The *landfill* shall be used for the final disposal of *construction and demolition waste* and *bulky waste*.
 - (b) Non-hazardous residential waste may be landfilled on an interim basis until such time as the *transfer station* is commissioned and as a contingency measure when waste can not be transferred off *Site* from the *transfer station*.
 - (c) No subject waste, as defined in *Ontario Regulation 347*, shall be disposed of at the *Site*.
- 15.6 The *Owner* may undertake size reduction, through grinding, shredding or equivalent, of *construction and demolition waste* and *bulky waste*.
- 15.7
- (a) The *Owner* shall designate a 300 m² staging area, consisting of a 0.15 m thick pad of granular material, for stockpiling *construction and demolition waste* and *bulky waste*.
 - (b) The stockpile shall not exceed 200 m³ before undergoing size reduction or being landfilled as is.

- (c) Size reduction shall take place in the designated staging area.
 - (d) All equipment used for size reduction activities shall be approved under Section 9 of the *Act*. The terms and conditions of the Section 9 approval shall govern the equipment's use at this *Site*.
- 15.8 Cover material shall be applied as follows:
- (a) cover, consisting of a minimum 0.15 m of soil or alternate cover material, shall be applied on a weekly basis over the entire working face;
 - (b) intermediate cover, consisting of a minimum of 0.3 m of soil shall be applied in areas where landfilling has been temporarily discontinued for six (6) months or more; and
 - (c) final cover, consisting of a minimum of 0.6 m of soil and 0.15 m of topsoil suitable for maintaining vegetative growth, shall be placed in areas where landfilling has been completed to final contours.
- 15.9 Where existing cover material has eroded such that waste is exposed, the *Owner* shall replace the cover material during the next operating day.
- 15.10 The *Owner* shall apply final cover progressively, as weather conditions permit, as each part of the *limit of fill* reaches its final grades. Vegetation of completed final cover using drought-resistant, low-nutrient requirement grass and legume blends which regenerate annually shall occur within one month of its placement and final grading, or as soon as weather permits.
- 15.11 The following waste is approved for use as alternative daily cover material:
- (a) *construction and demolition waste* consisting of size reduced concrete, brick, asphalt, gypsum board and porcelain/ceramics;
 - (b) wood, wood furniture, brush and lumber chips,
 - (c) *leaf and yard waste* mixed with sand/soil and compost;
 - (d) asphalt shingles;
 - (e) non-hazardous contaminated soil; and
 - (f) temporary or movable, low permeability, flexible membranes.
- 15.12 Notwithstanding Condition 15.11, alternative cover material shall be non-hazardous, according to *Ontario Regulation 347*, and shall perform at least as well as soil in relation to the following functions:
- (a) control of blowing litter, odours, dust, *landfill* gas, gulls, vectors, vermin and fires;
 - (b) provision for an aesthetic condition of the *landfill* during the active life of the *landfill*;
 - (c) provision for vehicle access to the active tipping face; and
 - (d) compatibility with the design of the *landfill* for groundwater protection, leachate management and *landfill* gas management.

15.13 Use of any other waste or materials as alternative cover requires the *Owner* to submit an application, with supporting information and applicable fee, for a trial use or permanent use, to the *Director*, copied to the *District Manager*.

16.0 Operations - Transfer Station

16.1 The *transfer station* shall be developed and operated in accordance with Items 5 and 7 of Schedule "A".

16.2 (a) This *transfer station* is approved for the following waste management activities:
(i) temporary storage, compaction and transfer of non-hazardous residential waste; and
(ii) temporary storage and transfer of *blue box waste*, waste tires, waste electrical and electronic waste and *organic waste*.

(b) The *transfer station* is not approved for the dismantling of *waste electrical and electronic equipment*.

16.3 Only waste which has been inspected by a competent attendant shall be accepted from the public.

16.4 The *Owner* shall ensure that the final maximum capacities are not exceeded:

(a) waste destined for final disposal	80 m ³
(b) <i>organic waste</i>	2 m ³
(c) <i>waste electrical and electronic equipment</i>	40 m ³
(d) <i>blue box waste</i>	325 m ³
(e) tires	100 m ³
(f) <i>leaf and yard waste</i>	50 m ³
(g) <i>construction and demolition waste</i>	200 m ³

16.5 The *Owner* shall ensure that waste is stored in the following manner:

- (a) waste destined for final disposal shall be collected in roll-off containers or equivalent and may be mechanically compacted;
- (b) *blue box waste* shall be collected in roll off containers or equivalent except as noted elsewhere;
- (c) scrap metal shall be collected in a segregated area with the stockpile not to exceed 25 m³;
- (d) the tire stockpile shall be located a minimum of 15 metres from the property line, any buildings and the active landfilling area and an area around stockpiles of no less than 4.5 metres shall be kept free of vegetation;
- (e) *organic waste* shall be collected in vector resistant containers;
- (f) *white goods which contain refrigerants* shall be stored in a segregated area in an upright position and in such a manner to allow for the safe handling and removal from the *Site* for removal of refrigerants as required by *Ontario Regulation 189*;

- (g) *waste electrical and electronic equipment* shall be collected in roll-off containers or segregated area.

16.6 The *Owner* shall ensure that all waste storage areas and bins are clearly labelled.

16.7 The *Owner* shall ensure that *white goods which contain refrigerants*:

- (a) have the refrigerant removed by a licensed technician, in accordance with *Ontario Regulation 189*, prior to shipment off *Site*; or
- (b) are shipped off *Site* only to facilities where the refrigerants can be removed by a licensed technician in accordance with *Ontario Regulation 189*; and
- (c) a detailed log of all *white goods which contain refrigerants* received is maintained which includes the following information:
 - (i) date of the record;
 - (ii) types, quantities and source of *white goods which contain refrigerants* received;
 - (iii) destination of the white goods; or
 - (iv) the details on removal of refrigerants, if conducted on *Site*, and the quantities and destination of the refrigerants transferred from the *Site*.

17.0 Nuisance Control

17.1 The *Site* shall be operated and maintained such that the vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.

17.2 If at any time vectors or vermin become a nuisance, the *Owner* shall hire a qualified, licensed pest control professional to design and implement a pest control plan for the *Site*. The pest control plan shall then remain in place until the *Site* has been closed.

18.0 Emergency Response and Contingency Planning

18.1 All spills, as defined in the *Act*, shall be immediately reported to the *Ministry's* Spill Action Centre at 1-800-268-6060 and shall be recorded in a written log or an electronic file format, as to the nature of the spill or upset, and action taken for clean-up, correction and prevention of future occurrences.

18.2 The *Owner* shall ensure that *Site* personnel have access to a reliable means of summoning assistance (e.g. telephone, cellular phone, mobile radio) at all times.

- 18.3 (a) The *Owner* shall have in place an emergency response plan which shall include, but is not limited to:
- (i) emergency response procedures to be undertaken in the event of a spill, fire, workplace accident, medical emergency or other emergency;
 - (ii) a list of equipment available for emergency response including names and telephone numbers of companies providing emergency response services; and

- (iii) a notification protocol with names and telephone numbers of persons to be contacted, including the *Owner's* personnel, the *Ministry* Spills Action Centre and District Office, the local fire department, the local Medical Officer of Health and the Ontario Ministry of Labour.
 - (b) A copy of the emergency response plan shall be kept in a location accessible to staff at all times.
 - (c) The *Owner* shall ensure that the equipment outlined in the emergency response plan are in a good state of repair, fully operational and immediately available;
 - (d) The *Owner* shall ensure that all *Site* attendant(s) are fully trained in the emergency response equipment's use and in the procedures to be employed in the event of an emergency.
 - (e) The *Owner* shall review the emergency response plan on an annual basis as a minimum. In particular, the *Owner* shall ensure that the notification information required by Condition 18.3 (a) (iii) is up-to-date.
- 18.4 The *Owner* shall have in place a written contingency plan which details how waste will be stored or disposed of in the event that it cannot be removed from the *Site* in the usual manner. If implementation of the contingency plan is necessary, it shall be effected through written concurrence from the *District Manager*.
- 18.5 The *Owner* shall have in place a contingency plan which specifies, as a minimum, the procedures to be followed in the event of a labour disruption, transportation disruption, inability of receiving sites to accept waste or other business disruption to the operation.
- 19.0 Monitoring**
- 19.1 (a) Groundwater and surface water monitoring shall be conducted by the *Owner* in accordance with Table 4 of Item 8, Schedule "A";
- (b) Within twelve (12) months of the issuance of this *Certificate*, the *Owner* shall review the monitoring program results against the *RUP* and identify any potential *RUP* issues. The *Owner* shall implement any actions required to address the *RUP* issues within 24 months of the issuance of this *Certificate*.
- 19.2 Any changes to the monitoring program shall be approved, in writing, by the *District Manager* prior to implementing the changes.
- 19.3 The *Owner* shall ensure that:
- (a) all monitoring wells which form part of any monitoring program shall be protected from damage; and

- (b) any groundwater monitoring wells that are damaged shall be repaired or replaced forthwith or properly abandoned in accordance with *Ontario Regulation 903*; and
- (c) any monitoring wells which are no longer required for monitoring, or which need to be closed due to operational changes on the *Site*, shall be properly abandoned in accordance with *Ontario Regulation 903*.

20.0 Training

20.1 All attendants shall be trained with respect to the following areas:

- (a) terms, conditions and operating requirements of this *Certificate*;
- (b) operation and management of the *Site*;
- (c) an outline of the responsibilities of the *Site* personnel;
- (d) personnel training protocols;
- (e) any environmental concerns pertaining to the wastes to be accepted at the *Site*;
- (f) proper receiving and recording procedures;
- (g) proper storage, handling, sorting and shipping procedures;
- (h) occupational health and safety concerns pertaining to the wastes received;
- (i) relevant waste management legislation; and
- (j) operation of equipment and procedures to be followed in the event of an emergency situation.

21.0 Record Keeping

21.1 The *Owner* shall maintain, at the *Site*, a log book which records on each day of operation, the following information:

- (a) date of record;
- (b) quantities and destination of waste shipped from the *transfer station* either for final disposal or for recycling; and
- (c) any operational difficulties, complaints and/or emergency situations experienced.

21.2 On a regular basis, the *Owner* shall undertake a field survey of the *landfill* to determine the amount of capacity utilized and estimate the amount of capacity remaining.

22.0 Annual Report

22.1 On March 31st of each year, the *Owner* shall submit to the *District Manager* an annual report covering the preceding calendar year. The annual report shall include the following:

- (a) a monthly summary of waste destined for final disposal, *blue box waste*, waste electrical and electronic equipment, tires and *organic waste* transferred from the *transfer station*;
- (b) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at in the *landfill* during the reporting period and a calculation of the total volume of *landfill* capacity used during the reporting period and including a calculation of the remaining capacity of the *landfill*;

- (c) a summary of *landfill* operations and development;
- (d) a summary of operational problems experienced during operation of the *transfer station* or the *landfill*, and their resolution;
- (e) recommendations respecting any proposed changes in the operations of the *Site*;
- (f) a summary of inspections;
- (g) site plans showing the existing contours of the *Site*; areas of landfilling operation during the reporting period; areas of intended operation during the next reporting period; areas of excavation during the reporting period; the progress of final cover, vegetative cover, and any intermediate cover application; previously existing facilities; facilities installed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;
- (h) tables outlining monitoring locations, analytical parameters sampled, and frequency of sampling;
- (i) an assessment of surface water quality in relation to the trigger concentrations (if and when surface water trigger mechanisms are in place) and the *PWQO*;
- (j) an assessment of groundwater quality in relation to the trigger concentrations (if and when groundwater trigger mechanisms are in place) and the *RUP*;
- (k) conclusions of the monitoring data, a review of the adequacy of monitoring programs and recommendations for any changes to monitoring programs that may be necessary;
- (l) a report on the status of all monitoring wells and a statement as to compliance with Ontario Regulation 903;
- (l) a summary of complaints made regarding *Site* operations, maintenance and monitoring; and
- (m) a statement as to compliance with all Conditions of this *Certificate* and with the inspections, monitoring and reporting requirements of the Conditions herein.

22.2 In the event that the results of the monitoring program are such that an off-site exceedance of the *RUP* or *PWQO* can reasonably be predicted to occur, the *Owner* shall include in the annual report:

- (a) the details of any such predicted off-site exceedance, including the assumptions upon which the prediction is based;
- (b) a discussion of the modifications, if any, to intended operations which would be necessary to prevent the predicted off-site exceedance;
- (c) a discussion of the modifications, if any, which should be made to the monitoring program; and
- (d) a discussion of other mitigation measures or contingency actions, if any, which may be necessary to prevent off-site impacts.

23.0 Closure

23.1 Two (2) years prior to *landfill* closure, the *Owner* shall submit for the *Director's* approval a detailed End Use and Closure Plan. This Plan shall include, but not limited to, the following subjects:

- (a) proposed end use;

- (b) final closure schedule;
- (c) final contour configuration;
- (d) landscaping;
- (e) facilities (if any);
- (f) rodent control;
- (g) groundwater, surface water and *landfill* gas control; and
- (h) post-closure inspection, maintenance, monitoring and reporting.

- 23.2 (a) Four (4) months prior to the permanent closure of the *transfer station*, the *Owner* shall submit to the *District Manager* written notification of the decision to cease activities and a closure plan outlining the activities to be taken to systematically decommission the *transfer station* including a schedule for the implementation of the activities; and
- (b) Within ten (10) days after closure of the *transfer station*, the *Owner* shall notify the *Director* and *District Manager*, in writing, that the *transfer station* is closed and that the closure plan required by Condition 23.2 (a) has been fully implemented.

SCHEDULE "A"

The following Schedule "A" forms part of Certificate of Approval No. A411901.

1. Application for a Provisional Certificate of Approval for a Waste Disposal Site signed by Mr. J.A. Baird, CAO/Clerk, Township of Greater Madawaska, dated July 16, 2007.
2. Design and Operations Plan, Municipal Solid Waste Transfer Station, Mount St. Patrick Waste Disposal Site, prepared for the Corporation of the Township of Greater Madawaska, prepared by Greenview Environmental Management, dated July 23, 2007.
3. Letter dated August 10, 1007, from Tyler H. Peters, Greenview Environmental Management, to Environmental Assessment and Approvals Branch, re: justification for maximum storage quantities, vehicle routes, details of staff training and description of contingency plans.
4. Letter dated October 25, 2007, from Tyler H. Peters, Greenview Environmental Management, to Environmental Assessment and Approvals Branch re: clarification of supporting documentation.
5. Letter dated April 24, 2008, from Tyler H. Peters, Greenview Environmental Management, to Environmental Assessment and Approvals Branch re: revised transfer station location and configuration.
6. Figure 4. Mount St. Patrick Waste Disposal Site, Landfill Area Development Plan, prepared by Greenview Environmental Management, Revision 1, dated April 2008.
7. Figure 5. Mount St. Patrick Waste Disposal Site, Proposed Transfer Station Layout, prepared by Greenview Environmental Management, Revision 1, dated April 2008.
8. 2006 Annual Report, Mount St. Patrick Waste Disposal Site, prepared for the Corporation of the Township of Greater Madawaska, prepared by Golder Associates, dated March 2007.

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

The reason for Condition 1.1 is to clarify that the previously issued Certificate of Approval No. A411901 issued on March 28, 1980 is no longer in effect and has been replaced and superseded by the Terms and Conditions stated in this Certificate.

The reason for Conditions 2.1, 2.2, 5.1, 5.2, 5.3, 6.1, 6.2, 10.1, 10.2 and 10.3 is to clarify the legal rights and responsibilities of the Owner under this Certificate.

The reason for Conditions 3.1, 15.1, 15.2, 16.1, 22.1 and 22.2 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.

The reason for Conditions 4.1, 4.2, 4.3 and 4.4 is to clarify how to interpret this Certificate in relation to the application and supporting documentation submitted by the Owner.

The reason for Conditions 7.1 are to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval.

The reason for Condition 7.2 is to restrict potential transfer or encumbrance of the Site without the approval of the Director. Transfer or encumbrance can be made only on the basis that it will not endanger compliance with this Certificate.

The reason for Condition 7.3 is to ensure that subsequent owners of the Site are informed of the terms and conditions of this Certificate. This also applies to all supporting documentation listed in Schedule "A".

Conditions 8.1, 8.2 and 8.3 are included, pursuant to subsection 197(1) of the Act, 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.

The reason for Condition 9.1 is to ensure that appropriate Ministry staff have ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Certificate. This condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the Act and OWRA.

The reason for Condition 10.4 is to ensure the availability of records and drawings for inspection and information purposes.

The reason for Condition 11.1 is to specify the approved areas from which waste may be accepted at the Site.

The reasons for Condition 12.1 is to specify the hours of operation for the Site and provide a mechanism for amendment of the hours of operation, as required.

The reason for Condition 13.1 is to minimize the risk of unauthorized entry to the Site.

The reason for Condition 13.2 is to ensure that the Site is utilized, particularly by members of the public, on under the supervision of a competent attendant able to ensure compliance with this Certificate.

The reason for Condition 13.3 is that open burning of waste is unacceptable because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard. Condition 13.3 is also necessary to protect the public from the potential risks inherent with uncontrolled scavenging.

The reason for Condition 13.4 is to ensure that emergency responders and the public have the necessary contact information in the event of an emergency or complaint.

The reason for Conditions 14.1 and 14.2 is to ensure that all equipment and facilities are maintained in good working order.

The reason for Conditions 15.3, 15.4, 15.6, 15.7, 17.1 and 17.2 is to ensure that the Site is operated in a manner which does not result in a nuisance or a hazard to the health and safety of the environment or people.

The reason for Conditions 15.5, 16.2 and 16.4 is to ensure that the types and quantities of waste received at the Site are in accordance with that approved under this Certificate.

The reasons for Conditions 15.8, 15.9 and 15.10 is to ensure that daily and intermediate cover is used to control potential nuisance effects, to facilitate vehicle access on the landfill, and to ensure an acceptable site appearance is maintained. The proper closure of a landfill requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the landfill.

The reasons for Conditions 15.11, 15.12 and 15.13 is to specify the waste approved for use as alternate cover material and for the approval requirements to be followed to designate other waste for use of alternative cover material at the Site.

The reason for Condition 16.3 is to ensure that only waste approved under this Certificate are received at the Site.

Conditions 16.5, 16.6 and 16.7 are included to ensure that waste storage is done in a manner which does not result in a nuisance or a hazard to the health and safety of the environment or people.

The reason for Condition 18.1 is to ensure that the Owner immediately notifies the Ministry of any spills as required in Part X of the Act so that appropriate spills response can be determined.

The reason for Conditions 18.2 and 18.3 is to ensure that the Owner is prepared and properly equipped to take action in the event of a spill, fire or other emergency.

The reason for Conditions 18.4 and 18.5 is to ensure that the Owner follows a plan with an organized set of procedures for identifying and responding to unexpected but possible problems at the Site.

The reason for Conditions 19.1 and 19.2 is to demonstrate that the landfill 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 action can be taken.

The reason for Condition 19.3 is to prevent contamination of the groundwater from surface contaminants.

The reason for Condition 20.1 is to ensure that the Site is supervised by properly trained staff.

The reason for Conditions 21.1 and 21.2 is to ensure that detailed records of Site inspections are recorded and maintained for inspection and information purposes.

The reason for Condition 23.1 and 23.2 is to ensure that the Site is closed in accordance with MOE standards and to protect the health and safety of the environment.

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A411901 issued on March 28, 1980.

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

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

The Notice should also include:

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

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

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 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 16th day of July, 2008



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

VP/

c: District Manager, MOE Ottawa



Ministry
of the
Environment

Provisional Certificate No.A 411901

**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:

Township of Brougham
Dacre, Ontario
K0J 1N0

for the use and operation of a 1.2 hectare dump site

all in accordance with the following plans and specifications:


Located: Lot 4, Concession XIV
Township of Brougham
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 and 10% other, limited to scrap metal).

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.

Dated this 28th day of March, 1980


Director, Section 30,
The Environmental Protection Act, 1971

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

yyyy mm dd Page 1 of 1

Properties

PIN 57385 - 0091 LT
 Description PT LTS 4 & 5, CON 14, BROUGHAM, AS IN R402583 & R121176 ; BAGOT BLYTHFLD
 BROUGHAM
 Address GRIFFITH

Party From(s)

Name THE CORPORATIO OF THE TOWNSHIP OF GREATER MADAWASKA
 Address for Service 1101 Francis Street, P. O. Box 180
 Calabogie, Ontario K0J 1H0

I, Peter Emond, Mayhor and Allison Holtzhauer, CEO/Clerk/Treasurer, have the authority to bind the corporation.

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

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 acting for Signed 2013 05 06
 Nepean
 K1V 9K4 Party From(s)
 Tel 613-224-6674
 Fax 613-729-9105

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 2013 05 15
 Nepean
 K1V 9K4
 Tel 613-224-6674
 Fax 613-729-9105

Fees/Taxes/Payment

Statutory Registration Fee \$60.00
 Total Paid \$60.00

File Number

Party From Client File Number : MADAWASKA 3407

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 a WASTE DISPOSAL SITE, NUMBER A411901 issued by TESFAYE GEBREZGHI, DIRECTOR, dated July 16, 2008 with respect to:

PIN. No. 57385-0091

Pt Lts 4 & 5, Con 14. Brougham, as I R402583 & R121176; Bagot Blythfld Brougham; Griffith

The following person(s):

The Corporation of the Township of Greater Madawaska

and any other persons having an interest in:

PIN. No. 57385-0091

Pt Lts 4 & 5, Con 14. Brougham, as I R402583 & R121176; Bagot Blythfld Brougham; Griffith

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. A411901, 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

MECP Correspondence



MOUNT ST. PATRICK WASTE DISPOSAL SITE
,
Inspection Report

System Number: A411901
Entity: THE CORPORATION OF THE
TOWNSHIP OF GREATER
MADAWASKA
Inspection Start Date: 10/03/2022
Inspection End Date: 11/21/2022
Inspected By: Thandeka Ponalo
Badge #: 1718

Thandeka Ponalo

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

This should not be construed as a confirmation of full compliance with all potential applicable legal requirement and BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: WASTE | **Regulated Activity:** Landfills

Question ID	NOL 1	Question Type	Legislative
Question: Does the Open landfill site have an Environmental Compliance Approval (ECA)?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes ECA Number A411901 was issued on July 16, 2008 and amended October 11, 2013.			

Question ID	NOL 3	Question Type	Legislative
Question: Does the holder of the landfill ECA own the entire site?			
Legislative Requirement	EPA 27 (1); EPA O. Reg. 232/98 3;		
Observation			
Yes The site is approved for the use and operation of a 1.2 ha landfill within a total site area of 38.25 ha.			

Question ID	NOL 4	Question Type	Information
Question: Does the landfill have a Contaminant Attenuation Zone (CAZ)?			
Legislative Requirement	Not Applicable		
Observation			
Yes The site consists of a 1.2 ha landfill within a total site area of 38.25 ha. A significant portion of the site area is located downgradient of the approved waste disposal area, and is currently used for operations, operational buffer and CAZ purposes.			

Question ID	NOL 5	Question Type	Information
Question: Is the CAZ on Crown land?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 9	Question Type	Legislative
Question: Does the holder of the landfill ECA own the property rights for the CAZ?			
Legislative Requirement	EPA 27 (1); EPA O. Reg. 232/98 4 (1);		
Observation			
Yes The 2021 Annual Report states that the operational and CAZ lands were acquired from the Crown and registered on Title.			

Question ID	NOL 13	Question Type	Information
Question: Are access roads and on-site roads provided so that vehicles hauling waste to and on the site may travel readily on any day under all normal weather conditions?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes The 2021 Annual Report states that the site access road has sufficient width at the entrance to allow for unimpeded winter travel and access for emergency and snow removal equipment. During routine site inspections conducted by Greenview Environmental Management (Greenview) staff, they observed the roads to be in good condition. At time of the inspection, roads were observed to be in good condition.			

Question ID	NOL 14	Question Type	Legislative
Question: Is site access limited to times when an attendant is on duty?			
Legislative Requirement	EPA 27 (1);		

Observation
<p>Yes</p> <p>As per Condition 13(1) of the ECA, access to the site is controlled through a locked gate at the site entrance. The site is surrounded by forested lands, which provide adequate screening and restricted access for vehicular traffic. Condition 13(2) of the ECA states that access to the landfill shall be restrict to the Owner and Owner authorized commercial vehicles; and access to the transfer station shall be permitted only under the supervision of a competent attendant. During non-operating hours, the site shall be secured to prevent entry by unauthorized persons.</p> <p>At time of the inspection, the site gate was locked to prevent access by unauthorized persons. Staff stated that in accordance with Condition 13(2), access to the site is only permitted to commercial vehicles in the presence of a site attendant.</p>

Question ID	NOL 15	Question Type	Legislative
Question:			
Does the site only receive waste from within its approved service area?			
Legislative Requirement	EPA 27 (1);		
Observation			
<p>Yes</p> <p>In accordance with Condition 11 of the ECA, the site only receives waste generated in the Township of Greater Madawaska.</p>			

Question ID	NOL 16	Question Type	Information
Question:			
Is the site required to have a ground water monitoring program by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
<p>Yes</p> <p>The groundwater monitoring requirements are outlined in Conditions 19 and 22 and in Schedule "A" of the ECA. It is the responsibility of the Township to ensure the site's groundwater parameters at the property boundary meet those as calculated by Guideline B-7: Reasonable Use Guideline.</p> <p>The 2021 Annual Report states that based on the RUC assessment completed in 2021, it was also interpreted that the site was in compliance with MECP Guideline B-7 and RUC along the northern and northeastern property boundaries. It was interpreted that the total</p>			

property area was sufficient for operational buffer and CAZ purposes at the site.

The 2021 Annual Report was submitted to Technical Support Section for review.

Question ID	NOL 20	Question Type	Information
Question:			
Is there ongoing abatement to address any concerns the ministry has with the ground water monitoring?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 21	Question Type	Information
Question:			
Is the site required to manage leachate by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No There is no leachate control system at this landfill site. The site is a natural attenuating landfill site.			

Question ID	NOL 26	Question Type	Information
Question:			
Is the site required to manage landfill gas by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No There is no methane gas control system at the site.			

Question ID	NOL 31	Question Type	Information
Question:			
Is the site required to have a surface water monitoring program by the ECA?			

Legislative Requirement	Not Applicable
Observation	
<p>Yes</p> <p>The surface water monitoring requirements are outlined in Conditions 19 and 22 and in Schedule "A" of the ECA. It is the responsibility of the Township to ensure the site's surface water parameters on and off-site meet those as stated in the Provincial Water Quality Objectives (PWQO).</p> <p>The 2021 Annual Report states that results from surface water location SW-2 were interpreted to be representative of background surface water quality at the site in 2021. Based on a review of 2021 surface water quality results for downstream surface water sampling locations SW-1 and SW-4, Constant Creek was not interpreted to be significantly impacted by landfill-related activities. The report also stated that surface water sampling location SW-3, located near the site and within the low-lying area was not interpreted to be significantly impacted by landfill-related activities in 2021.</p> <p>The 2021 Annual Report was submitted to Technical Support Section for review.</p>	

Question ID	NOL 36	Question Type	Legislative
Question:			
Is proper equipment available for the compaction of waste and applying cover material?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes			

Question ID	NOL 37	Question Type	Legislative
Question:			
Is the landfill able to accurately determine the amount of waste received?			
Legislative Requirement	EPA 27 (1);		
Observation			
<p>Yes</p> <p>Specialized survey and design technique referred to as digital terrain modelling (DTM) is used to determine waste landfilled and remaining capacity at the site. The DTM method is a computer-based process that compares two (2) topographic surfaces or digital terrain models and calculates the prismatic volumetric difference. The 2021 Annual Report states that the remaining capacity was estimated to be 35,967 cubic metres or approximately forty-four (44) years.</p>			

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Question ID	NOL 38	Question Type	Legislative
Question: Are all disposal operations at the site adequately and continually supervised?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes In accordance with Condition 13(2) of the ECA, access to the site is permitted only under the supervision of a site attendant.			

Question ID	NOL 39	Question Type	Information
Question: Does the landfill operator have a site inspection program as required by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
Yes Inspection and record keeping requirements for the site are outlined in Conditions 14 of the ECA. On each operating day an inspection of the landfill working face, transfer station storage areas, facilities, signage, fencing and gate shall be conducted. On a monthly basis an inspection for erosion of the areas under final cover for erosion, inspection of the landfill for signs of leachate generation, and an assessment of road condition and property litter inspection must be conducted. On an annual basis an inspection of the monitoring wells and a field survey of the limit of fill area must be conducted. At time of the inspection, records for inspections were reviewed. Township staff conduct daily and monthly inspections of the site as outlined in the ECA. Annual inspections of the monitoring wells and a field survey of the limit of fill area were conducted by Greenview staff and documented in the Annual Report.			

Question ID	NOL 40	Question Type	Legislative
Question: Does the landfill operator have a procedure in place to address issues identified by staff during the site inspection?			
Legislative Requirement	EPA 27 (1);		

Observation
<p>Yes</p> <p>The Township has a system in place to address deficiencies identified during daily and monthly inspections. Township staff shall ensure that corrective actions are always documented in the inspection forms.</p>

Question ID	NOL 41	Question Type	Legislative
Question:			
Is the waste being compacted adequately?			
Legislative Requirement	EPA 27 (1);		
Observation			
<p>Yes</p> <p>In accordance with Condition 15(3) of the ECA, waste is deposited in a manner that minimizes the exposure of the working face of the landfilling area and waste is being adequately compacted.</p>			

Question ID	NOL 42	Question Type	Legislative
Question:			
Is Daily cover applied to the waste at the end of each working day or as otherwise specified in the ECA?			
Legislative Requirement	EPA 27 (1); EPA O. Reg. 232/98 7;		
Observation			
<p>Yes</p> <p>As per Condition 15(11) of the ECA, the site is approved for the following alternative daily cover materials:</p> <ul style="list-style-type: none"> (a) C&D waste consisting of size reduced concrete, brick, asphalt, gypsum board and porcelain/ceramics; (b) wood, wood furniture, brush and lumber chips; (c) leaf and yard waste mixed with sand/soil and compost; (d) asphalt shingles; (e) non-hazardous contaminated soil; and (f) temporary or movable, low permeability, flexible membranes. <p>At time of the inspection, staff stated that they use C&D waste as alternative and have a stockpile of sand.</p>			

Question ID	NOL 43	Question Type	Legislative
Question: Are procedures implemented to control rodents or other animals and insects at the site?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes In accordance with Condition 17 of the ECA, the site is operated and maintained such that the vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance.			

Question ID	NOL 44	Question Type	Legislative
Question: Is site access restricted by use of a gate, fence, or physical barrier when the site is not operating?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes The site has a gate which is kept locked when the site attendant is not on site.			

Question ID	NOL 45	Question Type	Legislative
Question: Is the waste disposal area adequately screened from public view?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes The site is treelined which screens the site from public view.			

Question ID	NOL 46	Question Type	Legislative
Question: Are daily records of site operations available at the site for at least the past 2 years or as otherwise required by the ECA?			
Legislative Requirement	EPA 27 (1); EPA O. Reg. 232/98 21;		
Observation			

Yes

A record of the inspections shall kept in a daily log book that includes:

- (a) the name and signature of person that conducted the inspection;
- (b) the date and time of the inspection;
- (c) the list of any deficiencies discovered;
- (d) the recommendations for remedial action; and
- (e) the date, time and description of actions taken.

At time of the inspection, daily records were requested and presented.

Question ID	NOL 47	Question Type	Legislative
Question:			
Has the annual operations report been submitted to MECP or available on site as required by the ECA?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes In accordance with Condition 22 of the ECA, an Annual Report was submitted to the District Manager by March 31st.			

Question ID	NOL 48	Question Type	Legislative
Question:			
Is scavenging being prevented?			
Legislative Requirement	EPA 27 (1); EPA O. Reg. 232/98 23;		
Observation			
Yes In accordance with Condition 13(3) of the ECA, scavenging and the burning of waste are prohibited at the site.			

Question ID	NOL 51	Question Type	Legislative
Question:			
Is the landfill only accepting the types of waste that they are approved to receive?			
Legislative Requirement	EPA 27 (1);		
Observation			

Yes

The site can only accept municipal waste for disposal and recyclables from the Township of Greater Madawaska. In accordance with Conditions 15(5) of the ECA, the landfill is used for the final disposal of C&D and bulky waste. As per Condition 15(7) of the ECA, the stockpile of C&D and bulky waste shall not exceed 200 cubic metres before undergoing size reduction or being landfilled as is, and the size reduction shall take place in the designated staging area.

The site diverts household waste, organic waste, waste electrical and electronic equipment (WEEE), blue box recyclables, old corrugated cardboard, tires, scrap metal, propane cylinders, white goods, and refrigerants.

The 2021 Annual Report states that 73 tonnes of municipal waste was collected at the site and transported to GFL in Moose Creek for final disposal. A total of 25 tonnes of blue box recyclables were collected that consisted of 11 tonnes of commingled containers, 10 tonnes of mixed fibres and 4 tonnes of old corrugated cardboard. Additionally, approximately 410 cubic metres of C&D waste and 110 cubic metres of leaf and yard waste was received at the site. A total of 139 tonnes of scrap metal, 63 refrigerants appliances, 3,078 tires, and 20 tonnes of WEEE were diverted from the Townships three waste disposal sites (Norway Lake WDS, Mount St. Patrick and Griffith WDS). The Township no longer accept organics at their sites.

Question ID	NOL 54	Question Type	Legislative
Question:			
Does the landfill have a procedure in place to address and document spills and fires?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes			
In accordance with Condition 18(1) of the ECA, all spills, as defined in the EPA, shall be immediately reported to the Ministry's Spill Action Centre at 1-800-268-6060 and shall be recorded in a written log or an electronic file format, as to the nature of the spill or upset, and action taken for clean-up, correction and prevention of future occurrences. At time of the inspection, staff stated that there were no emergencies at the site in 2021 and 2022.			
In accordance with Condition 18(2) of the ECA, the site has provided a landline telephone for the site to ensure site personnel have access to a reliable means of summoning assistance.			

Question ID	NOL 55	Question Type	Legislative
Question:			

Does the landfill have emergency contingency plan as required by the ECA?	
Legislative Requirement	EPA 27 (1);
Observation	
Yes	

Question ID	NOL 56	Question Type	Information
Question: Is there an ECA condition requiring financial assurance?			
Legislative Requirement	Not Applicable		
Observation			
No Financial assurance is not required for municipally operated waste disposal/transfer sites.			

Question ID	NOL 59	Question Type	Legislative
Question: Does the landfill have a procedure in place to address complaints?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes The 2021 Annual Report states that there were no reported complaints received by the Township in 2021. At time of the inspection, Township staff stated that no complaints had been received in 2022.			

Question ID	NOL 61	Question Type	Information
Question: Has the landfill operator developed a Design and Operations Manual?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes			

Question ID	NOL 62	Question Type	Information
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Question: Is the Design and Operations Manual up to date?	
Legislative Requirement	Not Applicable
Observation	
Yes	

Question ID	NOL 63	Question Type	Legislative
Question: Does the landfill operator have training procedures for site personnel?			
Legislative Requirement	EPA 27 (1);		
Observation			
Yes Training requirements are listed in Condition 20 of the ECA. The 2021 Annual Report states that waste operations training was conducted by Greenview on June 12, 2017. At time of the inspection, Township staff stated that training will be conducted by the end of the year and documented in the 2022 Annual Report.			

Question ID	949100	Question Type	Legislative
Question: Were the inspection questions sufficient to address other identified non-compliance items?			
Legislative Requirement	Not Applicable		
Observation			
Yes			



mm 3 02
Quarterly Inspection Log
Griffin Waste Disposal Site
Township of Greater Madawaska

Waste Mound Final Cover Inspections			
Potential Issues	Deficiencies Noted		Actions Taken
	Y / N	Location of Issue & Description	
Erosion of Final Cover	N		
Vegetation	N		
Settlement Areas	N		
Leachate Seeps	N		
Litter Management	N		

Inspection Completed By:	Name	Date (mm/dd/yyyy)	Time
	L. Emery	11/07/23	9 AM



MT ST PAT
 Quarterly Inspection Log
~~Civilian~~ Waste Disposal Site
 Township of Greater Madawaska

Waste Mound Final Cover Inspections			
Potential Issues	Deficiencies Noted		Actions Taken
	Y/N	Location of Issue & Description	
Erosion of Final Cover	N		
Vegetation	N		
Settlement Areas	N		
Leachate Seeps	N		
Litter Management	N		

Inspection Completed By:	Name	Date (mm/dd/yyyy)	Time
	L. Emme	08/16/23	11 AM



MT ST PAT
 Quarterly Inspection Log
 Waste Disposal Site
 Township of Greater Madawaska

Waste Mound Final Cover Inspections			
Potential Issues	Deficiencies Noted		Actions Taken
	Y/N	Location of Issue & Description	
Erosion of Final Cover	N		
Vegetation	N		
Settlement Areas	N		
Leachate Seeps	N		
Litter Management	N		

Inspection Completed By:	Name	Date (mm/dd/yyyy)	Time
	L. Emery	05/03/23	8:30 AM



M. Spink
 Quarterly Inspection Log
 Griffin Waste Disposal Site
 Township of Greater Madawaska

Waste Mound Final Cover Inspections			
Potential Issues	Deficiencies Noted		Actions Taken
	Y/N	Location of Issue & Description	
Erosion of Final Cover	N		
Vegetation	N		
Settlement Areas	N		
Leachate Seeps	N		
Litter Management	N		

Inspection Completed By:	Name	Date (mm/dd/yyyy)	Time
	<i>Li Emer.</i>	<i>02/10/23</i>	<i>6:30 AM</i>



Appendix C

Borehole Logs



Cambium Environmental Inc.
 PO Box 325 • Unit 2 • 2085 Whittington Drive
 Peterborough • Ontario • K9J 6X4

Project No.: 10392-021

Project Name: Mount St. Patrick

Client: Twp of Greater Madawaska

Location: See Figure

Log of Borehole: MW06-1

UTM: 18 T 351249 5021541

Logged By: C. Wolf

Project Manager: C. Wolf

SUBSURFACE PROFILE			SAMPLE				Well Installation	Remarks
Depth	Symbol	Description	Number	Type	% Recovery	SPT (n)		
ft m								
0		Ground Surface						
0 to 2	[Sand symbol]	<i>Sand</i> Medium brown, medium grained Sand	1	SS	30	4		Well equipped with lockable steel casing. Bentonite Hole Plug Native Fill Bentonite Hole Plug Filter Sand Well Screen: 1.88m x 0.05m
2 to 6	[Sand symbol]		2	SS	5	12		
6 to 8	[Sand symbol]		3	SS	20	44		
8 to 10	[Sand and Gravel symbol]	<i>Sand and Gravel</i> Medium brown, medium grained Sand and Gravel	4	SS		19		
10 to 14	[Sand and Gravel symbol]	<i>Sand and Gravel, Saturated</i> Medium brown, medium grained Sand and Gravel, Saturated, Spoon wet	5	SS	20	51		
14 to 16	[Sand and Gravel symbol]		6	SS		66		
16 to 20	[Auger Refusal symbol]	<i>Auger Refusal at 6.10m</i>						
20 to 26		End of Borehole						

Drilled By: George Downing Estate Drilling

Drill Method: CME Hollow Stem

Drill Date: October 12/06

Input By: CMW, snr

Checked By: CMW

Sheet: 1 of 1



Cambium Environmental Inc.
 PO Box 325 • Unit 2 • 2085 Whittington Drive
 Peterborough • Ontario • K9J 6X4

Project No.: 10392-021

Project Name: Mount St. Patrick

Client: Twp of Greater Madawaska

Location: See Figure

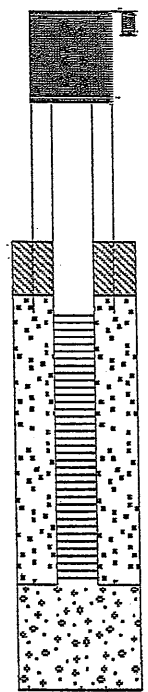
Log of Borehole: MW06-2

UTM: 18 T 351292 5021678

Logged By: C. Wolf

Project Manager: C. Wolf

SUBSURFACE PROFILE			SAMPLE				Well Installation	Remarks
Depth	Symbol	Description	Number	Type	% Recovery	SPT (n)		
ft m								
-2								
-6								
-4								
-2								
0		Ground Surface						
2		<i>Sand, some Clay</i> Medium brown, fine grained Sand, some Clay, Saturated, Spoon wet	1	SS	20	52		
4		<i>Sand</i> Coarse grained Sand, some large boulders	2	SS	20	36		
6		<i>Sand, some Silt</i> Coarse grained Sand, some Silt and Gravel	3	SS	20	44		
8		<i>Auger Refusal at 2.44m</i>						
10		End of Borehole						
12								



Well equipped with lockable steel casing.
 Bentonite Hole Plug
 Filter Sand
 Well Screen: 1.52m x 0.05m

Drilled By: George Downing Estate Drilling
Drill Method: CME Hollow Stem
Drill Date: October 13/06

Input By: CMW, snr
Checked By: CMW
Sheet: 1 of 1



Cambium Environmental Inc.
 PO Box 325 • Unit 2 • 2085 Whittington Drive
 Peterborough • Ontario • K9J 6X4

Project No.: 10392-021

Project Name: Mount St. Patrick

Client: Twp of Greater Madawaska

Location: See Figure

Log of Borehole: MW06-3

UTM: 18 T 351263 5021744

Logged By: C. Wolf

Project Manager: C. Wolf

SUBSURFACE PROFILE			SAMPLE				Well Installation	Remarks
Depth	Symbol	Description	Number	Type	% Recovery	SPT (n)		
ft m -2 -4 -6 -8 -10 -12		Ground Surface						Well equipped with lockable steel casing. Bentonite Hole Plug Native Fill Bentonite Hole Plug Filter Sand Well Screen: 1.52m x 0.05m Driller recommended installing well here, otherwise the hole would jam (no water source near by)
0								
2		<i>Sand</i> Medium brown, medium grained Sand, Saturated, Spoon wet	1	SS	20	2		
4			2	SS	20	3		
6		Very wet Sand						
10		End of Borehole						

Drilled By: George Downing Estate Drilling

Drill Method: CME Hollow Stem

Drill Date: October 13/06

Input By: CMW, snr

Checked By: CMW

Sheet: 1 of 1



Cambium Environmental Inc.
 PO Box 325 • Unit 2 • 2085 Whittington Drive
 Peterborough • Ontario • K9J 6X4

Project No.: 10392-021
Project Name: Mount St. Patrick
Client: Twp of Greater Madawaska
Location: See Figure

Log of Borehole: MW06-4
UTM: 18 T 351208 5021681
Logged By: C. Wolf
Project Manager: C. Wolf

SUBSURFACE PROFILE			SAMPLE				Well Installation	Remarks
Depth	Symbol	Description	Number	Type	% Recovery	SPT (n)		
0		Ground Surface					<p>Well equipped with lockable steel casing. Bentonite Hole Plug Native Fill Bentonite Hole Plug Filter Sand Well Screen: 1.52m x 0.05m (74 blows for 0.25m)</p>	
2		<i>Sand</i> Dark brown, fine grained Sand	1	SS	20	5		
4		<i>Sand, some Gravel</i> Brown, coarse grained Sand, some Gravel	2	SS	30	11		
6		<i>Sand</i> Medium brown, medium grained Sand, Saturated, Spoon wet	3	SS	30	8		
8			4	SS		8		
10		<i>Sand</i> Medium brown, fine grained Sand, very Saturated	5	SS	30	32		
12		<i>Auger Refusal at 4.21m</i>	6	SS		74		
14		End of Borehole						

Drilled By: George Downing Estate Drilling

Drill Method: CME Hollow Stem

Drill Date: October 13/06

Input By: CMW, snr

Checked By: CMW

Sheet: 1 of 1



Greenview

ENVIRONMENTAL MANAGEMENT

Greenview Environmental Management Limited
 69 Cleak Avenue, P.O. Box 100
 Bancroft, Ontario K0L 1C0
 t: (613) 332-0057
 f: (613) 332-1767
 e: solutions@greenview-environmental.ca

Log of Monitoring Well: MW08-1

Project No.: 102.08.015

Project: Mount St. Patrick Waste Disposal Site

Client: Township of Greater Madawaska

Location: See Site Plan

SUBSURFACE STRATA PROFILE			SAMPLE				Well Completion Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
						0 15 30 45 60		
-4								Stick-up = 0.77 m
0		Ground Surface						
0	1	Medium Sand Dark brown, medium sand, dry, loosely compacted.	1	AS	50			Silica Sand
2			2	SS	30			
4	3	Fine to Medium Sand Light brown, fine to medium sand, saturated at 3.66 m, compacted.	3	SS	40			Silica Sand
6			4	SS	50			
8			5	SS	50			
10			6	SS	45			
12			7	SS	25			
14			8	SS	30			
16	5	Fine to Medium Sand Light brown, fine to medium sand with small cobble, wet, compacted.	7	SS	25			Water level August 18, 2008 = 4.30 m
18			8	SS	30			
20		End of Borehole						

Drilled By: Lantech Drilling Ltd.

Drill Method: Hollow Stem Augers

Drill Date: August 18, 2008

Logged By: J. Bailey

Checked By: T. Peters

Sheet: 1 of 1



Greenview Environmental Management Limited
 69 Cleak Avenue, P.O. Box 100
 Bancroft, Ontario K0L 1C0
 t: (613) 332-0057
 f: (613) 332-1767
 e: solutions@greenview-environmental.ca

Borehole Log: MW09-5

Project No.: 102.09.015

Project: Mount St. Patrick Waste Disposal Site

Client: Township of Greater Madawaska

Location: Mount St. Patrick, ON

SUBSURFACE STRATA PROFILE			SAMPLE				Borehole Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
						0 15 30 45 60		
ft -4 -2 0 2 4 6		Ground Surface Organic Matter / Peat Dark brown-black, organic peat, loosely compacted, wet						Stick Up = 1.13 m Concrete Static Water Level June 23, 2009 = 0.21 m Native Fill Well Screen = 1.07 m x 0.05 m
		Unknown No description available						

Drilled By: Greenview Environmental Management Limited

Drill Method: Drive Point

Drill Date: June 23, 2009

Logged By: Dan Hagan, B.Sc.

Checked By: Tyler Peters, P. Eng.

Sheet: 1 of 1



Greenview Environmental Management Limited
 69 Cleak Avenue, P.O. Box 100
 Bancroft, Ontario K0L 1C0
 t: (613) 332-0057
 f: (613) 332-1767
 e: solutions@greenview-environmental.ca

Borehole Log: MW09-6

Project No.: 102.09.015

Project: Mount St. Patrick Waste Disposal Site

Client: Township of Greater Madawaska

Location: Mount. St. Patrick, ON

SUBSURFACE STRATA PROFILE			SAMPLE				Borehole Details	Comments
Depth	Symbol	Description	No.	Type	% R	SPT N-Value		
						0 15 30 45 60		
ft -5 -3 -1 1 3 5		Ground Surface						Stick Up = 1.32 m
		Sand Fine to medium sand, light brown, compact, wet						Static Water Level June 23, 2009 = 0.02 m
		Unknown No description available						Concrete
								Native Fill
		End of Borehole						Well Screen = 1.07 m x 0.05 m

Drilled By: Greenview Environmental Management Limited

Drill Method: Drive Point

Drill Date: June 23, 2009

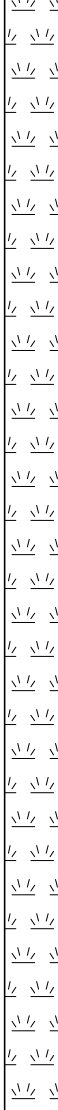

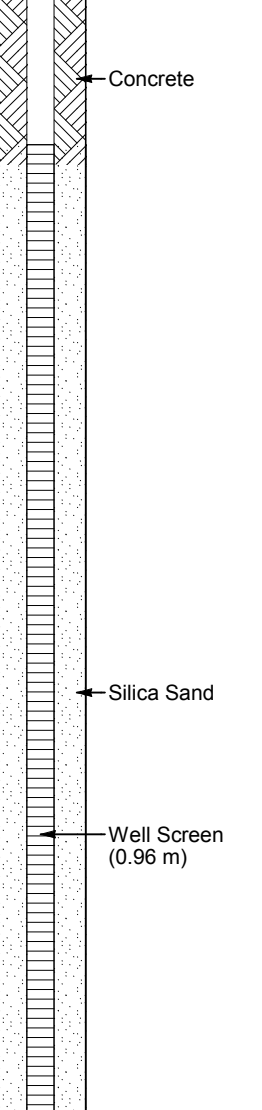

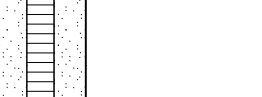
Logged By: Dan Hagan, B.Sc.

Checked By: Tyler Peters, P. Eng.

Sheet: 1 of 1

CLIENT Township of Greater Madawaska
PROJECT NUMBER 102.14.015
DATE STARTED 7/3/14 **COMPLETED** 7/3/14
DRILLING CONTRACTOR GEML
DRILLING METHOD Hand Auger
LOGGED BY DMH **CHECKED BY** THP
NOTES _____

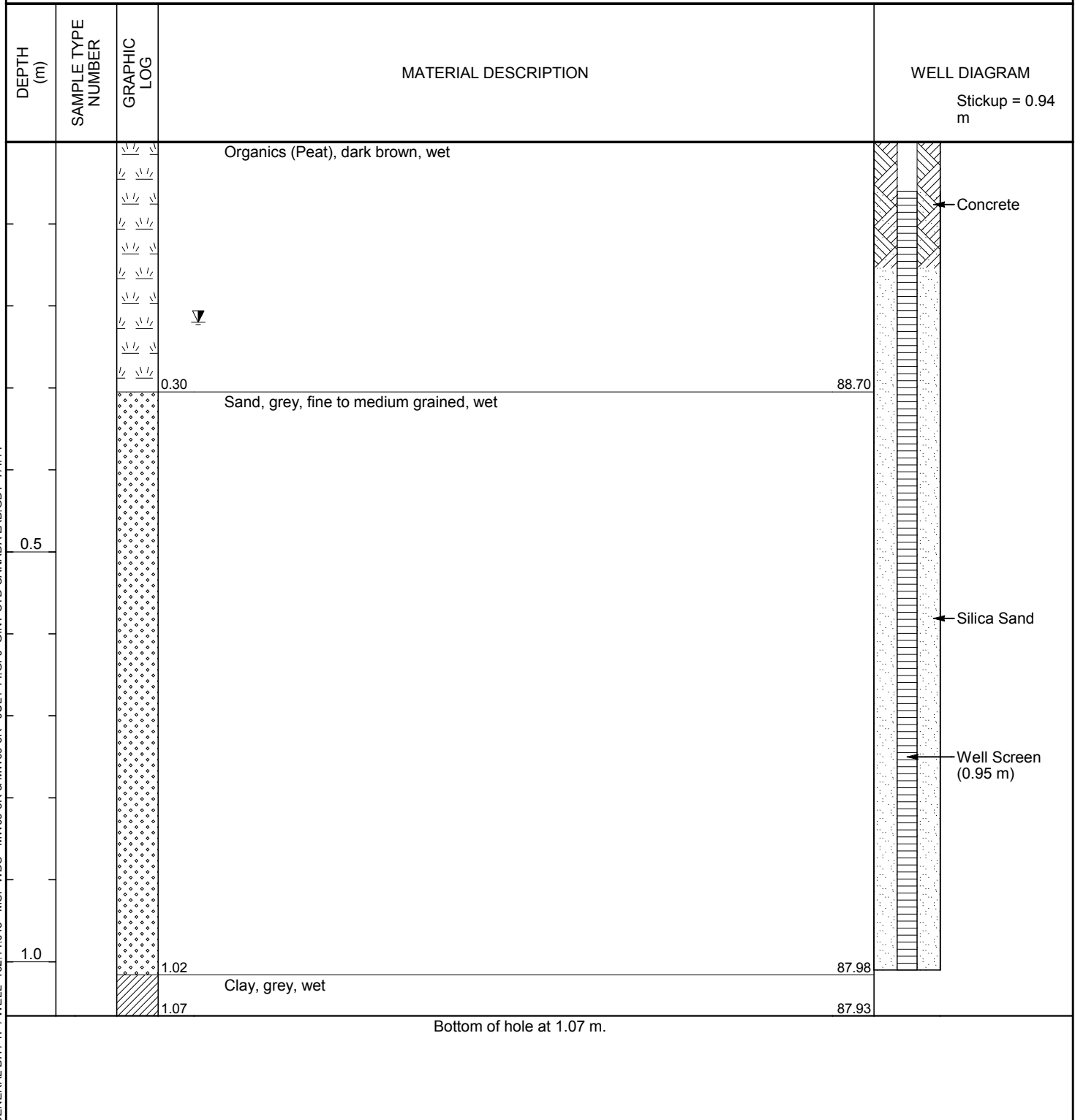
PROJECT NAME Mount St. Patrick Waste Disposal Site
PROJECT LOCATION Mount St. Patrick, Ontario
GROUND ELEVATION 92 m **HOLE SIZE** 0.2 m
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
1hrs AFTER DRILLING 0.12 m / Elev 91.89 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM Stickup = 1.12 m
0.5			Organics (peat), dark brown, wet 	 <p>Concrete</p> <p>Silica Sand</p> <p>Well Screen (0.96 m)</p>
1.0			1.02 Clay, grey, wet 90.98	
1.10 90.91 Bottom of hole at 1.10 m.				

GENERAL BH / TP / WELL 102.14.015 - MSP WDS - MW09-5R & MW09-6R - JUL4-14.GPJ GINT STD CANADA LAB.GDT 7/4/14

CLIENT Township of Greater Madawaska
PROJECT NUMBER 102.14.015
DATE STARTED 7/3/14 **COMPLETED** 7/3/14
DRILLING CONTRACTOR GEML
DRILLING METHOD Hand Auger
LOGGED BY DMH **CHECKED BY** THP
NOTES _____

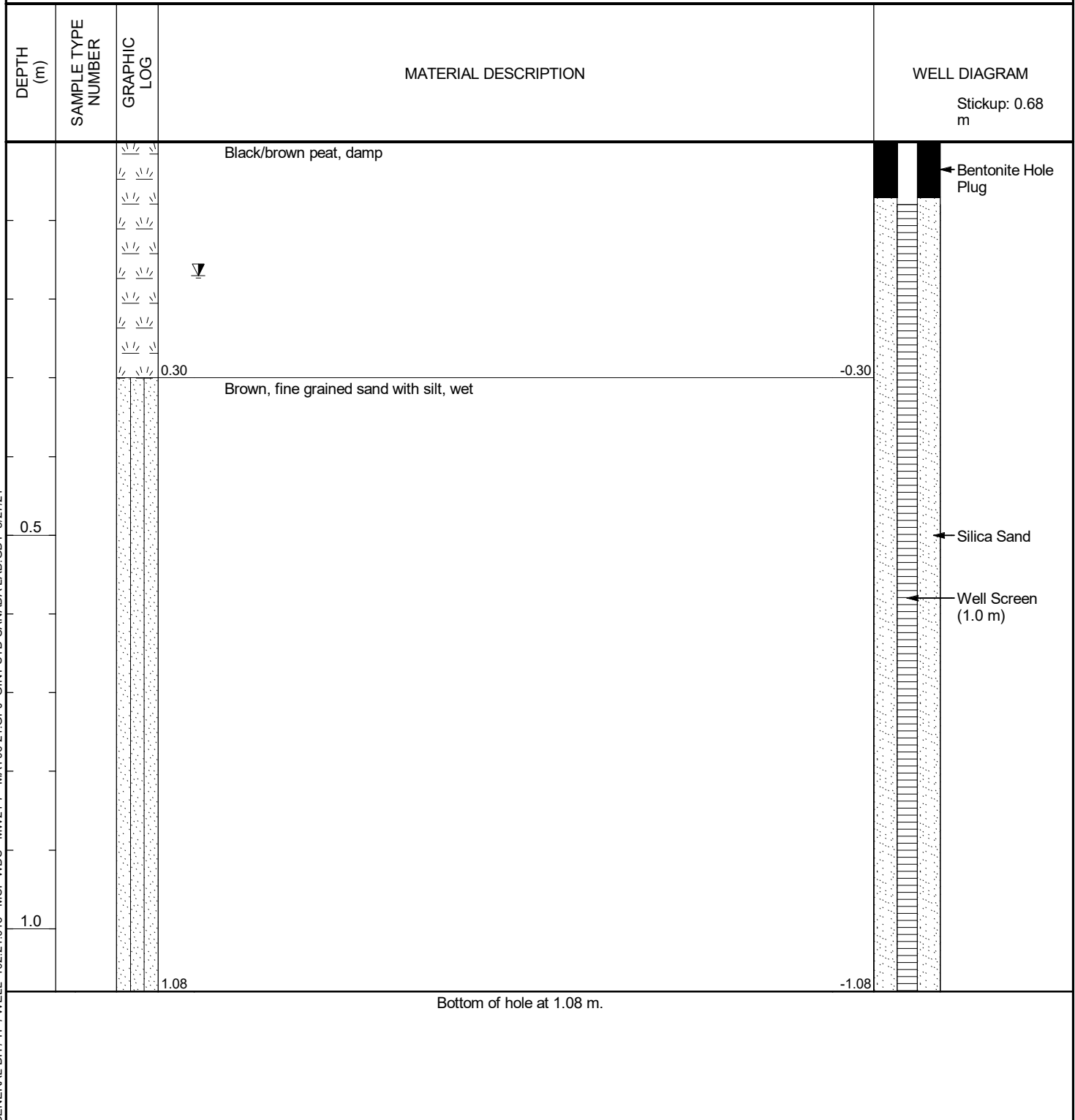
PROJECT NAME Mount St. Patrick Waste Disposal Site
PROJECT LOCATION Mount St. Patrick, Ontario
GROUND ELEVATION 89 m **HOLE SIZE** 0.2 m
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
1hrs AFTER DRILLING 0.22 m / Elev 88.78 m



GENERAL BH / TP / WELL 102.14.015 - MSP WDS - MW09-5R & MW09-6R - JUL4-14.GPJ GINT STD CANADA LAB.GDT 7/4/14

CLIENT Township of Greater Madawaska
PROJECT NUMBER 102.21.015
DATE STARTED 5/6/21 **COMPLETED** 5/6/21
DRILLING CONTRACTOR GEML
DRILLING METHOD Auger (0.20 m)
LOGGED BY DMH, P.Geo. **CHECKED BY** THP
NOTES New background well

PROJECT NAME Mount St. Patrick Waste Disposal Site
PROJECT LOCATION 134 Flat Road, Mount St. Patrick, Ontario
GROUND ELEVATION 0 m **HOLE SIZE** 50.8mm (PVC)
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
2hrs AFTER DRILLING 0.17 m / Elev -0.17 m



GENERAL BH / TP / WELL 102.21.015 - MSP WDS - MW21-7 - MAY06-21.GPJ GINT STD CANADA LAB.GDT 8/27/21



Appendix D

Photographs



MW 06-2



MW 06-3



MW 06-4



MW08-1



MW 21-7



MP5



MP6



MP7



SW1



SW2



SW3



SW4

DATE	March 2024
PROJECT	22-6213C
FIGURE	1



Appendix E

Sampling Protocol

STANDARD SAMPLING PROTOCOL

The following is a description of the monitoring procedures and protocols used for groundwater and surface water monitoring for landfill sites.

Equipment Cleaning and Calibration

Regardless of matrix, prior to traveling to the site to be sampled, all equipment such as water level indicators and multi-parameter meters must be cleaned and calibrated as specified by the equipment manufacturer. Details of the cleaning and calibration should be recorded in the field notes.

GROUNDWATER

Monitoring Well Assessment

Provide an assessment of the status of all monitoring wells at the site.

Note any changes to the well and/or protective casing and record the physical condition of the well; and

Label all observation wells clearly and accurately on both the protective casing and well pipe.

Groundwater Monitoring

Maintain and use an accurate, up-to-date list of all observation wells to be monitored.

Check all field equipment for cleanliness; and

Wear personnel protective equipment as required (i.e., gloves, protective glasses, splash guards) during all phases of work, and follow any appropriate health and safety plan procedures.

Gas Detection in Wells (Prior to Measuring Water Levels)

Turn on gas meter and prepare for sampling atmospheric condition inside monitoring well.

Remove protective casing cover and well cap avoiding introduction of foreign materials into the well.

Immediately insert the probe attached to the gas meter into the well and wait for readings to stabilize.

Record the measurement in the appropriate column on the field data sheet or field book.

Water Level Measurements (Prior to Purging)

Record water level measurements prior to purging or sampling when required.

Do not move dedicated sampling devices such as the "Waterra" inertial pump prior to measuring the water level unless the well diameter dictates removal; reference the measurement from the same location each time (marked location or lowest point on pipe).

Lower the tape/probe into the wells - record the depth to water when the indicator (audible/visual) shows the water level has been reached.

Measure the water level twice by raising and lowering the tape/probe; and

Record the measurement to the nearest cm (0.5 cm) in the appropriate column on the field data sheet or field book.

Well Purging (Prior to Sampling)

The purpose of purging is to remove the stagnant water from within a monitor (removal of all stagnant water) so that a representative water sample may be collected. The procedures for purging are as follows.

Purge the well only after water levels have been confirmed.

Lift the tubing off the bottom of the well and "pump" at a minimum all stagnant water from the well into a graduated container such as a bucket, pail or cylinder so that the purged volume can be measured and recorded.

For low-yield wells, it is expected that either "no purge sampling techniques or low flow purging will be utilized (avoid purging well dry).

Under normal circumstances purged water may be discarded on the ground, away from the well to avoid the potential of water seeping back into the well; and

Allow a sufficient recovery period before sampling (not more than 48 hours).

Field Measurements

Field measurements are to be collected and recorded as outlined in the Environmental Compliance Approval or the approved monitoring program. Typically, these include at a minimum: temperature, pH and conductivity.

Well Sampling

Collect the water sample as soon as practical (not more than 48 hours) after purging starting at the least contaminated location and proceeding to the most contaminated.

Lift tubing and check valve off bottom of well to avoid introducing unnecessary sediment into the sample and transfer some representative sample water into a clean, well rinsed container to conduct measurements of field parameters.

Lift the tubing and gently transfer a sample into a clean container and thoroughly mix to form a single representative sample.

Transfer the sample into a pre-labelled sample bottle; labelling to consist of at a minimum, the project number, well ID and the date.

For samples that require filtering, attach the disposable filter onto the end of the tubing (typically a 0.45-micron membrane filter or as otherwise specified should be used).

Attempt to keep sample agitation to a minimum during sample transfer.

Store samples in a cooler, with ice packs to keep cool.

Transport samples to laboratory within the maximum hold time established by the laboratory (typically within a 48-hour period).

Volatile Organic Compound (VOC) Sampling

Volatile Organic Compounds (VOC) can be easily lost during sample collection, storage, and transportation. The following sampling and handling protocols are adhered to.

VOC samples are to be collected in special containers provided by the laboratory. These typically include glass vials, preferably amber, with a minimum capacity of 20 ml and sealed with Septum tops.

Vials must be filled just to overflowing in such a manner that no air bubbles pass through the vial as it is being filled (this is easier to accomplish by inserting a 4' length of ¼ " poly tubing into the existing Wattera tubing and filling the vial from the ¼" tubing).

Vials must then be sealed with the cap so that no air bubbles are entrapped within it; the septum is placed with the Teflon side face down toward the inside of the bottle.

Check for the presence of air bubbles by inverting the vial and tapping on hard surface; if air bubbles are present, discard the sample and re-sample.

All VOC samples must be preserved as specified by the laboratory (typically with 1 to 2 drops of Hydrochloric Acid (HCl)) and refrigerated or stored on ice until analysed; and

VOC samples should be submitted in duplicate at a ratio specified in the approved monitoring program (typically 1:10)

Surface Water Sampling (General)

Surface water samples should be collected at the same designated location during each sample event (do not collect samples from any station which is frozen, stagnant or otherwise not representative of normal conditions).

If you must stand in the stream, position yourself downstream of the sample location to avoid contaminating the sample with sediment, debris, and other floating materials.

All equipment must be thoroughly rinsed with distilled water at the beginning of each station to avoid cross-contamination.

Wear gloves as required to handle the sample bottles.

Fill all bottles using an unpreserved transfer bottle (to avoid overflowing pre-preserved bottles).

When sampling for dissolved metals, the sample must be filtered and placed in a separate metals bottle, while sampling for total metals, the sample is placed in a common bottle for metals that is provided by the laboratory.

Label and store all samples in the same manner as for groundwater samples; and

Conduct field measurements (these typically include temperature, pH, conductivity, Dissolved Oxygen and Flow).

Flow Measurements (General)

Discharge flow measurements must be taken at designated stations.

QA/QC Water Samples

A field quality assurance and quality control program for all monitoring events will be established as follows and or as dictated in the approved monitoring program.

Where groundwater or surface water samples are collected, and if stipulated in the approved monitoring program, a field blank in which a set of sample bottles is filled with distilled water at a known site or monitoring station is submitted to the laboratory for analysis along with the samples

Where VOC samples are taken, a trip blank, in which 1 set of VOC vials are filled with distilled water (at the laboratory or office) prior to going to the field and accompanies the sample bottles until they are returned to the lab; and

Duplicate of as outlined in the approved monitoring program or 1 duplicate for every 10 samples (do not identify the sample ID number to the laboratory, but have it recorded in the field notes) use the sampling technique as for observation wells.

SAMPLING

Station Sampling Order

The stations will be sampled beginning with those wells exhibiting the lowest chemical concentrations and then moving on to wells with greater chemical concentrations.

Monitoring Periods

The monitoring periods are as recommended in either the approved monitoring program or the Environmental Compliance Approval.

Analytical Parameters

Analysis will be as recommended in either the approved monitoring program and or the Environmental Compliance Approval.

Gas Detection of On-site Buildings

Gas detection in on-site buildings is to be included as part of regular monitoring.



Appendix F

Historic Static Levels, Ground and Surface Water Analysis


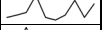
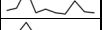
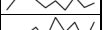
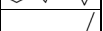
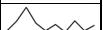

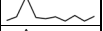
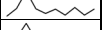
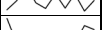
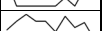
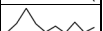

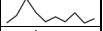

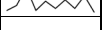
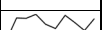


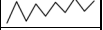
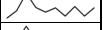
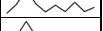
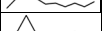
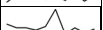





Table 3
Groundwater Elevations
Mount St. Patrick Waste Disposal Site

Monitor	Ground Elevation (m)	Top of Pipe Elevation (m)	Original Stick-Up (m)	Depth of Well (m)	Well Diameter (mm)	Water Elevation (m)													
						25-May-16	27-Oct-16	09-May-17	26-Oct-17	08-May-18	31-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22
MW08-1 ²	97.69	98.58	0.77	5.78	50.8	94.47	93.07	95.29	93.79	94.94	93.09	94.93	92.90	94.86	93.57	94.64	93.51	94.72	93.59
MW06-2 ¹	93.93	94.86	0.93	2.22	50.8	93.55	92.54	93.67	93.32	93.61	92.86	93.62	92.76	93.61	93.10	93.57	93.04	93.61	93.07
MW06-3 ¹	93.29	94.26	0.97	2.85	50.8	92.99	92.20	93.01	92.82	93.00	92.67	93.00	92.52	93.00	92.70	93.00	92.60	92.98	92.61
MW06-4 ¹	95.66	96.57	0.91	3.82	50.8	94.18	92.63	94.65	93.64	94.46	92.96	94.47	92.77	94.43	93.28	94.21	93.22	94.27	93.29
MW09-5R ⁵	92.08	93.28	1.12	1.10	50.8	91.94	91.63	91.98	91.93	91.69	91.93	91.99	91.92	91.98	91.97	91.92	91.87	91.88	91.87
MW09-6R ⁵	89.30	90.53	0.94	1.07	50.8	88.90	88.82	Flooded	88.92	89.56	88.92	89.08	88.83	88.95	88.84	88.98	88.82	88.95	88.80
MW21-7 ⁶	94.97	95.52	0.54	1.14	50.8	-	-	-	-	-	-	-	-	-	-	94.75	94.03	94.84	94.04
MP3R	93.51	94.45	0.91	0.89	19.0	92.70	92.62	93.72	93.37	93.66	92.93	93.64	92.70	93.54	93.15	93.64	-	93.55	93.27
MP4	95.93	96.71	0.74	0.74	19.0	94.32	-	94.94	-	94.69	-	94.92	-	94.65	-	94.38	-	94.41	-
MP5	92.86	93.65	0.78	0.70	19.0	92.49	-	92.64	92.50	92.58	-	92.77	-	92.72	-	92.75	-	92.73	-
MP6	93.02	93.67	0.66	0.57	19.0	92.83	92.18	92.86	92.75	92.87	92.42	93.07	92.60	93.06	92.85	93.08	92.77	93.07	92.76
MP7	92.81	93.47	0.71	0.71	19.0	92.57	92.12	92.57	92.50	92.72	92.36	92.54	92.34	92.52	92.44	92.51	92.37	92.52	92.37

Notes:

1. Ground elevations and top of pipe elevations surveyed by Greenview on October 30, 2007.
 2. Ground elevations and top of pipe elevations surveyed by Greenview on November 22, 2007.
 3. Ground elevations and top of pipe elevations surveyed by Greenview on January 14, 2010.
 4. Decommissioned
 5. Monitoring wells MW09-5R and MW09-6R were installed on July 03, 2014 to replace MW09-5 and MW09-6.
 6. Monitoring well MW21-7 installed on May 6, 2021.
- All elevations are relative to a site specific benchmark elevation of 100.00 m.
 "-" indicates data is not available.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	MW08-1 (Background)														5-year Trends (sparkline)
				25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	276	388	30 - 500	276	325	241	328	239	292	249	310	236	275	248	299	241	307	
Aluminum	0.073	0.09	0.1	0.02	0.03	0.11	0.05	0.05	0.07	0.09	0.23	0.05	0.03	0.07	0.19	0.05	0.16	
Ammonia, Total (as N)	0.1	N/L	N/L	< 0.01	0.10	0.06	0.03	0.05	0.07	0.23	0.03	0.06	0.03	0.02	0.13	0.04	0.03	
Barium	0.12	0.34	1	0.088	0.145	0.299	0.103	0.089	0.160	0.231	0.147	0.101	0.141	0.088	0.163	0.103	0.127	
Boron	0.011	1.3	5	< 0.005	< 0.005	< 0.005	0.016	0.008	0.006	0.008	0.011	0.006	0.015	0.009	0.013	0.005	0.013	
Cadmium	0.000015	0.0013	0.005	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	< 0.000015	< 0.000070	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	0.000020	
Calcium	96	N/L	N/L	73.6	110	170	90.3	79.7	116	170	109	80.2	104	75.0	117	79.1	100	
Chemical Oxygen Demand	24	N/L	N/L	93	65	57	35	25	8	21	38	37	115	5	22	20	26	
Chloride	40	145	250	29.2	39.0	277	18.6	23.8	62.9	301	55.2	41.9	63.8	16.1	78.4	16.6	67.3	
Conductivity (µS/cm) ³	715	N/L	N/L	581	-	1670	715	499	796	1500	783	608	771	540	835	539	769	
Conductivity (µS/cm) ⁴	526	N/L	N/L	416	510	1127	545	320	548	916	500	352	722	362	719	290	556	
Copper	0.002	0.5	1	< 0.002	0.002	< 0.002	< 0.002	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0014	< 0.002	0.0028	0.0022	
Dissolved Organic Carbon	1.7	3.4	5	1.2	1.4	0.7	1.7	1.2	2.0	2.7	2.0	2.0	1.0	2.5	1.4	1.9	0.3	
Hardness (as CaCO ₃)	311	405	500	246	359	586	280	262	375	568	368	266	341	253	388	259	325	
Iron	0.037	0.2	0.3	< 0.005	< 0.005	< 0.005	< 0.005	0.022	0.011	0.052	0.695	0.019	< 0.005	0.099	0.447	0.021	0.455	
Magnesium	18	N/L	N/L	15.1	20.8	39.1	13.3	15.2	20.8	34.8	23.3	15.9	19.9	16.0	22.9	14.9	18.3	
Manganese	0.003	0.03	0.05	< 0.001	< 0.001	< 0.001	0.001	< 0.001	0.001	0.003	0.049	0.001	< 0.001	0.007	0.038	0.002	0.021	
Nitrate (as N)	0.7	3	10	1.1	0.6	1.14	0.39	0.40	0.63	1.5	0.4	0.84	0.5	0.9	0.5	1.09	0.33	
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.1	0.19	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.48	7.29	6.54	5.90	6.16	7.38	7.36	7.59	7.01	6.77	7.52	7.10	6.64	7.32	
Phosphorus (total)	1.07	N/L	N/L	2.68	3.75	5.62	1.06	1.66	0.84	1.08	0.77	1.59	4.64	0.01	1.35	0.20	1.37	
Potassium	2.0	N/L	N/L	1.2	1.8	2.5	1.9	1.3	2.0	2.4	2.0	1.6	2.2	1.5	2.3	1.5	2.0	
Silicon	5.11	N/L	N/L	4.01	5.71	4.96	4.79	4.05	5.22	4.15	5.09	4.43	5.18	4.62	5.41	4.69	5.25	
Sodium	33	116	200	19.2	34.5	78.9	62.4	15.4	35.3	83.5	44.2	31.4	43.3	20.3	47.2	20.4	43.6	
Strontium	0.19	N/L	N/L	0.140	0.213	0.401	0.165	0.140	0.213	0.339	0.217	0.151	0.205	0.153	0.229	0.153	0.187	
Sulphate	13	256	500	13	11	22	15	8	16	28	16	11	12	9	12	9	13	
Total Dissolved Solids	402	451	500	321	414	921	393	258	418	818	411	316	404	290	440	279	403	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	1.2	1.7	2.2	0.6	0.9	0.6	0.6	0.4	0.7	2.1	0.1	0.6	0.2	0.5	
Zinc	0.005	2.5	5	0.008	< 0.005	< 0.005	0.010	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	

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 the parameter was not analyzed.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	MW06-2												5-year Trends (sparkline)	
				25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	30-Oct-18	16-May-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22		02-Nov-22
Alkalinity (as CaCO ₃)	276	388	30 - 500	387	349	360	328	318	305	326	332	310	326	340	334	346	
Aluminum	0.073	0.09	0.1	0.04	0.03	0.08	0.06	0.06	0.08	0.07	0.07	0.05	0.08	0.16	0.06	0.45	
Ammonia, Total (as N)	0.1	N/L	N/L	< 0.01	0.06	0.02	0.05	0.05	0.11	0.10	0.06	0.06	0.03	0.06	0.02	0.05	
Barium	0.12	0.34	1	0.234	0.259	0.296	0.369	0.205	0.242	0.258	0.266	0.251	0.232	0.284	0.293	0.260	
Boron	0.011	1.3	5	0.208	0.137	0.273	0.172	0.109	0.071	0.175	0.169	0.107	0.201	0.112	0.245	0.125	
Cadmium	0.000015	0.0013	0.005	< 0.00002	0.00002	< 0.000014	0.000019	< 0.000015	< 0.000015	< 0.000015	< 0.000028	< 0.000015	< 0.000015	< 0.000015	< 0.000028	0.000033	
Calcium	96	N/L	N/L	115	129	110	162	103	110	131	136	118	118	139	137	120	
Chemical Oxygen Demand	24	N/L	N/L	124	270	81	69	48	284	29	47	79	9	131	47	64	
Chloride	40	145	250	114	102	84.8	153	64.3	76.8	106	124	81.7	99.3	95.2	119	100	
Conductivity (µS/cm) ³	715	N/L	N/L	1040	-	1050	1260	772	871	1010	1060	902	973	1020	1080	966	
Conductivity (µS/cm) ⁴	526	N/L	N/L	803	720	708	847	522	598	622	587	656	634	684	629	696	
Copper	0.002	0.5	1	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0014	< 0.002	0.0014	0.0041	
Dissolved Organic Carbon	1.7	3.4	5	1.6	1.4	2.7	1.6	1.9	2.5	4.4	2.4	1.3	2.6	2.9	2.2	0.7	
Hardness (as CaCO ₃)	311	405	500	388	428	385	532	339	358	439	455	394	400	469	452	406	
Iron	0.037	0.2	0.3	0.007	< 0.005	< 0.005	< 0.005	0.007	0.081	< 0.005	0.006	0.039	0.005	0.365	0.005	1.10	
Magnesium	18	N/L	N/L	24.2	25.8	26.9	31.0	19.8	20.3	27.1	27.9	24.0	25.5	29.5	26.7	25.5	
Manganese	0.003	0.03	0.05	0.040	0.265	0.038	0.304	0.056	0.021	0.024	0.015	0.034	0.011	0.146	0.007	0.501	
Nitrate (as N)	0.7	3	10	0.7	0.2	0.50	0.13	0.37	< 0.05	0.6	0.44	0.1	0.5	0.2	0.49	0.18	
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.39	7.57	7.23	7.55	7.34	7.19	7.47	7.17	7.30	7.18	7.55	7.22	7.31	
Phosphorus (total)	1.07	N/L	N/L	3.58	4.18	3.84	1.23	1.03	6.90	0.62	0.85	1.04	0.05	2.65	0.35	0.85	
Potassium	2.0	N/L	N/L	2.7	3.9	2.7	3.8	2.4	3.8	2.7	2.6	3.8	2.5	3.8	2.8	3.6	
Silicon	5.11	N/L	N/L	5.41	7.26	6.40	6.92	4.75	6.54	5.19	5.21	6.61	5.50	6.07	5.97	6.81	
Sodium	33	116	200	57.3	70.8	66.7	67.9	57.4	62.3	52.2	57.9	61.8	54.3	62.3	59.4	55.8	
Strontium	0.19	N/L	N/L	0.238	0.290	0.293	0.327	0.192	0.224	0.275	0.274	0.257	0.254	0.294	0.282	0.251	
Sulphate	13	256	500	38	38	30	32	25	25	34	38	30	39	49	42	35	
Total Dissolved Solids	402	451	500	588	559	577	694	404	460	539	569	478	536	547	577	514	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	3.8	5.1	2.2	1.2	0.7	4.7	0.7	0.8	1.1	0.2	3.2	0.6	1.1	
Zinc	0.005	2.5	5	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.006	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	

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 the parameter was not analyzed.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	MW06-3														5-year Trends (sparkline)
				25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	276	388	30 - 500	246	292	204	311	257	258	184	279	176	260	222	266	214	284	
Aluminum	0.073	0.09	0.1	0.04	0.03	0.04	0.05	0.05	0.06	0.03	0.06	0.01	0.03	0.05	0.02	0.04	0.03	
Ammonia, Total (as N)	0.1	N/L	N/L	0.03	0.01	0.02	0.02	0.10	0.13	0.08	0.03	0.04	0.04	0.04	0.03	0.04	0.03	
Barium	0.12	0.34	1	0.137	0.233	0.166	0.269	0.177	0.241	0.127	0.205	0.135	0.219	0.138	0.221	0.156	0.231	
Boron	0.011	1.3	5	0.014	0.025	0.006	0.048	0.027	0.030	0.028	0.049	0.020	0.041	0.029	0.036	0.030	0.032	
Cadmium	0.000015	0.0013	0.005	0.00002	0.00006	0.00003	0.000043	0.000044	0.000039	0.000035	0.000044	0.000022	0.000125	0.000028	0.000037	< 0.000039	0.000035	
Calcium	96	N/L	N/L	52.8	83.3	65.7	93.7	75.7	85.9	55.4	78.1	59.4	88.9	59.9	89.2	64.4	93.9	
Chemical Oxygen Demand	24	N/L	N/L	37	10	32	30	133	33	32	15	29	25	27	28	26	13	
Chloride	40	145	250	62.9	134	58	89.8	62.8	97.3	43.3	75.5	60.4	99.8	54.4	89.1	52.7	124	
Conductivity (µS/cm) ³	715	N/L	N/L	631	-	666	972	656	850	552	783	592	863	621	824	608	925	
Conductivity (µS/cm) ⁴	526	N/L	N/L	467	714	374	746	366	582	304	856	285	649	375	618	312	665	
Copper	0.002	0.5	1	0.003	0.003	0.005	0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0019	< 0.002	0.0065	0.0019	
Dissolved Organic Carbon	1.7	3.4	5	12.4	4.2	9.9	6.4	7.8	6.3	12.1	6.7	8.6	6.1	8.9	8.9	9.3	1.9	
Hardness (as CaCO ₃)	311	405	500	173	275	208	306	246	277	184	257	193	293	202	298	212	314	
Iron	0.037	0.2	0.3	0.062	< 0.005	0.010	0.008	0.017	0.033	0.014	< 0.005	0.012	0.014	0.029	0.028	0.016	0.009	
Magnesium	18	N/L	N/L	9.96	16.1	10.7	17.4	13.8	15.2	11.0	15.1	10.9	17.3	12.6	18.2	12.5	19.3	
Manganese	0.003	0.03	0.05	0.679	0.775	0.622	0.723	0.498	0.452	0.454	0.472	0.188	0.198	0.366	0.307	0.342	0.343	
Nitrate (as N)	0.7	3	10	< 0.1	0.6	0.3	0.41	0.07	0.10	0.2	< 0.1	0.12	0.1	< 0.1	0.2	0.06	0.05	
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.32	7.33	7.37	7.38	8.02	7.05	7.70	7.61	7.21	7.39	7.25	7.58	7.41	7.37	
Phosphorus (total)	1.07	N/L	N/L	0.15	0.11	0.19	0.12	3.65	0.25	0.09	0.07	0.13	0.07	0.08	0.10	0.11	0.07	
Potassium	2.0	N/L	N/L	0.6	1.3	0.7	1.3	0.6	1.2	0.6	1.1	0.6	1.1	0.6	1.2	0.8	1.3	
Silicon	5.11	N/L	N/L	3.97	5.82	4.54	5.49	3.67	5.34	3.80	4.63	3.43	4.72	3.89	5.00	4.32	5.39	
Sodium	33	116	200	59.3	118	71	104	61.9	89.7	51.5	81.3	54.5	84.4	58.5	74.4	53.8	72.7	
Strontium	0.19	N/L	N/L	0.098	0.157	0.109	0.173	0.126	0.155	0.104	0.153	0.104	0.169	0.117	0.174	0.123	0.182	
Sulphate	13	256	500	16	20	20	21	14	19	29	17	29	24	16	20	18	20	
Total Dissolved Solids	402	451	500	350	557	366	535	341	449	276	411	307	456	336	434	315	491	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	0.7	0.6	0.6	0.4	1.9	0.6	0.4	0.3	0.4	0.4	0.4	0.5	0.5	0.3	
Zinc	0.005	2.5	5	0.009	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	

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 the parameter was not analyzed.

**Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site**

Parameter	Background (median)	RUC ¹	ODWS ²	MW06-4														5-year Trends (sparkline)
				25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	276	388	30 - 500	300	331	294	296	298	302	264	302	289	294	294	327	286	320	
Aluminum	0.073	0.09	0.1	0.04	0.04	0.08	0.07	0.04	0.05	0.08	0.11	0.06	0.03	0.06	0.03	0.06	0.04	
Ammonia, Total (as N)	0.1	N/L	N/L	< 0.01	0.02	< 0.01	0.02	0.04	0.07	0.12	0.03	0.07	0.07	0.03	0.02	0.02	0.02	
Barium	0.12	0.34	1	0.267	0.210	0.297	0.241	0.151	0.219	0.221	0.225	0.223	0.212	0.187	0.247	0.259	0.203	
Boron	0.011	1.3	5	0.011	0.005	0.013	0.022	0.012	0.018	0.036	0.028	0.047	0.041	0.057	0.083	0.078	0.044	
Cadmium	0.000015	0.0013	0.005	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	< 0.000015	< 0.000015	0.000071	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000028	< 0.000010	
Calcium	96	N/L	N/L	128	100	99.9	105	70.7	95.5	112	106	106	97.6	92.4	118	124	98.6	
Chemical Oxygen Demand	24	N/L	N/L	72	184	63	58	7	< 5	23	6	24	49	10	< 5	17	< 5	
Chloride	40	145	250	226	68.9	133	107	48.1	71.4	114	96.2	97.6	68.3	68.4	75.1	144	83.6	
Conductivity (µS/cm) ³	715	N/L	N/L	1220	-	1110	999	688	861	934	911	916	841	834	937	1030	880	
Conductivity (µS/cm) ⁴	526	N/L	N/L	955	602	710	716	452	573	304	964	518	751	554	693	565	630	
Copper	0.002	0.5	1	< 0.002	0.003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.0015	< 0.002	0.0009	0.0026	
Dissolved Organic Carbon	1.7	3.4	5	0.7	1.2	1.5	1.3	1.5	2.7	3.5	2.3	2.0	1.6	2.4	2.9	1.3	0.4	
Hardness (as CaCO ₃)	311	405	500	432	331	357	346	232	310	377	356	354	330	315	400	412	332	
Iron	0.037	0.2	0.3	< 0.005	< 0.005	< 0.005	0.029	< 0.005	0.008	0.154	0.294	< 0.005	< 0.005	< 0.005	0.010	< 0.005	< 0.005	
Magnesium	18	N/L	N/L	27.1	19.6	26.0	20.4	13.4	17.3	23.6	22.1	21.6	20.9	20.4	25.2	24.8	20.8	
Manganese	0.003	0.03	0.05	< 0.001	< 0.001	< 0.001	0.030	< 0.001	0.001	0.012	0.020	< 0.001	0.018	< 0.001	0.002	< 0.001	0.002	
Nitrate (as N)	0.7	3	10	1.7	1.0	1.08	0.45	0.53	0.70	1.7	0.7	1.01	0.6	0.9	0.8	0.98	0.35	
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.1	0.10	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.33	7.54	6.99	6.28	8.07	7.73	7.40	7.77	7.34	7.07	7.55	7.81	6.45	7.63	
Phosphorus (total)	1.07	N/L	N/L	1.59	1.16	5.13	0.94	0.91	0.40	1.16	0.32	0.68	2.86	0.04	0.32	0.52	0.13	
Potassium	2.0	N/L	N/L	2.4	2.4	2.7	2.7	2.0	2.7	2.5	2.7	2.6	3.0	2.4	2.9	2.8	2.6	
Silicon	5.11	N/L	N/L	4.46	5.46	5.63	5.43	4.20	5.16	4.83	4.86	4.88	5.30	4.93	5.16	5.13	5.22	
Sodium	33	116	200	65.8	73.7	70.1	88.8	82.7	92.7	57.6	67.7	72.4	73.4	62.0	63.2	60.8	57.4	
Strontium	0.19	N/L	N/L	0.239	0.187	0.251	0.192	0.120	0.167	0.214	0.208	0.194	0.195	0.187	0.230	0.238	0.189	
Sulphate	13	256	500	22	23	17	15	13	28	28	33	35	32	36	50	26	31	
Total Dissolved Solids	402	451	500	659	485	611	549	357	455	496	483	486	443	462	498	552	466	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	0.5	0.7	1.7	0.4	0.3	0.3	0.4	0.2	0.3	0.6	0.2	0.3	0.3	0.2	
Zinc	0.005	2.5	5	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	

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 the parameter was not analyzed.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	MW09-5R														5-year Trends (sparkline)
				25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	276	388	30 - 500	215	219	159	236	177	221	165	185	164	217	196	222	192	250	
Aluminum	0.073	0.09	0.1	0.03	0.05	0.04	0.05	0.04	0.05	0.04	0.06	0.04	0.02	0.05	0.02	0.05	0.03	
Ammonia, Total (as N)	0.1	N/L	N/L	0.19	0.08	< 0.01	0.14	0.15	0.12	0.23	0.10	0.08	0.07	0.12	0.08	0.16	0.09	
Barium	0.12	0.34	1	0.099	0.141	0.094	0.148	0.094	0.133	0.080	0.123	0.092	0.138	0.099	0.126	0.128	0.136	
Boron	0.011	1.3	5	0.005	< 0.005	< 0.005	0.015	0.007	0.005	0.009	0.013	0.006	0.012	0.009	0.009	0.011	0.008	
Cadmium	0.000015	0.0013	0.005	< 0.00002	0.00003	< 0.000014	< 0.000014	< 0.000015	< 0.000015	< 0.000015	0.000016	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000010	
Calcium	96	N/L	N/L	60.5	88.3	47.0	84.1	61.5	85.3	58.7	75.3	62.9	86.9	65.0	83.3	69.9	78.8	
Chemical Oxygen Demand	24	N/L	N/L	790	781	381	190	182	282	410	631	375	322	10	439	338	253	
Chloride	40	145	250	9.0	9.1	7.0	11.7	13.3	17.0	12.2	16.8	18.3	22.2	15.7	19.2	13.4	17.3	
Conductivity (µS/cm) ³	715	N/L	N/L	423	-	351	503	362	519	379	457	401	525	441	504	438	511	
Conductivity (µS/cm) ⁴	526	N/L	N/L	316	355	234	373	238	329	233	308	216	373	281	337	254	354	
Copper	0.002	0.5	1	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	0.0010	< 0.002	0.0010	0.0009	
Dissolved Organic Carbon	1.7	3.4	5	14.2	17.1	15.7	19.1	11.6	16.7	17.0	24.2	13.5	18.8	17.6	18.9	18.6	16.9	
Hardness (as CaCO ₃)	311	405	500	205	295	165	279	206	281	202	254	213	294	223	283	233	267	
Iron	0.037	0.2	0.3	0.586	0.157	0.498	0.408	0.429	0.080	0.443	0.109	0.176	0.239	0.405	0.126	0.432	0.364	
Magnesium	18	N/L	N/L	13.2	18.1	11.4	16.8	12.6	16.6	13.5	15.9	13.5	18.6	14.8	18.2	14.1	16.9	
Manganese	0.003	0.03	0.05	0.081	0.056	0.057	0.093	0.050	0.038	0.053	0.042	0.039	0.052	0.046	0.025	0.071	0.071	
Nitrate (as N)	0.7	3	10	0.1	0.1	< 0.05	0.14	0.07	0.11	0.3	0.3	0.13	0.1	0.1	0.1	0.17	0.06	
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.84	7.22	7.45	7.56	7.66	7.76	7.81	7.93	6.88	7.65	7.04	7.99	7.34	7.11	
Phosphorus (total)	1.07	N/L	N/L	0.47	0.44	3.40	0.49	0.36	0.41	0.61	1.06	0.55	0.51	0.09	0.82	0.35	0.35	
Potassium	2.0	N/L	N/L	1.1	1.0	1.1	1.1	1.2	0.6	1.3	0.6	1.2	1.2	1.3	0.9	1.2	1.2	
Silicon	5.11	N/L	N/L	3.97	5.15	3.88	5.52	3.46	4.32	3.45	4.68	3.77	5.47	4.44	5.09	4.37	5.26	
Sodium	33	116	200	5.2	5.9	5.0	6.3	5.5	6.7	6.0	7.9	6.9	9.8	7.5	9.5	8.0	9.3	
Strontium	0.19	N/L	N/L	0.128	0.186	0.117	0.176	0.120	0.168	0.127	0.169	0.124	0.191	0.147	0.181	0.152	0.174	
Sulphate	13	256	500	7	32	7	5	4	17	6	24	10	11	5	12	5	3	
Total Dissolved Solids	402	451	500	227	284	193	277	186	269	195	236	207	272	228	261	226	265	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	6.0	6.0	7.0	4.9	4.0	4.0	7.3	10.3	5.5	4.6	0.5	8.2	4.4	3.7	
Zinc	0.005	2.5	5	0.009	0.009	0.005	0.010	0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	

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 the parameter was not analyzed.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	MW09-6R													5-year Trends (sparkline)
				25-May-16	27-Oct-16	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	276	388	30 - 500	247	243	249	232	228	217	272	217	215	204	229	222	257	
Aluminum	0.073	0.09	0.1	0.04	0.05	0.07	0.07	0.07	0.07	0.07	0.07	0.05	0.07	0.13	0.05	0.06	
Ammonia, Total (as N)	0.1	N/L	N/L	0.06	0.12	0.10	0.07	0.12	0.15	0.10	0.05	0.08	0.08	0.08	0.07	0.10	
Barium	0.12	0.34	1	0.160	0.185	0.200	0.095	0.154	0.123	0.200	0.159	0.164	0.107	0.164	0.145	0.172	
Boron	0.011	1.3	5	< 0.005	< 0.005	0.015	0.010	< 0.005	0.008	0.013	0.005	0.017	0.008	0.010	0.007	0.010	
Cadmium	0.000015	0.0013	0.005	< 0.00002	0.000030	< 0.000014	0.000026	0.000019	0.000026	0.000025	0.000022	0.000016	< 0.000015	0.000037	< 0.000015	< 0.000010	
Calcium	96	N/L	N/L	107	106	123	93.0	100	101	107	112	108	83	113	94.0	107	
Chemical Oxygen Demand	24	N/L	N/L	76	143	68	152	57	106	142	60	95	55	51	64	40	
Chloride	40	145	250	104	111	81.2	31.4	84.4	58.2	80.4	90.5	91.5	57.6	85.0	65.1	98.4	
Conductivity (µS/cm) ³	715	N/L	N/L	793	-	818	528	746	647	817	762	777	621	758	670	805	
Conductivity (µS/cm) ⁴	526	N/L	N/L	663	291	693	366	449	420	527	436	728	422	471	376	599	
Copper	0.002	0.5	1	< 0.002	< 0.002	0.002	0.003	< 0.002	0.002	0.002	0.003	< 0.002	0.0042	< 0.002	0.0097	0.0021	
Dissolved Organic Carbon	1.7	3.4	5	9.9	12.6	14.3	19.9	12.2	28.0	16.6	14.2	9.9	16.5	13.7	17.2	7.3	
Hardness (as CaCO ₃)	311	405	500	343	336	384	284	309	317	338	352	342	266	365	293	340	
Iron	0.037	0.2	0.3	0.649	0.544	0.788	2.47	0.443	0.337	0.391	0.151	0.464	0.326	1.20	0.658	1.04	
Magnesium	18	N/L	N/L	18.2	17.2	18.7	12.6	14.3	15.6	17.1	17.4	17.4	14.1	19.9	14.1	17.5	
Manganese	0.003	0.03	0.05	0.074	0.074	0.076	0.289	0.046	0.045	0.041	0.048	0.050	0.024	0.123	0.035	0.052	
Nitrate (as N)	0.7	3	10	< 0.1	0.2	0.08	0.05	0.67	0.2	< 0.1	0.11	0.1	< 0.1	0.1	0.08	0.06	
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.60	7.63	7.68	7.59	7.90	7.31	7.85	7.13	7.22	7.35	7.74	7.05	7.44	
Phosphorus (total)	1.07	N/L	N/L	0.33	0.30	0.20	0.65	0.19	0.48	0.72	< 0.01	0.49	0.03	0.10	0.08	0.06	
Potassium	2.0	N/L	N/L	1.2	1.7	1.6	1.0	1.2	0.9	1.6	1.2	1.6	0.9	1.6	1.1	1.6	
Silicon	5.11	N/L	N/L	4.80	6.38	7.14	3.73	5.38	4.61	5.35	4.59	6.39	4.52	5.76	4.94	6.50	
Sodium	33	116	200	21.2	60.7	36.1	20.9	34.4	21.0	48.1	25.2	43.0	25.9	37.5	33.5	37.6	
Strontium	0.19	N/L	N/L	0.260	0.268	0.306	0.219	0.240	0.258	0.293	0.279	0.293	0.229	0.295	0.245	0.293	
Sulphate	13	256	500	16	22	16	13	15	26	34	32	35	23	24	18	23	
Total Dissolved Solids	402	451	500	417	467	450	273	390	336	430	399	407	328	396	348	423	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	1.0	1.4	1.0	2.2	1.0	1.6	2.1	0.8	1.6	0.7	0.8	0.9	0.8	
Zinc	0.005	2.5	5	0.008	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.008	< 0.005	< 0.005	

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 the parameter was not analyzed.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	MW21-7 (Background)		5-year Trends (sparkline)
				06-May-21	17-May-22	
Alkalinity (as CaCO ₃)	276	388	30 - 500	160	200	n/a
Aluminum	0.073	0.09	0.1	0.16	0.09	n/a
Ammonia, Total (as N)	0.1	N/L	N/L	0.18	0.12	n/a
Barium	0.12	0.34	1	0.034	0.034	n/a
Boron	0.011	1.3	5	0.020	0.052	n/a
Cadmium	0.000015	0.0013	0.005	0.000033	< 0.000035	n/a
Calcium	96	N/L	N/L	64	30.7	n/a
Chemical Oxygen Demand	24	N/L	N/L	133	136	n/a
Chloride	40	145	250	15.5	8.7	n/a
Conductivity (µS/cm) ³	715	N/L	N/L	449	496	n/a
Conductivity (µS/cm) ⁴	526	N/L	N/L	314	356	n/a
Copper	0.002	0.5	1	0.0033	0.0053	n/a
Dissolved Organic Carbon	1.7	3.4	5	25.1	22.3	n/a
Hardness (as CaCO ₃)	311	405	500	216	101	n/a
Iron	0.037	0.2	0.3	0.094	0.220	n/a
Magnesium	18	N/L	N/L	13.8	5.83	n/a
Manganese	0.003	0.03	0.05	0.033	0.078	n/a
Nitrate (as N)	0.7	3	10	0.2	0.23	n/a
Nitrite (as N)	0.05	0.29	1	< 0.1	< 0.05	n/a
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.41	7.75	n/a
Phosphorus (total)	1.07	N/L	N/L	0.04	1.07	n/a
Potassium	2.0	N/L	N/L	1.1	1.6	n/a
Silicon	5.11	N/L	N/L	5.20	5.61	n/a
Sodium	33	116	200	8.8	87.6	n/a
Strontium	0.19	N/L	N/L	0.159	0.093	n/a
Sulphate	13	256	500	39	37	n/a
Total Dissolved Solids	402	451	500	240	257	n/a
Total Kjeldahl Nitrogen	0.60	N/L	N/L	1.2	2.2	n/a
Zinc	0.005	2.5	5	0.029	0.007	n/a

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 the parameter was not analyzed.

Table 4
Groundwater Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (median)	RUC ¹	ODWS ²	GLL7 (Residential)												5-year Trends (sparkline)
				21-May-14	23-Oct-14	27-May-15	20-Oct-15	25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	31-Oct-18	16-May-19	29-Oct-19	
Alkalinity (as CaCO ₃)	276	388	30 - 500	85	197	216	212	217	206	205	205	204	187	190	195	
Aluminum	0.073	0.09	0.1	0.402	0.0197	0.0172	0.018	0.03	0.03	0.05	0.04	0.05	0.05	0.05	0.05	
Ammonia, Total (as N)	0.1	N/L	N/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01	< 0.01	0.03	0.02	0.05	0.03	0.02	
Barium	0.12	0.34	1	0.0069	0.200	0.202	0.155	0.184	0.211	0.216	0.211	0.204	0.189	0.180	0.188	
Boron	0.011	1.3	5	0.009	0.0078	0.0147	0.0116	< 0.005	< 0.005	< 0.005	0.010	0.009	< 0.005	0.007	0.008	
Cadmium	0.000015	0.0013	0.005	< 0.000003	< 0.000003	< 0.000003	< 0.000003	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	< 0.000015	< 0.000015	< 0.000015	
Calcium	96	N/L	N/L	37.8	67.4	70.7	66.5	60.5	72.8	75.5	71.8	71.7	68.6	67.3	68.5	
Chemical Oxygen Demand	24	N/L	N/L	< 8	< 8	< 8	< 8	< 5	< 5	7	12	< 5	6	< 5	< 5	
Chloride	40	145	250	1.0	1.3	1	1	0.9	0.7	0.6	1.2	1.3	1.3	1.0	< 0.5	
Conductivity (µS/cm) ³	715	N/L	N/L	-	-	-	-	402	-	409	410	379	386	391	392	
Conductivity (µS/cm) ⁴	526	N/L	N/L	278	350	305	385	351	348	305	348	309	309	285	269	
Copper	0.002	0.5	1	0.00255	0.00437	0.00202	0.00298	0.006	0.003	0.032	0.005	0.002	0.028	0.012	0.022	
Dissolved Organic Carbon	1.7	3.4	5	1.4	< 1	1.5	< 1	1.1	1.2	0.9	1.1	1.0	1.5	2.5	1.8	
Hardness (as CaCO ₃)	311	405	500	94.7	216	225	215	199	236	242	231	229	218	218	221	
Iron	0.037	0.2	0.3	0.015	0.119	0.018	0.010	0.006	0.056	0.048	0.022	0.021	0.067	0.011	< 0.005	
Magnesium	18	N/L	N/L	0.091	11.6	11.9	12.0	11.5	13.1	12.9	12.6	12.1	11.3	12.2	12.2	
Manganese	0.003	0.03	0.05	0.0004	0.168	0.485	0.430	0.374	0.244	0.522	0.400	0.340	0.067	0.110	0.005	
Nitrate (as N)	0.7	3	10	< 0.06	< 0.06	1.58	< 0.06	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	
Nitrite (as N)	0.05	0.29	1	< 0.03	< 0.03	< 0.03	< 0.03	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	
pH (units) ⁴	7.19	6.5 - 8.5	6.5 - 8.5	7.41	7.79	7.63	7.59	7.82	6.13	7.96	7.96	7.76	8.30	8.13	8.16	
Phosphorus (total)	1.07	N/L	N/L	< 0.03	< 0.03	< 0.03	< 0.03	0.02	0.01	< 0.01	< 0.01	0.01	< 0.01	0.02	< 0.01	
Potassium	2.0	N/L	N/L	6.80	2.11	2.22	1.99	1.8	2.1	2.1	2.2	2.1	1.8	1.9	1.9	
Silicon	5.11	N/L	N/L	15.5	4.58	4.64	4.49	3.86	4.59	4.68	4.54	4.01	3.89	3.87	3.87	
Sodium	33	116	200	3.0	1.7	1.9	1.8	2.1	2.1	1.9	2.0	2.1	1.8	1.8	1.9	
Strontium	0.19	N/L	N/L	0.309	0.194	0.185	0.188	0.166	0.208	0.199	0.195	0.189	0.176	0.192	0.202	
Sulphate	13	256	500	18	12	12	11	12	12	10	9	10	10	10	7	
Total Dissolved Solids	402	451	500	131	223	240	240	219	229	225	226	195	199	201	202	
Total Kjeldahl Nitrogen	0.60	N/L	N/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1	0.2	0.1	< 0.1	< 0.1	1.0	< 0.1	< 0.1	
Zinc	0.005	2.5	5	0.004	0.012	0.009	0.008	0.013	0.008	0.008	0.007	0.010	< 0.005	0.006	< 0.005	

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 the parameter was not analyzed.

Table 5
Groundwater Quality Compared to PWQO
Mount St. Patrick Waste Disposal Site

Parameter	PWQO ¹	MW08-1 (Background)														5-year Trends
		25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	(sparkline)
Alkalinity (as CaCO ₃)	< 25% decrease	276	325	241	328	239	292	249	310	236	275	248	299	241	307	
Aluminum	0.075	0.02	0.03	0.11	0.05	0.05	0.07	0.09	0.23	0.05	0.03	0.07	0.19	0.05	0.16	
Ammonia, Total (as N)	N/L	< 0.01	0.10	0.06	0.03	0.05	0.07	0.23	0.03	0.06	0.03	0.02	0.13	0.04	0.03	
Barium	N/L	0.088	0.145	0.299	0.103	0.089	0.160	0.231	0.147	0.101	0.141	0.088	0.163	0.103	0.127	
Boron	0.2	< 0.005	< 0.005	< 0.005	0.016	0.008	0.006	0.008	0.011	0.006	0.015	0.009	0.013	0.005	0.013	
Cadmium	0.0002	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	< 0.000015	< 0.000070	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	0.000020	
Calcium	N/L	73.6	110	170	90.3	79.7	116	170	109	80.2	104	75	117	79.1	100	
Chemical Oxygen Demand	N/L	93	65	57	35	25	8	21	38	37	115	5	22	20	26	
Chloride	N/L	29.2	39.0	277	18.6	23.8	62.9	301	55.2	41.9	63.8	16.1	78.4	16.6	67.3	
Conductivity (µS/cm) ²	N/L	581	-	1670	715	499	796	1500	783	608	771	540	835	539	769	
Conductivity (µS/cm) ³	N/L	416	510	1127	545	320	548	916	500	352	722	362	719	290	556	
Copper	0.005	< 0.002	0.002	< 0.002	< 0.002	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.001	< 0.002	0.0028	0.0022	
Dissolved Organic Carbon	N/L	1.2	1.4	0.7	1.7	1.2	2.0	2.7	2.0	2.0	1.0	2.5	1.4	1.9	0.3	
Hardness (as CaCO ₃)	N/L	246	359	586	280	262	375	568	368	266	341	253	388	259	325	
Iron	0.3	< 0.005	< 0.005	< 0.005	< 0.005	0.022	0.011	0.052	0.695	0.019	< 0.005	0.099	0.447	0.021	0.455	
Magnesium	N/L	15.1	20.8	39.1	13.3	15.2	20.8	34.8	23.3	15.9	19.9	16	22.9	14.9	18.3	
Manganese	N/L	< 0.001	< 0.001	< 0.001	0.001	< 0.001	0.001	0.003	0.049	0.001	< 0.001	0.007	0.038	0.002	0.021	
Nitrate (as N)	N/L	1.1	0.6	1.14	0.39	0.40	0.63	1.5	0.4	0.8	0.5	0.9	0.5	1.09	0.33	
Nitrite (as N)	N/L	< 0.1	< 0.1	0.19	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ³	6.5 - 8.5	7.48	7.29	6.54	5.90	6.16	7.38	7.36	7.59	7.01	6.77	7.96	7.10	6.64	7.32	
Phosphorus (total)	0.03	2.68	3.75	5.62	1.06	1.66	0.84	1.08	0.77	1.59	4.64	0.01	1.35	0.20	1.37	
Potassium	N/L	1.2	1.8	2.5	1.9	1.3	2.0	2.4	2.0	1.6	2.2	1.5	2.3	1.5	2.0	
Silicon	N/L	4.01	5.71	4.96	4.79	4.05	5.22	4.15	5.09	4.43	5.18	4.62	5.41	4.69	5.25	
Sodium	N/L	19.2	34.5	78.9	62.4	15.4	35.3	83.5	44.2	31.4	43.3	20.3	47.2	20.4	43.6	
Strontium	N/L	0.140	0.213	0.401	0.165	0.140	0.213	0.339	0.217	0.151	0.205	0.153	0.229	0.153	0.187	
Sulphate	N/L	13	11	22	15	8	16	28	16	11	12	9	12	9	13	
Total Dissolved Solids	N/L	321	414	921	393	258	418	818	411	316	404	290	440	279	403	
Total Kjeldahl Nitrogen	N/L	1.2	1.7	2.2	0.6	0.9	0.6	0.6	0.4	0.7	2.1	0.1	0.6	0.2	0.5	
Zinc	0.02	0.008	< 0.005	< 0.005	0.010	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	

Note:
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 the parameter was not analyzed.






























Table 5
Groundwater Quality Compared to PWQO
Mount St. Patrick Waste Disposal Site

Parameter	PWQO ¹	MW21-7 (Background)		5-year Trends
		06-May-21	17-May-22	(sparkline)
Alkalinity (as CaCO ₃)	< 25% decrease	160	200	n/a
Aluminum	0.075	0.16	0.09	n/a
Ammonia, Total (as N)	N/L	0.18	0.12	n/a
Barium	N/L	0.034	0.034	n/a
Boron	0.2	0.020	0.052	n/a
Cadmium	0.0002	0.000033	< 0.000035	n/a
Calcium	N/L	64	30.7	n/a
Chemical Oxygen Demand	N/L	133	136	n/a
Chloride	N/L	15.5	8.7	n/a
Conductivity (µS/cm) ²	N/L	449	496	n/a
Conductivity (µS/cm) ³	N/L	314	356	n/a
Copper	0.005	0.003	0.0053	n/a
Dissolved Organic Carbon	N/L	25.1	22.3	n/a
Hardness (as CaCO ₃)	N/L	216	101	n/a
Iron	0.3	0.094	0.220	n/a
Magnesium	N/L	13.8	5.83	n/a
Manganese	N/L	0.033	0.078	n/a
Nitrate (as N)	N/L	0.2	0.23	n/a
Nitrite (as N)	N/L	< 0.1	< 0.05	n/a
pH (units) ³	6.5 - 8.5	7.39	7.75	n/a
Phosphorus (total)	0.03	0.04	1.07	n/a
Potassium	N/L	1.1	1.6	n/a
Silicon	N/L	5.20	5.61	n/a
Sodium	N/L	8.8	87.6	n/a
Strontium	N/L	0.159	0.093	n/a
Sulphate	N/L	39	37	n/a
Total Dissolved Solids	N/L	240	257	n/a
Total Kjeldahl Nitrogen	N/L	1.2	2.2	n/a
Zinc	0.02	0.029	0.007	n/a

Note:






































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 the parameter was not analyzed.

Table 5
Groundwater Quality Compared to PWQO
Mount St. Patrick Waste Disposal Site

Parameter	PWQO ¹	MW09-6R													5-year Trends
		25-May-16	27-Oct-16	26-Oct-17	07-May-18	30-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	(sparkline)
Alkalinity (as CaCO ₃)	< 25% decrease	247	243	249	232	228	217	272	217	215	204	229	222	257	
Aluminum	0.075	0.04	0.05	0.07	0.07	0.07	0.07	0.07	0.07	0.05	0.07	0.13	0.05	0.06	
Ammonia, Total (as N)	N/L	0.06	0.12	0.10	0.07	0.12	0.15	0.10	0.05	0.08	0.08	0.08	0.07	0.10	
Barium	N/L	0.160	0.185	0.200	0.095	0.154	0.123	0.200	0.159	0.164	0.107	0.164	0.145	0.172	
Boron	0.2	< 0.005	< 0.005	0.015	0.010	< 0.005	0.008	0.013	0.005	0.017	0.008	0.010	0.007	0.010	
Cadmium	0.0002	< 0.00002	0.00003	< 0.000014	0.000026	0.000019	0.000026	0.000025	0.000022	0.000016	< 0.000015	0.000037	< 0.000015	< 0.000010	
Calcium	N/L	107	106	123	93.0	100	101	107	112	108	83	113	94.0	107	
Chemical Oxygen Demand	N/L	76	143	68	152	57	106	142	60	95	55	51	64	40	
Chloride	N/L	104	111	81.2	31.4	84.4	58.2	80.4	90.5	91.5	57.6	85.0	65.1	98.4	
Conductivity (µS/cm) ²	N/L	793	-	818	528	746	647	817	762	777	621	758	670	805	
Conductivity (µS/cm) ³	N/L	663	291	693	366	449	420	527	436	728	422	471	376	599	
Copper	0.005	< 0.002	< 0.002	0.002	0.003	< 0.002	0.002	0.002	0.003	< 0.002	0.004	< 0.002	0.0097	0.0021	
Dissolved Organic Carbon	N/L	9.9	12.6	14.3	19.9	12.2	28.0	16.6	14.2	9.9	16.5	13.7	17.2	7.3	
Hardness (as CaCO ₃)	N/L	343	336	384	284	309	317	338	352	342	266	365	293	340	
Iron	0.3	0.649	0.544	0.788	2.47	0.443	0.337	0.391	0.151	0.464	0.326	1.20	0.658	1.04	
Magnesium	N/L	18.2	17.2	18.7	12.6	14.3	15.6	17.1	17.4	17.4	14.1	19.9	14.1	17.5	
Manganese	N/L	0.074	0.074	0.076	0.289	0.046	0.045	0.041	0.048	0.050	0.024	0.123	0.035	0.052	
Nitrate (as N)	N/L	< 0.1	0.2	0.08	0.05	0.67	0.2	< 0.1	0.11	0.1	< 0.1	0.1	0.08	0.06	
Nitrite (as N)	N/L	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	< 0.05	< 0.1	< 0.1	< 0.1	< 0.05	< 0.05	
pH (units) ³	6.5 - 8.5	7.6	7.63	7.68	7.59	7.90	7.31	7.85	7.13	7.22	7.76	7.74	7.05	7.44	
Phosphorus (total)	0.03	0.33	0.30	0.20	0.65	0.19	0.48	0.72	< 0.01	0.49	0.03	0.10	0.08	0.06	
Potassium	N/L	1.2	1.7	1.6	1.0	1.2	0.9	1.6	1.2	1.6	0.9	1.6	1.1	1.6	
Silicon	N/L	4.80	6.38	7.14	3.73	5.38	4.61	5.35	4.59	6.39	4.52	5.76	4.94	6.50	
Sodium	N/L	21.2	60.7	36.1	20.9	34.4	21.0	48.1	25.2	43.0	25.9	37.5	33.5	37.6	
Strontium	N/L	0.260	0.268	0.306	0.219	0.240	0.258	0.293	0.279	0.293	0.229	0.295	0.245	0.293	
Sulphate	N/L	16	22	16	13	15	26	34	32	35	23	24	18	23	
Total Dissolved Solids	N/L	417	467	450	273	390	336	430	399	407	328	396	348	423	
Total Kjeldahl Nitrogen	N/L	1.0	1.4	1.0	2.2	1.0	1.6	2.1	0.8	1.6	0.7	0.8	0.9	0.8	
Zinc	0.02	0.008	< 0.005	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.008	< 0.005	< 0.005	

Note:
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 the parameter was not analyzed.

**Table 6
Surface Water Quality
Mount St. Patrick Waste Disposal Site**

Parameter	Background (75th Percentile)	PWQO ¹	SW-1														5-year Trends (sparkline)
			25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	31-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	147	25 % Decrease	231	128	131	204	176	125	117	148	119	110	133	139	151	133	
Ammonia, Total (as N)	0.1	N/L	< 0.01	0.04	< 0.01	0.02	0.02	0.02	0.04	0.03	0.02	0.02	0.03	0.02	0.02	0.02	
Ammonia, Un-ionized (as N) ²	0.00097	0.02	0.00014	0.00003	0.00012	0.00019	0.00040	0.00020	0.00093	0.00067	0.00004	0.00003	0.00049	0.00015	0.00024	0.00004	
Arsenic	0.00020	0.005	0.0001	< 0.0001	0.0003	0.0002	0.0003	0.0001	0.0001	0.0001	< 0.0001	0.0001	< 0.0001	0.0001	0.0001	0.0001	
Barium	0.080	N/L	0.0910	0.0760	0.042	0.066	0.069	0.078	0.061	0.079	0.068	0.060	0.062	0.066	0.071	0.065	
Biological Oxygen Demand	4	N/L	< 3	< 2	< 2	< 2	< 2	< 3	< 3	< 3	< 3	3	< 3	< 3	< 3	< 3	
Boron	0.009	0.2	0.0050	< 0.005	< 0.005	0.011	0.009	0.006	0.005	0.008	0.009	0.007	0.007	0.009	0.006	0.008	
Cadmium	0.000015	0.0002	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	
Calcium	47	N/L	70.3	45.6	43.7	59.8	57.2	44.8	41.2	43.2	48.3	37.5	42.0	39.6	46.7	40.1	
Chemical Oxygen Demand	22	N/L	10	7	20	19	21	22	15	19	25	18	21	14	23	9	
Chloride	8	N/L	2	7	1.3	2.1	1.6	8.5	7.2	9.3	7.6	9.3	8.0	9.1	8.4	8.4	
Chromium	0.001	0.001	< 0.002	< 0.002	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	
Conductivity (µS/cm) ⁴	304	N/L	431	-	269	391	349	283	269	277	280	265	289	281	314	276	
Conductivity (µS/cm) ³	272	N/L	353	184	165	277	254	181	256	220	230	402	203	172	237	206	
Copper	0.0005	0.005	0.00020	0.00060	0.0005	0.0001	0.0003	0.0033	0.0004	0.0004	0.0004	0.0003	0.0005	0.0005	0.0006	0.0003	
Dissolved Oxygen ³	11.86	5	11.5	7.83	12.66	9.53	7.41	13.75	8.50	8.62	7.06	9.30	12.75	12.29	5.65	10.11	
Dissolved Organic Carbon	8	N/L	5.8	6.9	4.8	10.1	5.6	6.7	7.0	7.2	5.7	6.6	7.1	8.0	8.5	7.6	
Hardness (as CaCO ₃)	155	N/L	225	153	139	194	182	151	130	144	154	123	135	132	152	133	
Iron	0.089	0.3	0.090	0.089	0.034	0.119	0.026	0.205	0.050	0.115	0.045	0.064	0.066	0.338	0.097	0.046	
Lead	0.000058	0.005	< 0.00002	0.00081	0.00004	< 0.00002	< 0.00002	0.00025	< 0.00002	0.00006	0.00005	0.00003	0.00004	0.00016	0.00007	< 0.00002	
Magnesium	9.0	N/L	12.10	9.56	7.3	10.90	9.56	9.6	6.61	8.86	8.02	7.06	7.33	8.06	8.62	8.04	
Manganese	0.057	N/L	0.0140	0.0410	0.003	0.018	0.008	0.077	0.023	0.017	0.027	0.026	0.031	0.117	0.078	0.017	
Mercury	0.00002	0.0002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	
Nitrate (as N)	0.10	N/L	< 0.1	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.1	< 0.05	0.1	0.09	0.10	
Nitrite (as N)	0.05	N/L	< 0.1	0.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	8.2425	6.5 - 8.5	7.94	-	8.00	8.27	7.96	7.91	8.13	8.00	7.85	-	8.15	8.14	8.14	7.43	
pH (units) ³	8.03	6.5 - 8.5	7.62	6.75	7.95	7.77	7.68	8.65	7.90	8.19	7.11	7.06	7.90	7.90	7.72	7.12	
Phenols	0.0020	0.001	< 0.001	< 0.001	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	
Phosphorus (total)	0.0225	0.03	< 0.01	0.020	0.010	0.01	0.02	0.02	0.02	0.03	< 0.01	0.05	0.03	0.04	0.02	0.04	
Potassium	1.3	N/L	0.90	1.20	0.6	1.4	1.1	1.3	1.0	1.2	1.0	0.9	1.0	1.1	1.2	1.1	
Sodium	5.5	N/L	2.30	5.80	1.2	2.2	2.1	6.3	4.6	5.2	5.5	5.0	5.5	5.2	5.7	5.2	
Strontium	0.146	N/L	0.168	0.162	0.105	0.142	0.135	0.158	0.110	0.141	0.125	0.108	0.119	0.119	0.137	0.123	
Sulphate	7	N/L	5.0	7	5	2	5	7	5	12	7	7	6	6	6	5	
Total Dissolved Solids	185	N/L	231	157	148	215	179	145	138	155	143	136	150	144	161	141	
Total Kjeldahl Nitrogen	0.5	N/L	0.26	0.4	0.6	0.3	0.3	0.5	0.3	0.5	0.2	0.4	0.4	0.5	0.4	0.4	
Total Suspended Solids	4	N/L	< 3	8	< 3	3	< 3	14	< 3	4	3	< 3	4	19	< 3	4	
Zinc	0.0085	0.02	< 0.005	< 0.005	< 0.005	0.099	< 0.005	0.011	0.005	0.007	0.006	0.014	0.008	0.010	< 0.005	< 0.005	






































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

**Table 6
Surface Water Quality
Mount St. Patrick Waste Disposal Site**

Parameter	Background (75th Percentile)	PWQO ¹	SW-2 (Background)														5-year Trends (sparkline)
			25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	31-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	147	25 % Decrease	141	128	113	137	181	125	112	116	114	109	134	137	148	146	
Ammonia, Total (as N)	0.1	N/L	< 0.01	0.04	< 0.01	0.03	0.02	0.02	0.05	0.02	0.02	0.01	0.02	0.02	0.03	0.02	
Ammonia, Un-ionized (as N) ²	0.00097	0.02	0.00025	0.00019	0.00014	0.00065	0.00032	0.00027	0.00129	0.00145	0.00019	0.00008	0.00042	0.00033	0.00086	0.00019	
Arsenic	0.00020	0.005	< 0.0001	< 0.0001	0.0003	0.0001	< 0.0001	< 0.0001	0.0001	0.0001	< 0.0001	< 0.0001	0.0001	0.0001	0.0001	0.0001	
Barium	0.080	N/L	0.074	0.073	0.051	0.070	0.114	0.081	0.062	0.072	0.063	0.063	0.059	0.069	0.077	0.079	
Biological Oxygen Demand	4	N/L	< 3	< 2	< 2	< 2	< 2	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	
Boron	0.009	0.2	< 0.005	< 0.005	< 0.005	0.013	0.009	0.006	< 0.005	0.006	0.008	0.007	0.007	0.010	0.006	0.009	
Cadmium	0.000015	0.0002	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	< 0.000015	0.000022	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	
Calcium	47	N/L	45.8	43.4	37.6	40.0	64.9	46.5	40.8	39.4	45.2	38.1	40.6	43.2	47.9	46.7	
Chemical Oxygen Demand	22	N/L	12	10	11	14	27	15	21	13	25	15	22	11	22	8	
Chloride	8	N/L	6.1	6.7	5.5	6.2	5.7	8.2	7.3	8.4	7.5	9.3	8.0	8.8	8.3	7.9	
Chromium	0.001	0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	
Conductivity (µS/cm) ⁴	304	N/L	304	-	252	296	335	282	265	302	275	266	285	286	306	300	
Conductivity (µS/cm) ³	272	N/L	350	190	160	223	232	172	178	94	165	237	202	163	213	198	
Copper	0.0005	0.005	< 0.0001	< 0.0001	0.0003	0.0001	0.0004	0.0005	0.0009	0.0002	0.0003	0.0003	0.0005	0.0005	0.0005	0.0005	
Dissolved Oxygen ³	11.86	5	9.83	7.90	14.00	9.59	9.75	14.54	11.13	8.73	12.28	11.38	11.86	14.55	10.05	10.60	
Dissolved Organic Carbon	8	N/L	6.0	6.8	6.1	8.1	3.2	6.6	7.0	6.4	5.9	6.6	7.4	6.3	8.1	6.9	
Hardness (as CaCO ₃)	155	N/L	149	146	121	133	211	158	129	133	143	125	131	144	156	155	
Iron	0.089	0.3	0.059	0.059	0.051	0.052	0.053	0.108	0.095	< 0.005	0.073	0.112	0.063	0.051	0.135	0.050	
Lead	0.000058	0.005	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.00018	0.00012	< 0.00002	0.00004	0.00005	0.00005	0.00003	0.00008	0.00002	
Magnesium	9.0	N/L	8.33	9.17	6.51	7.92	11.9	10.2	6.61	8.31	7.35	7.20	7.17	8.65	8.93	9.34	
Manganese	0.057	N/L	0.063	0.042	0.009	0.032	0.020	0.032	0.035	0.034	0.031	0.057	0.028	0.017	0.089	0.025	
Mercury	0.00002	0.0002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	
Nitrate (as N)	0.10	N/L	< 0.1	0.1	< 0.05	0.16	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.1	< 0.05	0.10	< 0.05	0.17	
Nitrite (as N)	0.05	N/L	< 0.1	0.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	8.2425	6.5 - 8.5	8.00	-	8.08	8.31	7.96	8.03	8.13	8.06	7.87	-	8.08	8.09	8.06	7.65	
pH (units) ³	8.03	6.5 - 8.5	7.90	7.49	7.98	8.04	8.07	8.17	8.04	8.59	7.74	7.70	8.02	8.23	7.98	7.78	
Phenols	0.0020	0.001	< 0.001	< 0.001	0.005	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	
Phosphorus (total)	0.0225	0.03	< 0.01	0.02	0.01	0.02	0.02	< 0.01	0.02	0.01	< 0.01	0.04	0.04	0.03	0.03	0.03	
Potassium	1.3	N/L	1.0	1.1	0.6	1.0	1.4	1.3	1.0	1.2	1.1	0.9	0.9	1.2	1.3	1.2	
Sodium	5.5	N/L	5.1	5.3	3.9	4.9	6.1	6.5	4.8	5.1	5.9	5.0	5.4	5.6	5.7	5.4	
Strontium	0.146	N/L	0.137	0.154	0.105	0.128	0.186	0.173	0.111	0.134	0.117	0.111	0.117	0.131	0.145	0.141	
Sulphate	7	N/L	7	7	5	5	5	7	6	6	7	7	6	6	6	7	
Total Dissolved Solids	185	N/L	158	156	139	163	172	144	136	142	141	383	149	147	157	154	
Total Kjeldahl Nitrogen	0.5	N/L	0.29	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.4	0.3	0.3	0.4	0.3	
Total Suspended Solids	4	N/L	< 3	4	< 3	6	< 3	4	6	< 3	6	< 3	4	10	< 3	< 3	
Zinc	0.0085	0.02	< 0.005	< 0.005	< 0.005	< 0.005	0.026	0.011	0.006	0.006	0.012	0.008	0.010	0.010	< 0.005	< 0.005	

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

Table 6
Surface Water Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (75th Percentile)	PWQO ¹	SW-3						5-year Trends (sparkline)
			25-May-16	09-May-17	07-May-18	16-May-19	28-Apr-20	06-May-21	
Alkalinity (as CaCO ₃)	147	25 % Decrease	312	220	257	241	240	284	
Ammonia, Total (as N)	0.1	N/L	< 0.01	< 0.01	0.02	0.09	< 0.01	0.01	
Ammonia, Un-ionized (as N) ²	0.00097	0.02	0.0001	0.00004	0.00059	0.00156	0.00010	0.00016	
Arsenic	0.00020	0.005	0.0001	0.0006	< 0.0001	< 0.0001	< 0.0001	< 0.0001	
Barium	0.080	N/L	0.247	0.129	0.199	0.162	0.177	0.201	
Biological Oxygen Demand	4	N/L	< 3	< 2	< 2	< 3	< 3	< 3	
Boron	0.009	0.2	0.008	< 0.005	0.009	0.005	0.008	0.009	
Cadmium	0.000015	0.0002	0.00002	< 0.000014	< 0.000015	< 0.000015	< 0.000015	< 0.000015	
Calcium	47	N/L	87.3	61.6	76.8	64.7	74.5	77.4	
Chemical Oxygen Demand	22	N/L	21	7	16	14	18	31	
Chloride	8	N/L	93.5	36.1	59.3	37.8	55.3	59.7	
Chromium	0.001	0.001	< 0.002	0.001	< 0.001	< 0.001	< 0.001	< 0.001	
Conductivity (µS/cm) ⁴	304	N/L	864	577	632	597	664	699	
Conductivity (µS/cm) ³	272	N/L	737	380	489	376	386	502	
Copper	0.0005	0.005	0.0011	0.0008	0.0007	0.0009	0.0007	0.0008	
Dissolved Oxygen ³	11.86	5	4.48	15.4	12.85	13.89	12.38	12.00	
Dissolved Organic Carbon	8	N/L	5.8	3.0	3.2	5.0	4.1	5.0	
Hardness (as CaCO ₃)	155	N/L	291	211	257	216	247	260	
Iron	0.089	0.3	0.040	0.009	0.009	0.016	0.024	0.020	
Lead	0.000058	0.005	0.00005	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.00003	
Magnesium	9.0	N/L	17.6	13.8	15.9	13.1	14.9	16.3	
Manganese	0.057	N/L	0.018	0.002	0.002	0.001	0.002	0.002	
Mercury	0.00002	0.0002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	
Nitrate (as N)	0.10	N/L	< 0.1	0.28	< 0.05	0.05	0.12	< 0.05	
Nitrite (as N)	0.05	N/L	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	0.06	
pH (units) ⁴	8.2425	6.5 - 8.5	7.94	8.20	8.17	8.28	8.05	8.19	
pH (units) ³	8.03	6.5 - 8.5	7.67	7.45	7.92	8.03	7.79	7.95	
Phenols	0.0020	0.001	< 0.001	0.004	< 0.001	< 0.002	< 0.002	< 0.001	
Phosphorus (total)	0.0225	0.03	< 0.01	0.01	0.01	0.01	< 0.01	0.06	
Potassium	1.3	N/L	1.4	0.5	1.4	1.2	1.1	1.2	
Sodium	5.5	N/L	73.9	37.9	46.2	41.5	43.8	45.4	
Strontium	0.146	N/L	0.162	0.110	0.131	0.111	0.118	0.138	
Sulphate	7	N/L	10	10	10	10	10	10	
Total Dissolved Solids	185	N/L	471	317	328	310	345	380	
Total Kjeldahl Nitrogen	0.5	N/L	0.33	0.3	0.2	0.2	0.2	0.4	
Total Suspended Solids	4	N/L	8	< 3	< 3	4	< 3	22	
Zinc	0.0085	0.02	< 0.005	< 0.005	0.006	0.006	0.007	0.008	

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

Table 6
Surface Water Quality
Mount St. Patrick Waste Disposal Site

Parameter	Background (75th Percentile)	PWQO ¹	SW-4														5-year Trends (sparkline)
			25-May-16	27-Oct-16	09-May-17	26-Oct-17	07-May-18	31-Oct-18	16-May-19	29-Oct-19	28-Apr-20	28-Oct-20	06-May-21	23-Nov-21	17-May-22	02-Nov-22	
Alkalinity (as CaCO ₃)	147	25 % Decrease	155	128	133	133	162	133	117	120	115	218	133	138	217	134	
Ammonia, Total (as N)	0.1	N/L	< 0.01	0.04	< 0.01	0.02	0.02	0.02	0.05	0.02	0.01	0.04	0.03	0.05	0.04	0.02	
Ammonia, Un-ionized (as N) ²	0.00097	0.02	0.00003	0.00026	0.00007	0.00042	0.00032	0.00027	0.00111	0.00092	0.00004	0.00010	0.00081	0.00039	0.00063	0.00019	
Arsenic	0.00020	0.005	0.0001	< 0.0001	0.0003	< 0.0001	< 0.0001	0.0002	< 0.0001	0.0001	0.0001	0.0005	0.0001	< 0.0001	0.0003	< 0.0001	
Barium	0.080	N/L	0.081	0.073	0.043	0.067	0.057	0.092	0.058	0.075	0.044	0.158	0.063	0.067	0.113	0.067	
Biological Oxygen Demand	4	N/L	< 3	< 2	< 2	< 2	< 2	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	
Boron	0.009	0.2	< 0.005	< 0.005	< 0.005	0.013	0.006	< 0.005	0.007	0.008	0.006	0.008	0.008	0.018	0.010	0.007	
Cadmium	0.000015	0.0002	< 0.00002	< 0.00002	< 0.000014	< 0.000014	< 0.000015	0.000024	< 0.000015	< 0.000015	< 0.000015	0.000085	< 0.000015	< 0.000015	0.000025	< 0.000015	
Calcium	47	N/L	49.9	44.0	45.7	39.6	57.2	56.0	39.8	41.8	35.6	87.0	42.8	42.7	69.0	41.2	
Chemical Oxygen Demand	22	N/L	18	8	20	18	21	27	20	21	27	74	22	12	67	10	
Chloride	8	N/L	15.7	7.7	1.8	6.2	2.0	14.5	8.7	13.6	7.6	71.4	8.1	9.7	39.3	9.3	
Chromium	0.001	0.001	< 0.002	< 0.002	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	
Conductivity (µS/cm) ⁴	304	N/L	358	-	275	293	307	324	277	304	277	735	290	283	527	283	
Conductivity (µS/cm) ³	272	N/L	278	185	153	221	211	187	191	199	246	583	208	162	265	250	
Copper	0.0005	0.005	0.0002	< 0.0001	0.0005	0.0001	0.0006	0.0067	0.0004	0.0005	0.0006	0.0051	0.0003	0.0008	0.0018	0.0003	
Dissolved Oxygen ³	11.86	5	9.82	10.47	11.69	9.97	9.24	14.40	9.52	9.75	7.98	10.78	11.00	14.10	8.46	10.38	
Dissolved Organic Carbon	8	N/L	8.0	7.0	5.2	8.1	5.4	11.8	7.2	8.2	7.2	15.8	7.1	6.5	28.6	7.4	
Hardness (as CaCO ₃)	155	N/L	161	148	142	131	173	185	127	140	116	279	137	141	224	136	
Iron	0.089	0.3	0.075	0.075	0.015	0.048	0.021	0.163	0.049	0.008	0.005	1.79	0.067	0.054	0.351	0.044	
Lead	0.000058	0.005	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	0.00023	< 0.00002	< 0.00002	0.00005	0.00102	0.00004	0.00006	0.00029	< 0.00002	
Magnesium	9.0	N/L	8.86	9.27	6.64	7.72	7.42	10.9	6.57	8.63	6.65	15.0	7.34	8.4	12.5	8.15	
Manganese	0.057	N/L	0.056	0.039	0.002	0.034	0.004	0.037	0.021	0.028	< 0.001	0.186	0.031	0.015	0.052	0.022	
Mercury	0.00002	0.0002	< 0.00002	0.00003	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	
Nitrate (as N)	0.10	N/L	< 0.1	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.1	< 0.05	< 0.1	0.10	0.13	
Nitrite (as N)	0.05	N/L	< 0.1	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.1	< 0.05	< 0.05	
pH (units) ⁴	8.2425	6.5 - 8.5	8.02	-	8.04	8.35	8.00	8.04	8.14	8.06	7.87	-	8.01	8.07	8.04	7.62	
pH (units) ³	8.03	6.5 - 8.5	6.92	7.73	7.74	8.04	8.06	7.96	8.03	8.38	7.36	7.21	8.14	7.90	7.77	7.79	
Phenols	0.0020	0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	
Phosphorus (total)	0.0225	0.03	< 0.01	0.01	0.01	0.02	0.02	< 0.01	0.02	0.01	< 0.01	0.11	0.03	0.01	0.06	0.02	
Potassium	1.3	N/L	0.9	1.1	0.7	1.0	0.8	1.0	0.9	1.1	1.0	0.6	1.0	1.2	1.1	1.1	
Sodium	5.5	N/L	11.2	5.7	1.9	5.1	2.3	17.2	5.2	7.5	5.1	41.1	5.7	6.1	35.0	5.8	
Strontium	0.146	N/L	0.142	0.156	0.123	0.125	0.149	0.166	0.106	0.138	0.099	0.195	0.120	0.127	0.163	0.125	
Sulphate	7	N/L	7	7	6	4	4	11	6	11	7	44	6	6	7	6	
Total Dissolved Solids	185	N/L	187	158	151	161	158	166	142	156	142	135	150	145	273	145	
Total Kjeldahl Nitrogen	0.5	N/L	0.42	0.4	0.3	0.4	0.3	0.6	0.3	0.4	0.3	1.4	0.4	0.3	1.2	0.4	
Total Suspended Solids	4	N/L	< 3	3	< 3	< 3	< 3	8	< 3	< 3	< 3	25	3	< 3	61	< 3	
Zinc	0.0085	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	0.005	< 0.005	0.015	0.008	0.011	< 0.005	< 0.005	

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



Appendix G

Groundwater Elevations 2023

**Table E1. Groundwater Elevations
Mt. St. Patrick WDS**

Monitor	Top of Pipe Elevation (Assumed Datum)	Ground Elevation (Assumed Datum)	Well of Bottom Depth (M)	Date	Water Depth From Top of Pipe (m)	Water elevation (Assumed Datum)
MW 08-1	98.58	97.69	6.51	Jul-23	4.27	94.31
	98.58	97.69	6.51	Nov-23	5.37	93.21
MW 06-2	94.86	93.93	3.19	Jul-23	1.37	93.49
	94.86	93.93	3.19	Nov-23	2.07	92.79
MW 06-3	94.26	93.29	3.85	Jul-23	1.34	92.92
	94.26	93.29	3.85	Nov-23	1.82	92.44
MW 06-4	96.57	95.66	4.92	Jul-23	2.60	93.97
	96.57	95.66	4.92	Nov-23	3.64	92.93
MW 09-5R	93.28	92.08		Jul-23	NM	
	93.28	92.08		Nov-23	NM	
MW 09-6R	90.53	89.30	2.02	Jul-23	NM	
	90.53	89.30	2.02	Nov-23	1.73	88.80
MW 21-7	95.52	94.97	1.73	Jul-23	1.15	94.37
	95.52	94.97	1.73	Nov-23	1.72	93.80
MP 3R	94.45	93.51		Jul-23	NM	
	94.45	93.51		Nov-23	NM	
MP 4	96.71	95.93		Jul-23	NM	
	96.71	95.93		Nov-23	Likely Destroyed	
MP 5	93.65	92.86	0.92	Jul-23	NM	
	93.65	92.86	0.92	Nov-23	DRY	DRY
MP 6	93.67	93.02	1.82	Jul-23	0.67	93.00
	93.67	93.02	1.82	Nov-23	1.08	92.59
MP 7	93.47	92.81	1.83	Jul-23	0.99	92.48
	93.47	92.81	1.83	Nov-23	1.21	92.26

- Note:
1. Well depths based on Jp2g measurements in 2023
 2. Elevations based on Greenview 2011 Survey
 3. Elevations are assumed
 4. NM: Not measured



Appendix H

Laboratory Certificates of Analysis 2023

C.O.C.: G 110189

REPORT No: 23-030898 - Rev. 0

Report To:

Jp2g Consultants Inc
 1150 Morrison Dr.
 Ottawa, ON K2H 8S9

CADUCEON Environmental Laboratories

2378 Holly Lane
 Ottawa, ON K1V 7P1

Attention: Nick Weston

DATE RECEIVED: 2023-Nov-02
 DATE REPORTED: 2023-Dec-06
 SAMPLE MATRIX: Surface Water

CUSTOMER PROJECT: Mount St Patrick 22-621313
 P.O. NUMBER:

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	3	OTTAWA	LMACGREGOR	2023-Nov-17	A-IC-01	SM 4110B
BOD5 (Liquid)	3	KINGSTON	JWOLFE2	2023-Nov-23	BOD-001	SM 5210B
COD (Liquid)	3	KINGSTON	EHINCH	2023-Nov-09	COD-001	SM 5220D
Cond/pH/Alk Auto (Liquid)	3	OTTAWA	SBOUDREAU	2023-Nov-08	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
DOC/DIC (Liquid)	3	OTTAWA	VKASYAN	2023-Nov-16	C-OC-01	EPA 415.2
Ion Balance (Calc.)	3	OTTAWA	STAILLON		CP-028	MECP E3196
ICP/MS Total (Liquid)	3	OTTAWA	TPRICE	2023-Nov-03	D-ICPMS-01	EPA 6020
ICP/OES Total (Liquid)	3	OTTAWA	NHOGAN	2023-Nov-08	D-ICP-01	SM 3120B
Mercury (Liquid)	3	OTTAWA	TBENNETT	2023-Nov-03	D-HG-02	SM 3112B
Ammonia & o-Phosphate (Liquid)	3	KINGSTON	KDIBBITS	2023-Nov-24	NH3-001	SM 4500NH3
Phenols (Liquid)	3	KINGSTON	JMACINNES	2023-Dec-05	PHEN-01	MECP E3179
TP & TKN (Liquid)	3	KINGSTON	KDIBBITS	2023-Nov-30	TPTKN-001	MECP E3516.2
TSS (Liquid)	3	KINGSTON	TSUNNY	2023-Nov-07	TSS-001	SM 2540D

R.L. = Reporting Limit

NC = Not Calculated

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




Michelle Dubien
Data Specialist

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-030898 - Rev. 0

Parameter	Units	R.L.	Client I.D.	SW2	SW4	SW1
			Sample I.D.	23-030898-1	23-030898-2	23-030898-3
			Date Collected	2023-11-01	2023-11-01	2023-11-01
				-	-	-
Alkalinity(CaCO3) to pH4.5	mg/L	5		145	142	147
TDS (Calc. from Cond.)	mg/L	3		152	153	154
Conductivity @25°C	uS/cm	1		296	298	301
pH @25°C	pH units	-		7.99	7.99	7.95
Chloride	mg/L	0.5		9.2	9.4	9.3
Nitrate (N)	mg/L	0.05		0.05	0.08	0.07
Nitrite (N)	mg/L	0.05		<0.05	<0.05	<0.05
Sulphate	mg/L	1		6	6	6
BOD5	mg/L	3		<3	<3	<3
Total Suspended Solids	mg/L	3		4	9	48
Phosphorus (Total)	mg/L	0.01		0.03	0.02	0.03
Total Kjeldahl Nitrogen	mg/L	0.1		0.5	0.5	0.4
Ammonia (N)-Total (NH3+NH4)	mg/L	0.05		<0.05	<0.05	<0.05
Dissolved Organic Carbon	mg/L	0.2		8.0	8.5	8.6
Phenolics	mg/L	0.001		<0.001	<0.001	<0.001
COD	mg/L	5		14	19	17
Hardness (as CaCO3)	mg/L	-		146	153	154
Barium (Total)	mg/L	0.001		0.079	0.081	0.082
Boron (Total)	mg/L	0.005		0.006	0.006	0.006
Calcium (Total)	mg/L	0.02		43.9	46.0	46.5
Iron (Total)	mg/L	0.005		0.060	0.073	0.126



Michelle Dubien
Data Specialist

The analytical results reported herein refer to the samples as received and relate only to the items tested. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-030898 - Rev. 0

Parameter	Client I.D.		SW2	SW4	SW1
	Sample I.D.		23-030898-1	23-030898-2	23-030898-3
	Date Collected		2023-11-01	2023-11-01	2023-11-01
	Units	R.L.	-	-	-
Magnesium (Total)	mg/L	0.02	8.80	9.15	9.29
Manganese (Total)	mg/L	0.001	0.035	0.032	0.027
Potassium (Total)	mg/L	0.1	1.4	1.5	1.5
Sodium (Total)	mg/L	0.2	5.5	6.0	6.1
Strontium (Total)	mg/L	0.001	0.141	0.148	0.149
Zinc (Total)	mg/L	0.005	<0.005	0.022	0.014
Arsenic (Total)	mg/L	0.0001	0.0001	0.0001	0.0001
Cadmium (Total)	mg/L	0.000015	<0.000015	<0.000015	<0.000015
Chromium (Total)	mg/L	0.001	<0.001	<0.001	<0.001
Copper (Total)	mg/L	0.0001	0.0002	0.0002	0.0005
Lead (Total)	mg/L	0.00002	<0.00002	0.00002	0.00003
Mercury	mg/L	0.00002	<0.00002	<0.00002	<0.00002
Anion Sum	meq/L	-	3.28	3.23	3.32
Cation Sum	meq/L	-	3.20	3.35	3.40
% Difference	%	-	1.27	1.83	1.13
Ion Ratio	-	-	1.03	0.964	0.978
Sodium Adsorption Ratio	-	-	0.198	0.210	0.214
TDS (Ion Sum Calc)	mg/L	1	162	164	167
TDS(calc.)/EC(actual)	-	-	0.547	0.549	0.555
Conductivity Calc	µmho/cm	-	310	317	322
Conductivity Calc / Conductivity	-	-	1.05	1.06	1.07



Michelle Dubien
Data Specialist

The analytical results reported herein refer to the samples as received and relate only to the items tested. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-030898 - Rev. 0

Parameter	Client I.D.		SW2	SW4	SW1
	Sample I.D.		23-030898-1	23-030898-2	23-030898-3
	Date Collected		2023-11-01	2023-11-01	2023-11-01
	Units	R.L.	-	-	-
Langelier Index(25°C)	-	-	0.391	0.402	0.381
Saturation pH (25°C)	-	-	7.60	7.59	7.57
pH (Client Data)	pH units	-	7.6	8.1	7.8
Temperature (Client Data)	°C	-	7.1	6.2	5.7



Michelle Dubien
Data Specialist

The analytical results reported herein refer to the samples as received and relate only to the items tested. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G 107341

REPORT No: 23-016470 - Rev. 0

Report To:

Jp2g Consultants Inc
 1150 Morrison Dr.
 Ottawa, ON K2H 8S9

CADUCEON Environmental Laboratories

2378 Holly Lane
 Ottawa, ON K1V 7P1

Attention: Nick Weston

DATE RECEIVED: 2023-Jul-05
 DATE REPORTED: 2023-Jul-20
 SAMPLE MATRIX: Ground Water

CUSTOMER PROJECT: Mount St Patrick 22-621313
 P.O. NUMBER:

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	5	OTTAWA	VKASYAN	2023-Jul-07	A-IC-01	SM 4110B
COD (Liquid)	5	KINGSTON	KWELCH	2023-Jul-11	COD-001	SM 5220D
Cond/pH/Alk Auto (Liquid)	5	OTTAWA	SBOUDREAU	2023-Jul-06	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
DOC/DIC (Liquid)	5	OTTAWA	VKASYAN	2023-Jul-06	C-OC-01	EPA 415.2
Ion Balance (Calc.)	5	OTTAWA	STAILLON		CP-028	MECP E3196
ICP/MS (Liquid)	5	OTTAWA	TPRICE	2023-Jul-10	D-ICPMS-01	EPA 200.8
ICP/OES (Liquid)	5	OTTAWA	NHOGAN	2023-Jul-07	D-ICP-01	SM 3120B
Ammonia (Liquid)	5	KINGSTON	AMANIYA	2023-Jul-12	NH3-001	SM 4500NH3
TP & TKN (Liquid)	5	KINGSTON	VWATTS	2023-Jul-12	TPTKN-001	MECP E3516.2

R.L. = Reporting Limit

NC = Not Calculated

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

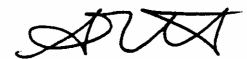


Steve Garrett
Director of Laboratory Services

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-016470 - Rev. 0

Parameter	Units	R.L.	Client I.D.	MW 06-3	MW 06-2	MW 06-4	MW 08-1	Dup#1
			Sample I.D.	23-016470-1	23-016470-2	23-016470-3	23-016470-4	23-016470-5
			Date Collected	2023-07-04	2023-07-04	2023-07-04	2023-07-04	2023-07-04
				-	-	-	-	-
Alkalinity(CaCO3) to pH4.5	mg/L	5	327	333	281	267	266	
pH @25°C	pH units	-	7.54	7.70	7.70	7.90	7.87	
Conductivity @25°C	uS/cm	1	885	1110	1450	578	573	
TDS (Calc. from Cond.)	mg/L	3	468	595	789	300	297	
Chloride	mg/L	0.5	89.3	142	280	20.2	19.5	
Nitrate (N)	mg/L	0.05	0.07	0.64	1.08	0.66	0.65	
Nitrite (N)	mg/L	0.05	<0.05	<0.05	<0.40	<0.05	<0.05	
Sulphate	mg/L	1	10	29	29	9	9	
Phosphorus (Total)	mg/L	0.01	0.09	0.86	0.83	0.48	0.32	
Total Kjeldahl Nitrogen	mg/L	0.1	0.5	0.9	0.3	0.2	0.2	
Ammonia (N)-Total (NH3+NH4)	mg/L	0.05	0.05	0.24	<0.05	<0.05	<0.05	
Dissolved Organic Carbon	mg/L	0.2	5.5	<0.2	<0.2	1.5	2.3	
COD	mg/L	5	20	15	<5	<5	<5	
Hardness (as CaCO3)	mg/L	0.02	337	396	504	213	215	
Aluminum	mg/L	0.01	0.06	0.06	0.06	0.04	0.04	
Barium	mg/L	0.001	0.258	0.276	0.342	0.100	0.089	
Boron	mg/L	0.005	0.050	0.135	0.041	0.012	0.011	
Calcium	mg/L	0.02	102	119	151	64.2	64.7	
Iron	mg/L	0.005	0.103	0.036	<0.005	0.028	0.027	
Magnesium	mg/L	0.02	20.0	24.0	30.8	12.8	12.9	
Manganese	mg/L	0.001	0.987	0.278	<0.001	<0.001	0.001	



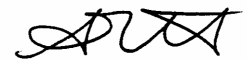
Steve Garrett
Director of Laboratory Services

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Final Report
REPORT No: 23-016470 - Rev. 0

Parameter	Units	R.L.	Client I.D.	MW 06-3	MW 06-2	MW 06-4	MW 08-1	Dup#1
			Sample I.D.	23-016470-1	23-016470-2	23-016470-3	23-016470-4	23-016470-5
			Date Collected	2023-07-04	2023-07-04	2023-07-04	2023-07-04	2023-07-04
				-	-	-	-	-
Potassium	mg/L	0.1	0.8	3.5	2.9	1.4	1.4	
Silicon	mg/L	0.01	4.49	5.14	4.42	3.83	3.80	
Sodium	mg/L	0.2	62.6	57.5	72.4	37.3	37.4	
Strontium	mg/L	0.001	0.197	0.256	0.295	0.127	0.127	
Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cadmium	mg/L	0.000015	0.000057	0.000022	0.000032	<0.000015	<0.000015	
Copper	mg/L	0.0001	0.0024	0.0032	0.0026	0.0029	0.0029	
Anion Sum	meq/L	-	9.25	11.3	14.2	6.15	6.11	
Cation Sum	meq/L	-	9.52	10.5	13.3	5.92	5.96	
% Difference	%	-	1.47	3.68	3.28	1.96	1.31	
Ion Ratio	-	-	0.971	1.08	1.07	1.04	1.03	
Sodium Adsorption Ratio	-	-	1.48	1.26	1.40	1.11	1.11	
TDS (Ion Sum Calc)	mg/L	1	482	578	740	309	308	
TDS(calc.)/EC(actual)	-	-	0.544	0.522	0.510	0.534	0.537	
Conductivity Calc	µmho/cm	-	884	1050	1380	557	556	
Conductivity Calc / Conductivity	-	-	0.999	0.949	0.953	0.963	0.971	
Langelier Index(25°C)	-	-	0.600	0.826	0.846	0.692	0.664	
Saturation pH (25°C)	-	-	6.94	6.87	6.85	7.21	7.21	
pH (Client Data)	pH units	-	7.3	7.2	7.2	7.6		
Temperature (Client Data)	°C	-	13.1	14.8	14.6	10.8		



Steve Garrett
Director of Laboratory Services

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C.O.C.: G 107315

REPORT No: 23-017576 - Rev. 0

Report To:

Jp2g Consultants Inc
 1150 Morrison Dr.
 Ottawa, ON K2H 8S9

CADUCEON Environmental Laboratories

2378 Holly Lane
 Ottawa, ON K1V 7P1

Attention: Nick Weston

DATE RECEIVED: 2023-Jul-14
 DATE REPORTED: 2023-Jul-27
 SAMPLE MATRIX: Surface Water


CUSTOMER PROJECT: Mount St Patrick 22-621313
 P.O. NUMBER:

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	2	OTTAWA	PCURIEL	2023-Jul-26	A-IC-01	SM 4110B
BOD5 (Liquid)	2	KINGSTON	MDUBIEN	2023-Jul-19	BOD-001	SM 5210B
COD (Liquid)	2	KINGSTON	KWELCH	2023-Jul-21	COD-001	SM 5220D
Cond/pH/Alk Auto (Liquid)	2	OTTAWA	SBOUDREAU	2023-Jul-17	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
DOC/DIC (Liquid)	2	OTTAWA	VKASYAN	2023-Jul-17	C-OC-01	EPA 415.2
Ion Balance (Calc.)	2	OTTAWA	STAILLON		CP-028	MECP E3196
ICP/MS Total (Liquid)	2	OTTAWA	TPRICE	2023-Jul-17	D-ICPMS-01	EPA 6020
ICP/OES Total (Liquid)	2	OTTAWA	NHOGAN	2023-Jul-18	D-ICP-01	SM 3120B
Mercury (Liquid)	2	OTTAWA	TBENNETT	2023-Jul-20	D-HG-02	SM 3112B
Ammonia & o-Phosphate (Liquid)	2	KINGSTON	KDIBBITS	2023-Jul-20	NH3-001	SM 4500NH3
Phenols (Liquid)	2	KINGSTON	JMACINNES	2023-Jul-21	PHEN-01	MECP E3179
TP & TKN (Liquid)	2	KINGSTON	KDIBBITS	2023-Jul-21	TPTKN-001	MECP E3516.2
TSS (Liquid)	2	KINGSTON	AMANIYA	2023-Jul-20	TSS-001	SM 2540D

R.L. = Reporting Limit

NC = Not Calculated

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

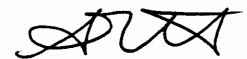


Steve Garrett
Director of Laboratory Services

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-017576 - Rev. 0

Parameter	Units	R.L.	Client I.D.	SW2	SW4
			Sample I.D.	23-017576-1	23-017576-2
			Date Collected	2023-07-13	2023-07-13
				-	-
Alkalinity(CaCO3) to pH4.5	mg/L	5		134	132
pH @25°C	pH units	-		7.25	7.32
Conductivity @25°C	uS/cm	1		281	287
TDS (Calc. from Cond.)	mg/L	3		144	147
Chloride	mg/L	0.5		8.4	9.4
Nitrate (N)	mg/L	0.05		0.08	0.10
Nitrite (N)	mg/L	0.05		<0.05	<0.05
Sulphate	mg/L	1		5	5
BOD5	mg/L	3		<3	<3
Total Suspended Solids	mg/L	3		3	4
Phosphorus (Total)	mg/L	0.01		0.02	0.02
Total Kjeldahl Nitrogen	mg/L	0.1		0.4	0.4
Ammonia (N)-Total (NH3+NH4)	mg/L	0.05		<0.05	<0.05
Dissolved Organic Carbon	mg/L	0.2		10.1	10.0
Phenolics	mg/L	0.001		<0.001	<0.001
COD	mg/L	5		21	22
Hardness (as CaCO3)	mg/L	-		134	140
Barium (Total)	mg/L	0.001		0.074	0.077
Boron (Total)	mg/L	0.005		0.011	0.010
Calcium (Total)	mg/L	0.02		40.6	42.6
Iron (Total)	mg/L	0.005		0.079	0.101



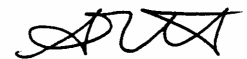
Steve Garrett
Director of Laboratory Services

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Final Report
REPORT No: 23-017576 - Rev. 0

Parameter	Units	R.L.	Client I.D.	SW2	SW4
			Sample I.D.	23-017576-1	23-017576-2
			Date Collected	2023-07-13	2023-07-13
				-	-
Magnesium (Total)	mg/L	0.02	7.90	8.24	
Manganese (Total)	mg/L	0.001	0.039	0.040	
Potassium (Total)	mg/L	0.1	0.7	0.8	
Sodium (Total)	mg/L	0.2	5.1	5.4	
Strontium (Total)	mg/L	0.001	0.131	0.138	
Zinc (Total)	mg/L	0.005	<0.005	<0.005	
Arsenic (Total)	mg/L	0.0001	0.0001	0.0001	
Cadmium (Total)	mg/L	0.000015	<0.000015	<0.000015	
Chromium (Total)	mg/L	0.001	<0.001	<0.001	
Copper (Total)	mg/L	0.0001	0.0005	0.0005	
Lead (Total)	mg/L	0.00002	0.00003	0.00002	
Mercury	mg/L	0.00002	<0.00002	<0.00002	
Anion Sum	meq/L	-	3.02	3.02	
Cation Sum	meq/L	-	2.92	3.07	
% Difference	%	-	1.72	0.801	
Ion Ratio	-	-	1.03	0.984	
Sodium Adsorption Ratio	-	-	0.191	0.198	
TDS (Ion Sum Calc)	mg/L	1	148	151	
TDS(calc.)/EC(actual)	-	-	0.528	0.528	
Conductivity Calc	µmho/cm	-	286	294	
Conductivity Calc / Conductivity	-	-	1.02	1.02	



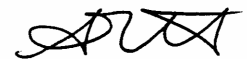
Steve Garrett
Director of Laboratory Services

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Final Report
 REPORT No: 23-017576 - Rev. 0

Parameter	Client I.D.		SW2	SW4
	Sample I.D.		23-017576-1	23-017576-2
	Date Collected		2023-07-13	2023-07-13
	Units	R.L.	-	-
Langelier Index(25°C)	-	-	-0.406	-0.323
Saturation pH (25°C)	-	-	7.66	7.64
pH (Client Data)	pH units	-	6.5	6.7
Temperature (Client Data)	°C	-	22.9	22.3



Steve Garrett
 Director of Laboratory Services

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C.O.C.: G 110188

REPORT No: 23-030873 - Rev. 0

Report To:

Jp2g Consultants Inc
 1150 Morrison Dr.
 Ottawa, ON K2H 8S9

CADUCEON Environmental Laboratories

2378 Holly Lane
 Ottawa, ON K1V 7P1

Attention: Nick Weston

DATE RECEIVED: 2023-Nov-02
 DATE REPORTED: 2023-Dec-07
 SAMPLE MATRIX: Ground Water

CUSTOMER PROJECT: Mount St Patrick 22-621313
 P.O. NUMBER:

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	6	OTTAWA	PCURIEL	2023-Nov-16	A-IC-01	SM 4110B
COD (Liquid)	6	KINGSTON	EHINCH	2023-Nov-09	COD-001	SM 5220D
Cond/pH/Alk Auto (Liquid)	6	OTTAWA	SBOUDREAU	2023-Nov-10	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
DOC/DIC (Liquid)	6	OTTAWA	VKASYAN	2023-Nov-16	C-OC-01	EPA 415.2
Ion Balance (Calc.)	6	OTTAWA	STAILLON		CP-028	MECP E3196
ICP/MS (Liquid)	6	OTTAWA	AOZKAYMAK	2023-Nov-07	D-ICPMS-01	EPA 200.8
ICP/OES (Liquid)	6	OTTAWA	APRUDYVUS	2023-Nov-06	D-ICP-01	SM 3120B
Ammonia & o-Phosphate (Liquid)	6	KINGSTON	KDIBBITS	2023-Nov-24	NH3-001	SM 4500NH3
Phenols (Liquid)	6	KINGSTON	JMACINNES	2023-Dec-06	PHEN-01	MECP E3179
TP & TKN (Liquid)	6	KINGSTON	KDIBBITS	2023-Nov-30	TPTKN-001	MECP E3516.2

R.L. = Reporting Limit

NC = Not Calculated

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



Michelle Dubien
Data Specialist

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Final Report

REPORT No: 23-030873 - Rev. 0

Parameter	Units	R.L.	Client I.D.	GLL7	MW08-1	MW06-3	MW06-2	MW06-4
			Sample I.D.	23-030873-1	23-030873-2	23-030873-3	23-030873-4	23-030873-5
			Date Collected	2023-11-01	2023-11-01	2023-11-01	2023-11-01	2023-11-01
				-	-	-	-	-
Alkalinity(CaCO3) to pH4.5	mg/L	5	206	321	289	348	320	
TDS (Calc. from Cond.)	mg/L	3	213	398	562	547	564	
Conductivity @25°C	uS/cm	1	413	760	1050	1020	1050	
pH @25°C	pH units	-	8.16	7.82	7.71	7.78	7.87	
Chloride	mg/L	0.5	1.3	40.0	146	107	122	
Nitrate (N)	mg/L	0.05	<0.05	0.49	<0.05	0.34	1.07	
Nitrite (N)	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Sulphate	mg/L	1	10	17	22	25	38	
Phosphorus (Total)	mg/L	0.01	0.01	2.45	0.39	1.49	4.22	
Total Kjeldahl Nitrogen	mg/L	0.1	0.2	1.1	0.4	4.7	1.7	
Ammonia (N)-Total (NH3+NH4)	mg/L	0.05	<0.05	<0.05	0.08	0.34	0.05	
Dissolved Organic Carbon	mg/L	0.2	2.1	2.6	5.4	2.8	2.5	
Phenolics	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
COD	mg/L	5	<5	76	19	138	96	
Hardness (as CaCO3)	mg/L	0.02	0.47	297	335	379	373	
Aluminum	mg/L	0.01	<0.01	0.03	0.04	0.03	0.07	
Barium	mg/L	0.001	<0.001	0.134	0.279	0.337	0.262	
Boron	mg/L	0.005	0.008	0.014	0.045	0.138	0.071	
Calcium	mg/L	0.02	0.14	87.2	97.9	111	108	
Iron	mg/L	0.005	0.006	<0.005	0.063	0.514	0.127	
Magnesium	mg/L	0.02	0.03	19.1	22.0	24.6	25.1	



Michelle Dubien
Data Specialist

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Final Report

REPORT No: 23-030873 - Rev. 0

Parameter	Units	R.L.	Client I.D.	GLL7	MW08-1	MW06-3	MW06-2	MW06-4
			Sample I.D.	23-030873-1	23-030873-2	23-030873-3	23-030873-4	23-030873-5
			Date Collected	2023-11-01	2023-11-01	2023-11-01	2023-11-01	2023-11-01
				-	-	-	-	-
Manganese	mg/L	0.001	0.002	<0.001	1.66	2.24	0.018	
Potassium	mg/L	0.1	0.2	2.0	1.1	3.8	3.0	
Silicon	mg/L	0.01	4.24	5.14	5.45	7.20	5.32	
Sodium	mg/L	0.2	104	38.2	74.0	60.6	72.6	
Strontium	mg/L	0.001	<0.001	0.187	0.208	0.258	0.226	
Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cadmium	mg/L	0.000015	<0.000015	<0.000015	0.000054	<0.000015	<0.000015	
Copper	mg/L	0.0001	0.0077	0.0015	0.0017	0.0007	0.0021	
Anion Sum	meq/L	-	4.37	7.93	10.4	10.5	10.7	
Cation Sum	meq/L	-	4.52	7.64	10.0	10.4	10.7	
% Difference	%	-	1.70	1.84	1.76	0.623	0.0800	
Ion Ratio	-	-	0.967	1.04	1.04	1.01	1.00	
Sodium Adsorption Ratio	-	-	65.0	0.965	1.76	1.36	1.64	
TDS (Ion Sum Calc)	mg/L	1	239	398	539	545	565	
TDS(calc.)/EC(actual)	-	-	0.579	0.524	0.513	0.533	0.536	
Conductivity Calc	µmho/cm	-	403	718	992	982	1020	
Conductivity Calc / Conductivity	-	-	0.976	0.945	0.945	0.960	0.969	
Langelier Index(25°C)	-	-	-1.80	0.814	0.689	0.893	0.935	
Saturation pH (25°C)	-	-	9.96	7.01	7.02	6.89	6.93	
pH (Client Data)	pH units	-	7.9	7.3	7.0	6.8	6.5	
Temperature (Client Data)	°C	-	11.5	10.5	12.1	11.1	9.4	



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Client I.D.
			Dup#1
			Sample I.D.
			23-030873-6
			Date Collected
			2023-11-01
			-
Alkalinity(CaCO3) to pH4.5	mg/L	5	321
TDS (Calc. from Cond.)	mg/L	3	397
Conductivity @25°C	uS/cm	1	759
pH @25°C	pH units	-	7.79
Chloride	mg/L	0.5	39.1
Nitrate (N)	mg/L	0.05	0.55
Nitrite (N)	mg/L	0.05	<0.05
Sulphate	mg/L	1	17
Phosphorus (Total)	mg/L	0.01	2.65
Total Kjeldahl Nitrogen	mg/L	0.1	0.6
Ammonia (N)-Total (NH3+NH4)	mg/L	0.05	<0.05
Dissolved Organic Carbon	mg/L	0.2	3.0
Phenolics	mg/L	0.001	<0.001
COD	mg/L	5	75
Hardness (as CaCO3)	mg/L	0.02	299
Aluminum	mg/L	0.01	0.03
Barium	mg/L	0.001	0.134
Boron	mg/L	0.005	0.013
Calcium	mg/L	0.02	87.8
Iron	mg/L	0.005	<0.005
Magnesium	mg/L	0.02	19.3



Michelle Dubien
 Data Specialist

Parameter	Units	R.L.	Client I.D.
			Dup#1
			Sample I.D.
			Date Collected
			-
Manganese	mg/L	0.001	<0.001
Potassium	mg/L	0.1	2.0
Silicon	mg/L	0.01	5.15
Sodium	mg/L	0.2	38.4
Strontium	mg/L	0.001	0.189
Zinc	mg/L	0.005	<0.005
Cadmium	mg/L	0.000015	<0.000015
Copper	mg/L	0.0001	0.0008
Anion Sum	meq/L	-	7.90
Cation Sum	meq/L	-	7.69
% Difference	%	-	1.40
Ion Ratio	-	-	1.03
Sodium Adsorption Ratio	-	-	0.966
TDS (Ion Sum Calc)	mg/L	1	398
TDS(calc.)/EC(actual)	-	-	0.525
Conductivity Calc	µmho/cm	-	719
Conductivity Calc / Conductivity	-	-	0.947
Langelier Index(25°C)	-	-	0.787
Saturation pH (25°C)	-	-	7.00



Michelle Dubien
Data Specialist



Appendix I

Chemistry Analysais 2023

Groundwater Quality

Project Name: Mt. St. Patrick

Monitor Number->	ODWS	MW 08-1			
		Jul-23	Jul-23	Nov-23	Nov-23
Parameters mg/L			Dup #1		Dup #1
Alkalinity(CaCO3) to pH4.5	30-500	267	266	321	321
pH @25°C	6.5 - 8.5	7.9	7.87	7.82	7.79
Conductivity @25°C		578	573	760	759
TDS (Calc. from Cond.)	500	300	297	398	397
Chloride	250	20.2	19.5	40	39.1
Nitrate (N)	10	0.66	0.65	0.49	0.55
Nitrite (N)	1	<0.05	<0.05	<0.05	<0.05
Sulphate	500	9	9	17	17
Phosphorus (Total)		0.48	0.32	2.45	2.65
Total Kjeldahl Nitrogen		0.2	0.2	1.1	0.6
Ammonia (N)-Total (NH3+NH4)		<0.05	<0.05	<0.05	<0.05
Dissolved Organic Carbon	5	1.5	2.3	2.6	3
Phenolics				<0.001	<0.001
COD		<5	<5	76	75
Hardness (as CaCO3)	500	213	215	297	299
Aluminum		0.04	0.04	0.03	0.03
Barium	1	0.1	0.089	0.134	0.134
Boron	5	0.012	0.011	0.014	0.013
Calcium		64.2	64.7	87.2	87.8
Iron	0.3	0.028	0.027	<0.005	<0.005
Magnesium		12.8	12.9	19.1	19.3
Manganese	0.05	<0.001	0.001	<0.001	<0.001
Potassium		1.4	1.4	2	2
Silicon		3.83	3.8	5.14	5.15
Sodium	200	37.3	37.4	38.2	38.4
Strontium		0.127	0.127	0.187	0.189
Zinc	5	<0.005	<0.005	<0.005	<0.005
Arsenic	0.01				
Cadmium	0.005	<0.000015	<0.000015	<0.000015	<0.000015
Chromium	0.05				
Cobalt					
Copper	1	0.0029	0.0029	0.0015	0.0008
Lead	0.01				
Mercury	0.001				
Anion Sum		6.15	6.11	7.93	7.9
Cation Sum		5.92	5.96	7.64	7.69
% Difference		1.96	1.31	1.84	1.4
Ion Ratio		1.04	1.03	1.04	1.03
Sodium Adsorption Ratio		1.11	1.11	0.965	0.966
TDS (Ion Sum Calc)		309	308	398	398
TDS(calc.)/EC(actual)		0.534	0.537	0.524	0.525
Conductivity Calc		557	556	718	719
Conductivity Calc / Conductivity		0.963	0.971	0.945	0.947
Langelier Index(25°C)		0.692	0.664	0.814	0.787
Saturation pH (25°C)		7.21	7.21	7.01	7
<u>Field Measured</u>					
Water Temp. (°C)		10.8		10.5	
Conductivity (microS/cm)		660		860	
pH (pH units)		7.6		7.3	

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality**Project Name: Mt. St. Patrick**

Monitor Number->	ODWS	MW 06-2			
		Jul-23	Nov-23		
Parameters mg/L					
Alkalinity(CaCO3) to pH4.5	30-500	333	348		
pH @25°C	6.5 - 8.5	7.7	7.78		
Conductivity @25°C		1110	1020		
TDS (Calc. from Cond.)	500	595	547		
Chloride	250	142	107		
Nitrate (N)	10	0.64	0.34		
Nitrite (N)	1	<0.05	<0.05		
Sulphate	500	29	25		
Phosphorus (Total)		0.86	1.49		
Total Kjeldahl Nitrogen		0.9	4.7		
Ammonia (N)-Total (NH3+NH4)		0.24	0.34		
Dissolved Organic Carbon	5	<0.2	2.8		
Phenolics			<0.001		
COD		15	138		
Hardness (as CaCO3)	500	396	379		
Aluminum		0.06	0.03		
Barium	1	0.276	0.337		
Boron	5	0.135	0.138		
Calcium		119	111		
Iron	0.3	0.036	0.514		
Magnesium		24	24.6		
Manganese	0.05	0.278	2.24		
Potassium		3.5	3.8		
Silicon		5.14	7.2		
Sodium	200	57.5	60.6		
Strontium		0.256	0.258		
Zinc	5	<0.005	<0.005		
Arsenic	0.01				
Cadmium	0.005	0.000022	<0.000015		
Chromium	0.05				
Cobalt					
Copper	1	0.0032	0.0007		
Lead	0.01				
Mercury	0.001				
Anion Sum		11.3	10.5		
Cation Sum		10.5	10.4		
% Difference		3.68	0.623		
Ion Ratio		1.08	1.01		
Sodium Adsorption Ratio		1.26	1.36		
TDS (Ion Sum Calc)		578	545		
TDS(calc.)/EC(actual)		0.522	0.533		
Conductivity Calc		1050	982		
Conductivity Calc / Conductivity		0.949	0.96		
Langelier Index(25°C)		0.826	0.893		
Saturation pH (25°C)		6.87	6.89		
Field Measured					
Water Temp. (°C)		14.8	11.1		
Conductivity (microS/cm)		1200	1070		
pH (pH units)		7.2	6.8		

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality

Project Name: Mt. St. Patrick

Monitor Number->	ODWS	MW 06-3			
		Jul-23	Nov-23		
Parameters mg/L					
Alkalinity(CaCO3) to pH4.5	30-500	327	289		
pH @25°C	6.5 - 8.5	7.54	7.71		
Conductivity @25°C		885	1050		
TDS (Calc. from Cond.)	500	468	562		
Chloride	250	89.3	146		
Nitrate (N)	10	0.07	<0.05		
Nitrite (N)	1	<0.05	<0.05		
Sulphate	500	10	22		
Phosphorus (Total)		0.09	0.39		
Total Kjeldahl Nitrogen		0.5	0.4		
Ammonia (N)-Total (NH3+NH4)		0.05	0.08		
Dissolved Organic Carbon	5	5.5	5.4		
Phenolics			<0.001		
COD		20	19		
Hardness (as CaCO3)	500	337	335		
Aluminum		0.06	0.04		
Barium	1	0.258	0.279		
Boron	5	0.05	0.045		
Calcium		102	97.9		
Iron	0.3	0.103	0.063		
Magnesium		20	22		
Manganese	0.05	0.987	1.66		
Potassium		0.8	1.1		
Silicon		4.49	5.45		
Sodium	200	62.6	74		
Strontium		0.20	0.21		
Zinc	5	<0.005	<0.005		
Arsenic	0.01				
Cadmium	0.005	0.000057	0.000054		
Chromium	0.05				
Cobalt					
Copper	1	0.0024	0.0017		
Lead	0.01				
Mercury	0.001				
Anion Sum		9.25	10.4		
Cation Sum		9.52	10		
% Difference		1.47	1.76		
Ion Ratio		0.971	1.04		
Sodium Adsorption Ratio		1.48	1.76		
TDS (Ion Sum Calc)		482	539		
TDS(calc.)/EC(actual)		0.544	0.513		
Conductivity Calc		884	992		
Conductivity Calc / Conductivity		0.999	0.945		
Langelier Index(25°C)		0.6	0.689		
Saturation pH (25°C)		6.94	7.02		
Field Measured					
Water Temp. (°C)		13.1	12.1		
Conductivity (microS/cm)		980	1140		
pH (pH units)		7.3	7		

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality**Project Name: Mt. St. Patrick**

Monitor Number->	ODWS	MW 06-4			
		Jul-23	Nov-23		
Parameters mg/L					
Alkalinity(CaCO3) to pH4.5	30-500	281	320		
pH @25°C	6.5 - 8.5	7.7	7.87		
Conductivity @25°C		1450	1050		
TDS (Calc. from Cond.)	500	789	564		
Chloride	250	280	122		
Nitrate (N)	10	1.08	1.07		
Nitrite (N)	1	<0.40	<0.05		
Sulphate	500	29	38		
Phosphorus (Total)		0.83	4.22		
Total Kjeldahl Nitrogen		0.3	1.7		
Ammonia (N)-Total (NH3+NH4)		<0.05	0.05		
Dissolved Organic Carbon	5	<0.2	2.5		
Phenolics			<0.001		
COD		<5	96		
Hardness (as CaCO3)	500	504	373		
Aluminum		0.06	0.07		
Barium	1	0.342	0.262		
Boron	5	0.041	0.071		
Calcium		151	108		
Iron	0.3	<0.005	0.127		
Magnesium		30.8	25.1		
Manganese	0.05	<0.001	0.018		
Potassium		2.9	3		
Silicon		4.42	5.32		
Sodium	200	72.4	72.60		
Strontium		0.295	0.226		
Zinc	5	<0.005	<0.005		
Arsenic	0.01				
Cadmium	0.005	0.000032	<0.000015		
Chromium	0.05				
Cobalt					
Copper	1	0.0026	0.0021		
Lead	0.01				
Mercury	0.001				
Anion Sum		14.2	10.7		
Cation Sum		13.3	10.7		
% Difference		3.28	0.08		
Ion Ratio		1.07	1		
Sodium Adsorption Ratio		1.4	1.64		
TDS (Ion Sum Calc)		740	565		
TDS(calc.)/EC(actual)		0.51	0.536		
Conductivity Calc		1380	1020		
Conductivity Calc / Conductivity		0.953	0.969		
Langelier Index(25°C)		0.846	0.935		
Saturation pH (25°C)		6.85	6.93		
Field Measured					
Water Temp. (°C)		14.6	9.4		
Conductivity (microS/cm)		1460	1230		
pH (pH units)		7.2	6.5		

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality

Project Name: Mt. St. Patrick

Monitor Number->	ODWS	MW 09-5R					
		Jul-23	Nov-23				
Parameters mg/L		NS	NS				
Alkalinity(CaCO3) to pH4.5	30-500						
pH @25°C	6.5 - 8.5						
Conductivity @25°C							
TDS (Calc. from Cond.)	500						
Chloride	250						
Nitrate (N)	10						
Nitrite (N)	1						
Sulphate	500						
Phosphorus (Total)							
Total Kjeldahl Nitrogen							
Ammonia (N)-Total (NH3+NH4)							
Dissolved Organic Carbon	5						
Phenolics							
COD							
Hardness (as CaCO3)	500						
Aluminum							
Barium	1						
Boron	5						
Calcium							
Iron	0.3						
Magnesium							
Manganese	0.05						
Potassium							
Silicon							
Sodium	200						
Strontium							
Zinc	5						
Arsenic	0.01						
Cadmium	0.005						
Chromium	0.05						
Cobalt							
Copper	1						
Lead	0.01						
Mercury	0.001						
Anion Sum							
Cation Sum							
% Difference							
Ion Ratio							
Sodium Adsorption Ratio							
TDS (Ion Sum Calc)							
TDS(calc.)/EC(actual)							
Conductivity Calc							
Conductivity Calc / Conductivity							
Langelier Index(25°C)							
Saturation pH (25°C)							
Field Measured							
Water Temp. (°C)							
Conductivity (microS/cm)							
pH (pH units)							

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality

Project Name: Mt. St. Patrick

Monitor Number->	ODWS	MW 09-6R					
		Jul-23	Nov-23				
Parameters mg/L		NS	NS				
Alkalinity(CaCO3) to pH4.5	30-500						
pH @25°C	6.5 - 8.5						
Conductivity @25°C							
TDS (Calc. from Cond.)	500						
Chloride	250						
Nitrate (N)	10						
Nitrite (N)	1						
Sulphate	500						
Phosphorus (Total)							
Total Kjeldahl Nitrogen							
Ammonia (N)-Total (NH3+NH4)							
Dissolved Organic Carbon	5						
Phenolics							
COD							
Hardness (as CaCO3)	500						
Aluminum							
Barium	1						
Boron	5						
Calcium							
Iron	0.3						
Magnesium							
Manganese	0.05						
Potassium							
Silicon							
Sodium	200						
Strontium							
Zinc	5						
Arsenic	0.01						
Cadmium	0.005						
Chromium	0.05						
Cobalt							
Copper	1						
Lead	0.01						
Mercury	0.001						
Anion Sum							
Cation Sum							
% Difference							
Ion Ratio							
Sodium Adsorption Ratio							
TDS (Ion Sum Calc)							
TDS(calc.)/EC(actual)							
Conductivity Calc							
Conductivity Calc / Conductivity							
Langelier Index(25°C)							
Saturation pH (25°C)							
Field Measured							
Water Temp. (°C)							
Conductivity (microS/cm)							
pH (pH units)							

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality

Project Name: Mt. St. Patrick

Monitor Number->	ODWS	MW 21-7					
		Jul-23	Nov-23				
Parameters mg/L		NS	NS				
Alkalinity(CaCO3) to pH4.5	30-500						
pH @25°C	6.5 - 8.5						
Conductivity @25°C							
TDS (Calc. from Cond.)	500						
Chloride	250						
Nitrate (N)	10						
Nitrite (N)	1						
Sulphate	500						
Phosphorus (Total)							
Total Kjeldahl Nitrogen							
Ammonia (N)-Total (NH3+NH4)							
Dissolved Organic Carbon	5						
Phenolics							
COD							
Hardness (as CaCO3)	500						
Aluminum							
Barium	1						
Boron	5						
Calcium							
Iron	0.3						
Magnesium							
Manganese	0.05						
Potassium							
Silicon							
Sodium	200						
Strontium							
Zinc	5						
Arsenic	0.01						
Cadmium	0.005						
Chromium	0.05						
Cobalt							
Copper	1						
Lead	0.01						
Mercury	0.001						
Anion Sum							
Cation Sum							
% Difference							
Ion Ratio							
Sodium Adsorption Ratio							
TDS (Ion Sum Calc)							
TDS(calc.)/EC(actual)							
Conductivity Calc							
Conductivity Calc / Conductivity							
Langelier Index(25°C)							
Saturation pH (25°C)							
Field Measured							
Water Temp. (°C)							
Conductivity (microS/cm)							
pH (pH units)							

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Groundwater Quality

Project Name: Mt. St. Patrick

Monitor Number->	ODWS	GLL7					
		Jul-23	Nov-23				
Parameters mg/L		NS					
Alkalinity(CaCO3) to pH4.5	30-500		206				
pH @25°C	6.5 - 8.5		8.16				
Conductivity @25°C			413				
TDS (Calc. from Cond.)	500		213				
Chloride	250		1.3				
Nitrate (N)	10		<0.05				
Nitrite (N)	1		<0.05				
Sulphate	500		10				
Phosphorus (Total)			0.01				
Total Kjeldahl Nitrogen			0.2				
Ammonia (N)-Total (NH3+NH4)			<0.05				
Dissolved Organic Carbon	5		2.1				
Phenolics			<0.001				
COD			<5				
Hardness (as CaCO3)	500		0.47				
Aluminum			<0.01				
Barium	1		<0.001				
Boron	5		0.008				
Calcium			0.14				
Iron	0.3		0.006				
Magnesium			0.03				
Manganese	0.05		0.002				
Potassium			0.2				
Silicon			4.24				
Sodium	200		104				
Strontium			<0.001				
Zinc	5		<0.005				
Arsenic	0.01						
Cadmium	0.005		<0.000015				
Chromium	0.05						
Cobalt							
Copper	1		0.0077				
Lead	0.01						
Mercury	0.001						
Anion Sum			4.37				
Cation Sum			4.52				
% Difference			1.7				
Ion Ratio			0.967				
Sodium Adsorption Ratio			65				
TDS (Ion Sum Calc)			239				
TDS(calc.)/EC(actual)			0.579				
Conductivity Calc			403				
Conductivity Calc / Conductivity			0.976				
Langelier Index(25°C)			-1.8				
Saturation pH (25°C)			9.96				
Field Measured							
Water Temp. (°C)			11.5				
Conductivity (microS/cm)			490				
pH (pH units)			7.9				

Notes:

All values reported in mg/L unless otherwise noted

ODWS = Ontario Drinking Water Standards

Shaded values exceed ODWS

Surface Water Quality
Project Name: Mt. St. Patrick

Monitor Number ->				SW 1				
Parameters	Limit	PWQO	CWQG	23-Jul	23-Nov			
Alkalinity(CaCO3) to pH4.5	IPWQO	a		NS	147			
pH @25°C					7.95			
Conductivity @25°C					301			
TDS (Calc. from Cond.)					154			
Chloride			120		9.3			
Nitrate (N)			3		0.07			
Nitrite (N)			0.6		<0.05			
Sulphate					6			
BOD5					<3			
Total Suspended Solids					48			
Phosphorus (Total)	IPWQO	0.03			0.03			
Total Kjeldahl Nitrogen					0.4			
Ammonia (N)-Total (NH3+NH4)					<0.05			
Dissolved Organic Carbon					8.6			
Phenolics					<0.001			
COD					17			
Hardness (as CaCO3)					154			
Barium (Total)					0.082			
Boron (Total)	IPWQO	0.2	1.5		0.006			
Calcium (Total)					46.5			
Iron (Total)	PWQO	0.3	0.3		0.126			
Magnesium (Total)					9.29			
Manganese (Total)					0.027			
Potassium (Total)					1.5			
Sodium (Total)					6.1			
Strontium (Total)					0.149			
Zinc (Total)	PWQO IPWQO	0.03 0.02	0.007		0.014			
Arsenic (Total)					0.0001			
Cadmium (Total)	PWQO	0.0002	0.00009		<0.000015			
Chromium (Total)	PWQO	0.001	0.001		<0.001			
Copper (Total)	PWQO IPWQO	0.005 d	Max 0.004 min 0.002 (based on hardness)		0.0005			
Lead (Total)	PWQO	0.005	0.001		0.00003			
Mercury	PWQO	0.0002	0.000026		<0.00002			
Anion Sum					3.32			
Cation Sum					3.4			
% Difference					1.13			
Ion Ratio					0.978			
Sodium Adsorption Ratio					0.214			
TDS (Ion Sum Calc)					167			
TDS(calc.)/EC(actual)					0.555			
Conductivity Calc					322			
Conductivity Calc / Conductivity					1.07			
Langelier Index(25°C)					0.381			
Saturation pH (25°C)					7.57			
Field Measured								
Water Temp. (°C)					5.7			
Conductivity (microS/cm)					370			
pH (pH units)		6.5 - 8.5	6.5 - 9		7.8			
DO					10.6			
FLOW L/S					NA			

Notes:

All values reported in mg/L unless otherwise noted

PWQO- Provincial Water Quality Objectives

CWQG - Canadian Water Quality Guidelines

NS - No Sample Taken

Surface Water Quality
Project Name: Mt. St. Patrick

Monitor Number ->			SW 2				
Parameters	Limit	PWQO	23-Jul	23-Nov			
Alkalinity(CaCO3) to pH4.5	IPWQO	a	134	145			
pH @25°C			7.25	7.99			
Conductivity @25°C			281	296			
TDS (Calc. from Cond.)			144	152			
Chloride			8.4	9.2			
Nitrate (N)			0.08	0.05			
Nitrite (N)			<0.05	<0.05			
Sulphate			5	6			
BOD5			<3	<3			
Total Suspended Solids			3	4			
Phosphorus (Total)	IPWQO	0.03	0.02	0.03			
Total Kjeldahl Nitrogen			0.4	0.5			
Ammonia (N)-Total (NH3+NH4)			<0.05	<0.05			
Dissolved Organic Carbon			10.1	8			
Phenolics			<0.001	<0.001			
COD			21	14			
Hardness (as CaCO3)			134	146			
Barium (Total)			0.074	0.079			
Boron (Total)	IPWQO	0.2	0.011	0.006			
Calcium (Total)			40.6	43.9			
Iron (Total)	PWQO	0.3	0.079	0.06			
Magnesium (Total)			7.9	8.8			
Manganese (Total)			0.039	0.035			
Potassium (Total)			0.7	1.4			
Sodium (Total)			5.1	5.5			
Strontium (Total)			0.131	0.141			
Zinc (Total)	PWQO IPWQO	0.03 0.02	<0.005	<0.005			
Arsenic (Total)			0.0001	0.0001			
Cadmium (Total)	PWQO	0.0002	<0.000015	<0.000015			
Chromium (Total)	PWQO	0.001	<0.001	<0.001			
Copper (Total)	PWQO IPWQO	0.005 d	0.0005	0.0002			
Lead (Total)	PWQO	0.005	0.00003	<0.00002			
Mercury	PWQO	0.0002	<0.00002	<0.00002			
Anion Sum			3.02	3.28			
Cation Sum			2.92	3.2			
% Difference			1.72	1.27			
Ion Ratio			1.03	1.03			
Sodium Adsorption Ratio			0.191	0.198			
TDS (Ion Sum Calc)			148	162			
TDS(calc.)/EC(actual)			0.528	0.547			
Conductivity Calc			286	310			
Conductivity Calc / Conductivity			1.02	1.05			
Langelier Index(25°C)			-0.406	0.391			
Saturation pH (25°C)			7.66	7.6			
Field Measured							
Water Temp. (°C)			22.9	7.1			
Conductivity (microS/cm)			340	370			
pH (pH units)		6.5 - 8.5	6.5	7.6			
DO			13.1	10.9			
FLOW L/S			NA	NA			

Notes:
 All values reported in mg/L unless otherwise noted
 PWQO- Provincial Water Quality Objectives
 CWQG - Canadian Water Quality Guidelines
 NS - No Sample Taken

Surface Water Quality
Project Name: Mt. St. Patrick

Monitor Number ->			SW 3				
Parameters	Limit	PWQO	23-Jul	23-Nov			
Alkalinity(CaCO3) to pH4.5	IPWQO	a	NS	NS			
pH @25°C							
Conductivity @25°C							
TDS (Calc. from Cond.)							
Chloride							
Nitrate (N)							
Nitrite (N)							
Sulphate							
BOD5							
Total Suspended Solids							
Phosphorus (Total)	IPWQO	0.03					
Total Kjeldahl Nitrogen							
Ammonia (N)-Total (NH3+NH4)							
Dissolved Organic Carbon							
Phenolics							
COD							
Hardness (as CaCO3)							
Barium (Total)							
Boron (Total)	IPWQO	0.2					
Calcium (Total)							
Iron (Total)	PWQO	0.3					
Magnesium (Total)							
Manganese (Total)							
Potassium (Total)							
Sodium (Total)							
Strontium (Total)							
Zinc (Total)	PWQO IPWQO	0.03 0.02					
Arsenic (Total)							
Cadmium (Total)	PWQO	0.0002					
Chromium (Total)	PWQO	0.001					
Copper (Total)	PWQO IPWQO	0.005 d					
Lead (Total)	PWQO	0.005					
Mercury	PWQO	0.0002					
Anion Sum							
Cation Sum							
% Difference							
Ion Ratio							
Sodium Adsorption Ratio							
TDS (Ion Sum Calc)							
TDS(calc.)/EC(actual)							
Conductivity Calc							
Conductivity Calc / Conductivity							
Langelier Index(25°C)							
Saturation pH (25°C)							
Field Measured							
Water Temp. (°C)							
Conductivity (microS/cm)							
pH (pH units)		6.5 - 8.5					
DO							
FLOW L/S							

Notes:
 All values reported in mg/L unless otherwise noted
 PWQO- Provincial Water Quality Objectives
 CWQG - Canadian Water Quality Guidelines
 NS - No Sample Taken

Surface Water Quality
Project Name: Mt. St. Patrick

Monitor Number ->			SW 4				
Parameters	Limit	PWQO	23-Jul	24-Nov			
Alkalinity(CaCO3) to pH4.5	IPWQO	a	132	142			
pH @25°C			7.32	7.99			
Conductivity @25°C			287	298			
TDS (Calc. from Cond.)			147	153			
Chloride			9.4	9.4			
Nitrate (N)			0.1	0.08			
Nitrite (N)			<0.05	<0.05			
Sulphate			5	6			
BOD5			<3	<3			
Total Suspended Solids			4	9			
Phosphorus (Total)	IPWQO	0.03	0.02	0.02			
Total Kjeldahl Nitrogen			0.4	0.5			
Ammonia (N)-Total (NH3+NH4)			<0.05	<0.05			
Dissolved Organic Carbon			10	8.5			
Phenolics			<0.001	<0.001			
COD			22	19			
Hardness (as CaCO3)			140	153			
Barium (Total)			0.077	0.081			
Boron (Total)	IPWQO	0.2	0.01	0.006			
Calcium (Total)			42.6	46			
Iron (Total)	PWQO	0.3	0.101	0.073			
Magnesium (Total)			8.24	9.15			
Manganese (Total)			0.04	0.032			
Potassium (Total)			0.8	1.5			
Sodium (Total)			5.4	6			
Strontium (Total)			0.138	0.148			
Zinc (Total)	PWQO IPWQO	0.03 0.02	<0.005	0.022			
Arsenic (Total)			0.0001	0.0001			
Cadmium (Total)	PWQO	0.0002	<0.000015	<0.000015			
Chromium (Total)	PWQO	0.001	<0.001	<0.001			
Copper (Total)	PWQO IPWQO	0.005 d	0.0005	0.0002			
Lead (Total)	PWQO	0.005	0.00002	0.00002			
Mercury	PWQO	0.0002	<0.00002	<0.00002			
Anion Sum			3.02	3.23			
Cation Sum			3.07	3.35			
% Difference			0.801	1.83			
Ion Ratio			0.984	0.964			
Sodium Adsorption Ratio			0.198	0.21			
TDS (Ion Sum Calc)			151	164			
TDS(calc.)/EC(actual)			0.528	0.549			
Conductivity Calc			294	317			
Conductivity Calc / Conductivity			1.02	1.06			
Langelier Index(25°C)			-0.323	0.402			
Saturation pH (25°C)			7.64	7.59			
Field Measured							
Water Temp. (°C)			22.3	6.2			
Conductivity (microS/cm)			340	370			
pH (pH units)		6.5 - 8.5	6.7	8.10			
DO			12.9	10.8			
FLOW L/S			NA	NA			

Notes:
 All values reported in mg/L unless otherwise noted
 PWQO- Provincial Water Quality Objectives
 CWQG - Canadian Water Quality Guidelines
 NS - No Sample Taken



Appendix J

Monitoring and Screening Checklist

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	Mount St. Patrick WDS
Location (e.g. street address, lot, concession)	Part of Lot 4, Concession 14, geographic Township of Brougham
GPS Location (taken within the property boundary at front gate/ front entry)	NAD 83, UTM Zone 18, 351183E 5021553N
Municipality	Township of Greater Madawaska
Client and/or Site Owner	Township of Greater Madawaska
Monitoring Period (Year)	2023
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	A411901
Director's Order No.:	NA
Provincial Officer's Order No.:	NA
Other:	NA

Report Submission Frequency	<input checked="" type="radio"/> Annual <input type="radio"/> Other		
The site is: (Operation Status)	<input checked="" type="radio"/> Open <input type="radio"/> Inactive <input type="radio"/> Closed		
Does your Site have a Total Approved Capacity?	<input checked="" type="radio"/> Yes <input type="radio"/> No		
If yes, please specify Total Approved Capacity	46785	Units	Cubic Metres
Does your Site have a Maximum Approved Fill Rate?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
If yes, please specify Maximum Approved Fill Rate		Units	<input type="text"/>
Total Waste Received within Monitoring Period (Year)	3,880	Units	Cubic Metres
Total Waste Received within Monitoring Period (Year) <i>Methodology</i>			
Estimated Remaining Capacity	30,994	Units	Cubic Metres
Estimated Remaining Capacity <i>Methodology</i>	Estimation based on Calculation		
Estimated Remaining Capacity <i>Date Last Determined</i>	December 20, 2023		
Non-Hazardous Approved Waste Types	<input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Industrial, Commercial & Institutional (IC&I) <input type="checkbox"/> Source Separated Organics (Green Bin) <input type="checkbox"/> Tires	<input type="checkbox"/> Contaminated Soil <input type="checkbox"/> Wood Waste <input checked="" type="checkbox"/> Blue Box Material <input type="checkbox"/> Processed Organics <input type="checkbox"/> Leaf and Yard Waste	<input type="checkbox"/> Food Processing/Preparation Operations Waste <input type="checkbox"/> Hauled Sewage Other: <input type="text"/>
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial <i>(separate waste classes by comma)</i>			
Year Site Opened <i>(enter the Calendar Year only)</i>	1960	Current ECA Issue Date	Mar. 1980 last amended Oct. 2013
Is your Site required to submit Financial Assurance?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Describe how your Landfill is designed.	<input checked="" type="radio"/> Natural Attenuation only <input type="radio"/> Fully engineered Facility <input type="radio"/> Partially engineered Facility		
Does your Site have an approved Contaminant Attenuation Zone?	<input checked="" type="radio"/> Yes <input type="radio"/> No		

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

Has the nature of the operations at the site changed during this monitoring period?

Yes

No

If yes, provide details:

Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i.e. exceeded the LEL for methane)

Yes

No

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

<p>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:</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	
<p>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):</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Applicable</p>	<p>If no, list exceptions below or attach information.</p>

Groundwater Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
MW09-5R	Not sampled	July & November 2023
MW09-6R	Not sampled	July & November 2023
MW21-7	Dry	July & November 2023
GLL7	Not sampled	July 2023

3) a) Is landfill gas being monitored or controlled at the site?	<input type="radio"/> Yes <input checked="" type="radio"/> No
--	--

If yes to 3(a), please answer the next two questions below.

b) Have any measurements been taken since the last reporting period that indicate landfill gas is present in the subsurface at levels exceeding criteria established for the site?	<input type="radio"/> Yes <input checked="" type="radio"/> No
--	--

c) Has the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	<input type="radio"/> Yes <input type="radio"/> No <input checked="" type="radio"/> Not Applicable	If no, list exceptions below or attach additional information.
--	--	--

Groundwater Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
All sampling completed in general accordance with our sampling protocols		

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):	<input checked="" type="radio"/> Yes <input type="radio"/> No	All sampling completed in general accordance with our sampling protocols
--	--	--

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

<p>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.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>		
<p>6) The site meets compliance and assessment criteria.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>		
<p>7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>		
<p>1) Is one or more of the following risk reduction practices in place at the site:</p> <p>(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</p> <p>(b) There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or</p> <p>(c) The site meets the following two conditions (typically achieved after 15 years or longer of site operation):</p> <p><i>i.</i> The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and</p> <p><i>ii.</i> Seasonal and annual water levels and water quality fluctuations are well understood.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>Note which practice(s):</p>	<p><input type="checkbox"/> (a) <input type="checkbox"/> (b) <input checked="" type="checkbox"/> (c)</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not Applicable</p>		

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:

<p><input checked="" type="radio"/> No changes to the monitoring program are recommended</p> <p><input type="radio"/> The following change(s) to the monitoring program is/are recommended:</p>	Continue to monitor with no changes from 2023 monitoring program
<p><input checked="" type="radio"/> No Changes to site design and operation are recommended</p> <p><input type="radio"/> The following change(s) to the site design and operation is/are recommended:</p>	

Name:	Andrew Buzza, P.Geo Note: Report signed and stamped.		
Seal:	Add Image		
Signature:	<input type="text"/>	Date:	
CEP Contact Information:	Andrew Buzza, p.Geo		
Company:	Jp2g Consultants Inc.		
Address:	1150 Morrison Drive Suite 410 Ottawa ON K2H 8S9		
Telephone No.:	613 828-7800	Fax No. :	613 828-2600
E-mail Address:	andrewb@jp2g.com		
Co-signers for additional expertise provided:			
Signature:	<input type="text"/>	Date:	
Signature:	<input type="text"/>	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)	Constant Creek
Distance(s)	Approximately 630m north of the site

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

Sampling and Monitoring Program Status:

<p>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:</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	
<p>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):</p>	<p><input type="radio"/> Yes <input checked="" type="radio"/> No <input type="radio"/> Not applicable (No C of A, authorizing / control document applies)</p>	<p>If no, specify below or provide details in an attachment.</p>

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
SW1	Dry	July 2023
SW3	Dry	July & November 2023

<p>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.</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not Applicable</p>	
<p>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:</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Not Applicable</p>	<p>If no, specify below or provide details in an attachment.</p>
<p>Surface Water Sampling Location</p>	<p>Description/Explanation for change (change in name or location, additions, deletions)</p>	<p>Date</p>
<p>All surface water sampling completed in general accordance with our sampling procedures.</p>		
<p>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):</p>	<p><input checked="" type="radio"/> Yes <input type="radio"/> No</p>	<p>All surface water sampling completed in general accordance with our sampling procedures.</p>

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):	<input checked="" type="radio"/> Yes <input type="radio"/> 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

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)?	<input checked="" type="radio"/> Yes <input type="radio"/> No	
--	--	--

<p>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.</p>	<p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No</p>	
<p>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)):</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Known</p> <p><input type="radio"/> Not Applicable</p>	<p>Overall the results of the surface and groundwater sampling do not indicate that the landfill activities at this location is having a negative effect on the surface water around the Landfill site.</p>
<p>9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):</p>	<p><input type="radio"/> Yes</p> <p><input checked="" type="radio"/> No</p> <p><input type="radio"/> Not Applicable</p>	

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:

<p><input checked="" type="radio"/> No Changes to the monitoring program are recommended</p> <p><input type="radio"/> The following change(s) to the monitoring program is/are recommended:</p>	<p>Continue to monitor with no changes from 2023 monitoring program</p>
<p><input checked="" type="radio"/> No changes to the site design and operation are recommended</p> <p><input type="radio"/> The following change(s) to the site design and operation is/are recommended:</p>	

CEP Signature	
Relevant Discipline	Education with 30 years experience
Date:	
CEP Contact Information:	Andrew Buzza, P.Ge
Company:	Jp2g Consultants Inc.
Address:	1150 Morrison Drive Suite 410 Ottawa ON K2H 8S9
Telephone No.:	613 828-7800
Fax No. :	613 828-2600
E-mail Address:	andrewb@jp2g.com
Save As	Print Form