2025 Annual Monitoring Report
Papineau Lake Waste Disposal Site
Environmental Compliance Approval No. A361105

Prepared for:
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Table of Contents

1 Introduction ____ 1

1.1 Location ____ 1
1.2 Ownership and Key Personnel ____ 2
1.3 Description and Development of the WDS ____ 2
1.4 Monitoring and Reporting Program Objectives and Requirements ____ 3

2 Physical Setting ____ 4

2.1 Geology ____ 4
2.1.1 Surficial Geology ____ 4
2.1.2 Bedrock Geology ____ 4
2.2 Surface Water Features ____ 4

3 Description of Monitoring Program ____ 5

3.1 Site Inspections and Operations Monitoring ____ 5
3.2 Monitoring Locations, Frequency and Monitoring Parameters ____ 5
3.2.1 Groundwater Monitoring ____ 5
3.2.1.1 Groundwater Elevation and Flow Monitoring ____ 7
3.2.1.2 Groundwater Gradients and Flow Direction ____ 8
3.2.2 Surface Water Monitoring ____ 9
3.2.3 Landfill Gas Monitoring ____ 9
3.3 Trigger Mechanisms and Contingency Plan ____ 9
3.4 Monitoring Procedures and Methods ____ 10
3.4.1 Groundwater Monitoring ____ 10
3.4.2 Surface Water Monitoring ____ 10
3.4.3 Landfill Gas Monitoring ____ 10
3.4.4 Field QA/QC Program ____ 11

4 Monitoring Results ____ 12

4.1 Groundwater Quality ____ 12
4.2 Landfill Gas Concentrations ____ 15
4.3 QA/QC Results ____ 15

5 Assessment, Interpretation, and Discussion ____ 16

5.1 Groundwater Assessment ____ 16
5.2 Mann-Kendall Trend Analysis ____ 19
5.3 Trigger Mechanisms and Contingency Plan Assessment ____ 20

5.4 Landfill Gas Assessment ____ 21

6 On-Site Operations ____ 21

6.1 Annual Waste Summary ____ 21
6.1.1 Annual Segregated Materials Removed Summary ____ 22
6.2 Annual Complaints & Emergency Situations Summary ____ 22
6.3 Capacity ____ 22

7 Summary Statements, Conclusions and Recommendations ____ 23

7.1 Site Operations ____ 24
7.2 Groundwater ____ 24
7.3 Surface Water ____ 25
7.4 Trigger Mechanisms and Contingency Plan ____ 25
7.5 Landfill Gas ____ 26
7.6 Landfill Capacity ____ 26

8 Limiting Conditions ____ 26

9 References ____ 28

List of Tables

Table 1: Contact Information ____ 2
Table 2: Groundwater Monitor Sampling Locations ____ 6
Table 3: Groundwater Quality Monitoring Parameters ____ 7
Table 4: Groundwater Depths and Elevation Data ____ 8
Table 5: Groundwater Quality Parameters Exceeding ODWSOG Criteria ____ 12
Table 6: Reasonable Use Calculations ____ 13
Table 7: Groundwater Quality Parameters Exceeding RUV ____ 14
Table 8: Groundwater Quality Results Exceeding PWQOs ____ 14
Table 9: Combustible Gas Monitoring Results ____ 15
Table 10: Annual Recycling and Waste Tonnages ____ 21
Table 11: 2025 Groundwater Chemistry Results ____ (end of text)

List of Figures

Figure 01: Site Location Map
Figure 02: Site Plan
Figure 03: Site Plan with Contours
Figure 04: Groundwater Flow Direction – Spring 2025
Figure 05: Groundwater Flow Direction – Fall 2025

Site Photographs

List of Appendices

(Provided on USB Drive for Hard Copy)

Appendix A: A-1 Environmental Compliance Approval
A-2 Land Use Permit
A-3 2025 Aggregate Permit Approval
A-4 2022 Papineau ECA Amendment - Correspondence
Appendix B: Monitoring and Screening Checklist (MECP)
Appendix C: Monitoring Well Logs
Appendix D: Field Forms, Laboratory Reports and Chain of Custody Records
D-1 Field Checklists
D-2 Groundwater Laboratory Reports
D-3 QAQC Comparisons
Appendix E: Historical Groundwater Chemistry (2006 to 2025)
Appendix F: Mann-Kendall Trend Analysis
Appendix G: Trigger Mechanisms and Contingency Plan
Appendix H: Capacity Calculation and 2010 Design & Operations Figures

1 Introduction

BluMetric Environmental Inc. (BluMetric®) was retained by The Municipality of Hastings Highlands (MHHs or Municipality) to conduct the 2025 environmental monitoring and sampling program and prepare the 2025 Annual Monitoring Report (AMR). This report provides a summary and analysis of environmental monitoring activities at the Papineau Lake Waste Disposal Site (WDS), in Maynooth, Ontario. The WDS, as shown in Figure 01, is herein referred to as the "Site".

This report is prepared in accordance with Condition 6 of the Environmental Compliance Approval (ECA) A361105 for the Site, issued May 26, 2011, and later amended on January 5, 2018, a copy of which is included in **Appendix A (A1).** The report covers all work and activities carried out for the period from January 1 to December 31, 2025. The report includes both the environmental monitoring and sampling program as well as details relating to site operations, including the Waste Transfer (WT) areas at the Site in 2025.

In November 2022, the MECP approved the revised trigger mechanism and contingency plan presented in the previous annual monitoring report. This is discussed in Sections 3.3 and 5.2.

The intent of this report is to be consistent with the general requirements of the Ontario Ministry of Environment, Conservation and Parks (MECP) document titled; *Monitoring and Reporting for Waste Disposal Sites (WDS), Groundwater and Surface Water: Technical Guidance Document* (MOE, November 2010), referred to as the "WDS Technical Guidance". The Monitoring and Screening Checklist from the WDS Technical Guidance has been completed and is included as **Appendix B** of this report. The screening checklist was completed with the Operational Status set as "open" as the Site operated through 2025.

1.1 Location

The WDS is located west of the intersection of Highway 62 and South Papineau Lake Road in Maynooth, Ontario (Figure 01). The civic address is 113 South Papineau Lake Road, Maynooth, Ontario. The WDS has a total site area of 7.3 hectares (ha) and is located on Part of Lots 2 & 3, Concession 5 of the former townships of Bangor, Wicklow, McClure, now part of the Municipality of Hastings Highlands. The facility layout, topography (2024), road network, and site features are shown on Figure 02.

1.2 Ownership and Key Personnel

The facility is operated by the MHHs, with the Municipal office located in Maynooth, Ontario. The property is owned by the Crown and administered by the MNR. MNR leases the property to MHHs for use as a WDS under a Land Use Permit (LUP). The current Land Use Permit (LUP) for the Site (LUP1634-1004189) dated June 1, 2016, identifies the 7.3 ha site area and is in effect until May 31, 2026. A copy of the LUP is provided in **Appendix A (A2)**. In 2025, Fuhrmann Aggregate Consulting Services (FACS) successfully applied to amend Aggregate Permit 10473 to reduce the area under the authorization of the Permit to provide additional lands to the WDS ECA. The revised Aggregate Permit is provided in **Appendix A (A3).**

The facility's operational representative is responsible for all activities on-site. The Site contact is David Stewart and the Competent Environmental Practitioner (CEP) for both groundwater and surface water is S'rana Scholes, P.Eng., of BluMetric. Ms. Scholes is a Professional Engineer as designated by Professional Engineers Ontario (PEO).

Contact information is outlined in Table 1.

Table 1: Contact Information

Role	Name	Address	Phone Number	Email
Site Owner/ Contact	CAO, MHHs – David Stewart	P.O. Box 130 33011 Highway No. 62, Maynooth, ON K0L 2S0	(613) 338-2811 x233	dstewart@hastingshighlands.ca
CEP	Senior Environmental Engineer, BluMetric – S'rana Scholes, P.Eng.	209 Frederick Street, Kitchener, ON N2H 2M7	(877) 487-8436 x218	sscholes@blumetric.ca

1.3 Description and Development of the WDS

The Site has a total area of 7.3 hectares (ha) with a 0.8 ha approved landfilling area. In addition to domestic waste, Papineau Lake WDS includes recycling bins for metal, plastic, paper/cardboard products, as well as segregated areas for scrap metal, tires, and brush. Construction and demolition wastes are no longer accepted at the Site. The Ontario Electronic Stewardship (OES) has approved the Papineau Lake WDS for the collection of Waste Electrical and Electronic Equipment (WEEE) wastes. New regulations came into effect in 2020 with respect to this material, now referred to as Electrical and Electronic Equipment (EEE). The regulation with respect to EEE falls under the

Resource Recovery and Circular Economy Act, 2016, and the regulation was filed on September 21, 2020.

The ECA (A7361105) was issued on May 26, 2011, for the use and operation of a 0.8 ha waste disposal/transfer site within a total site area of 7.3 ha. In January 2018, an amendment was issued that updated the site operating hours, imposed a restriction on the daily volume of industrial, commercial, and institutional waste, and approved the trigger mechanisms and contingency plan, which was further revised via email correspondence in 2022. The amendment also provided the Municipality until January 5, 2021, to obtain easement rights for the Contaminant Attenuation Zone (CAZ). In 2023, the MECP accepted a reduced groundwater monitoring program, limiting fall sampling to water level measurements at all wells and analytical sampling at monitoring wells PL1-06, PL3-06, PL7-19, PL8-19, and PL9-19 only.

The Municipality has been coordinating with the Ministry of Natural Resources (MNR) to obtain the easement rights for additional lands. Approval to amend the adjacent Aggregate Resources Permit was granted to remove lands from the aggregate permit and transferred to the Municipality for use as additional lands for the landfill, subject to MECP approval. On August 21, 2025, the MNR issued the amended Aggregate Resources Permit **(see Appendix A (A3)).** An amendment to the ECA is required to finalize the registration of these additional lands.

1.4 Monitoring and Reporting Program Objectives and Requirements

The objectives of the monitoring and reporting program are to identify and mitigate impacts to the environment caused by the municipal solid WDS. In addition, the monitoring and reporting program are designed to adhere to the MECP's WDS-Technical Guidance and the ECA for the Site. The ECA specifies routine monitoring for explosive methane gas under Section 8(1), and groundwater monitoring under Sections 8(2–7).

Based on the recommendations provided in the 2022 Annual Monitoring Report, the MECP reviewed the program and, in a comment dated September 4, 2023, approved a reduction in monitoring locations for the fall sampling event. This adjustment was incorporated into the fall 2023 monitoring event and has been continued in subsequent monitoring programs. A copy of this correspondence is provided in **Appendix A (A-4).**

2 Physical Setting

2.1 Geology

2.1.1 Surficial Geology

The surficial geology of the area is a glaciofluvial plain covered with till veneer. Papineau Lake WDS is located within an area formerly used for aggregate extraction. The area immediately to the south of the WDS is still used for aggregate extraction. Overburden thickness at the Site ranges from approximately 1.8 m at PL6-12 to greater than 17 m at PL7-16. Overburden materials typically consist of sand with coarser materials such as gravel, stone, and boulders found at greater depths.

The monitoring well logs are provided in **Appendix C.**

2.1.2 Bedrock Geology

Bedrock in the area includes tectonites, gneisses mylonites and protomylonites, as well as mafic to ultramafic plutonic rocks (diorite, gabbro, peridotite, pyroxenite, anorthosite, derived metamorphic rocks) (Ontario Geological Survey, 1991). Monitoring well PL6-12 is screened in dark, grey granite.

A 2023 assessment of potential groundwater users in the vicinity of the Papineau Lake WDS identified two water supply wells approximately 350 m northeast of the site with depths of 43.3 and 36.9 m, drilled in bedrock. One water supply well was identified approximately 200 m northwest of the site with a depth of 54.9 m, drilled in bedrock (Groundwater Information Network, February 2023).

2.2 Surface Water Features

There are no surface water features in the immediate vicinity of the WDS. The closest surface water body is Kitts Creek located approximately 500 m to the south. The largest surface water feature in the area, Papineau Lake is located just under 1 km to the north.

Based on the MECP's review of the 2018 and 2019 annual monitoring reports, surface water is not sampled unless it is observed to be flowing off-site or there are upward trends in concentrations of parameters of concern at the south boundary wells.

A topographic survey was carried out in June 2024 and the Site topography based on that survey is present in Figure 03, Figure 04, and Figure 05. The site layout is also provided in these figures.

3 Description of Monitoring Program

3.1 Site Inspections and Operations Monitoring

Site visits to the Papineau Lake WDS were made on May 6, and October 20, 2025. The detailed site checklists are provided in **Appendix D (D1)**. In general, the site was observed to be in good condition; however, the following concerns were noted:

- Spring: The scrap metal and bulky item piles were large and encroaching on each other. The electronics bin was left open and appeared disorganized.
- Fall: The township was hauling material from the aggregate pit located behind the WDS, resulting in the gate being left open. The scrap metal and bulky item piles remained large, although a contractor was scheduled to remove them in the near future. The active/trench working area was not covered or compacted. Additionally, there was an accumulation of loose plastic debris across the Site, particularly northwest of the access road, directly across from the active/trench area.

Select photographs taken during the Site visits are provided at the end of the text following the tables and figures.

3.2 Monitoring Locations, Frequency and Monitoring Parameters

3.2.1 Groundwater Monitoring

The Papineau WDS groundwater monitoring program is conducted on a semi-annual basis (spring and fall). There are currently nine groundwater monitoring wells located at the Site. Groundwater monitoring wells PL1-06, PL2-06, and PL3-06 were drilled and installed in 2006 to depths of 5.18 m below ground surface (mbgs), 9.91 mbgs, and 12.95 mbgs, respectively. Each well screens a water-bearing medium-grained sand and gravel unit.

Three additional groundwater monitoring wells were drilled and installed in October 2012 to fulfill a request from the MECP (MOE, 2011). Monitoring wells PL4-12, PL5-12, and PL6-12 were drilled to depths of 10.67 mbgs, 13.72 mbgs, and 12.19 mbgs, respectively. Monitoring wells PL4-12 and PL5-12 screen a water-bearing medium-grained sand and gravel unit.

In 2016, the MECP requested that additional monitoring wells be installed to better characterize groundwater flow direction, downgradient groundwater quality, and to evaluate potential leachate impacts. Three additional overburden wells (PL7-16, PL8-16, and PL9-16) were installed to depths of 17.1 mbgs, 10.7 mbgs, and 13.4 mbgs, respectively. These wells were installed to meet the above objectives and to assist in determining the potential requirements for a contaminant attenuation zone (CAZ) downgradient of the Site.

All groundwater monitoring wells meet the construction requirements set forth in O.Reg. 903. Table 2 summarizes the GPS coordinates and location descriptions of the groundwater monitoring wells. Monitoring well logs are provided in **Appendix C**.

Table 2: Groundwater Monitor Sampling Locations

Sample Location	Northing (m)	Easting (m)	Screened Interval (mbgs)	Location Description
PL1-06	5021301	281140	2.13 – 5.18	Base level of former gravel pit, 55 m south-west of waste footprint area
PL2-06	5021368	281238	5.336 – 9.906	8 m southeast of waste footprint area (leachate well)
PL3-06	5021405	281404	8.38 – 12.95	143 m east of waste footprint area (background well)
PL4-12	5021332	281179	6.10 – 10.67	5 m south of waste footprint area (leachate well)
PL5-12	5021388	280075	9.15 – 13.72	Within waste footprint area (leachate well)
PL6-12	5021448	281169	7.62 – 12.19	23 m northwest of waste footprint area
PL7-16	5021177	281137	9.2 – 12.2	164 m south of the waste footprint area
PL8-16	5021250	281067	7.6 – 10.6	140 m southwest of the waste footprint area
PL9-16	5021301	281238	9.6 – 12.8	70 m southeast of the waste footprint area

Note: UTM Zone 18, NAD 83, All monitoring well coordinates were surveyed in September 2023.

Groundwater monitoring is conducted on a semi-annual basis, with sampling completed during the spring and fall monitoring events. All monitoring wells are sampled during the spring event. During the fall event, groundwater samples are collected from monitoring wells PL1-06, PL3-06, PL7-16, PL8-16, and PL9-16, while groundwater levels are measured at all monitoring wells. In September 2023, the fall monitoring program was revised following comments from the MECP, resulting in the removal of four monitoring wells (PL2-06, PL4-12, PL5-12, and PL6-12) from the fall groundwater sampling program. This revised monitoring program has been implemented since the fall 2023 monitoring event.

Groundwater samples were collected on May 6 and October 20, 2025. The laboratory reports and chain of custody (COC) records are included in **Appendix D (D2)**. Table 3 lists the groundwater quality monitoring parameters. Historic groundwater sampling data results are presented in **Appendix E**.

Table 3: Groundwater Quality Monitoring Parameters

Category	Parameters
Spring Event	
Organic Parameters	Dissolved Oxygen Demand (DOC), Phenols
Inorganic Parameters	Nitrate, Nitrite, Ammonia, Chloride, Sodium, Potassium, Calcium, Magnesium, Sulphate, Alkalinity, Total Phosphorous (TP), Total Kjeldahl Nitrogen (TKN)
Dissolved Metals	Iron, Chromium, Copper, Lead, Cadmium, Boron, Barium, Manganese, Zinc, Arsenic, Mercury
Physical/Chemical Parameters	pH, Conductivity, Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD)
Fall Event	
Organic Parameters	DOC
Inorganic Parameters	Nitrate, Ammonia, Chloride, Sodium, Calcium, Magnesium, Sulphate, Alkalinity
Dissolved Metals	Iron, Boron, Barium, Manganese
Physical/Chemical Parameters	pH, Conductivity, TDS, COD

Field measurements of groundwater pH, temperature, and conductivity were collected at the time of sampling.

During the 2025 spring and fall monitoring events, the conditions of groundwater monitoring wells were inspected. Any repairs, such as new locks, labels or well caps, were made as necessary. Protective casings with proper annular space seals remain in place to ensure that surface water or foreign materials cannot enter groundwater monitoring wells. Monitoring wells are fitted with a vermin proof cap to meet the requirements of O.Reg. 903 and are locked to provide protection against vandalism and are in line with industry best practices.

3.2.1.1 Groundwater Elevation and Flow Monitoring

During each monitoring event, groundwater elevations were collected from each of the monitoring wells. Groundwater level measurements were collected using a Solinst electronic water level meter prior to purging/sampling activity. Groundwater elevation data are presented in Table 4.

Table 4: Groundwater Depths and Elevation Data

Groundwater Monitor	Elevation TPVC (masl)	Depth 06-May-25 (mbpvc)	Depth 20-Oct-25 (mbpvc)	Groundwater Elevation 06-May-25	Groundwater Elevation 20-Oct-25
PL1-06	317.78	0.91	1.54	316.87	316.24
PL2-06	324.81	7.78	8.32	317.04	316.49
PL3-06	325.75	8.06	8.51	317.69	317.25
PL4-12	317.68	0.75	1.35	316.93	316.33
PL5-12	325.23	11.03	11.93	314.20	313.30
PL6-12	326.65	6.29	7.73	320.36	318.92
PL7-16	323.62	6.88	7.52	316.74	316.10
PL8-16	319.64	2.60	3.42	317.05	316.22
PL9-16	326.04	8.98	9.64	317.06	316.40

Note: * Elevation data collected using an RTK unit from September 2023 and recorded in metres above sea level (masl).

3.2.1.2 Groundwater Gradients and Flow Direction

Based on the spring 2025 groundwater elevation data, groundwater is inferred to flow generally toward the south, in the direction of monitoring well PL7-16. Calculated horizontal hydraulic gradients across the Site are relatively low, indicating generally flat groundwater conditions. Representative gradients toward PL7-16 are 0.0133 m/m from PL6-12, 0.0012 m/m from PL4-12, and 0.0009 m/m from PL2-06. A reverse gradient of -0.0119 m/m was observed between PL5-12 and PL7-16, corresponding with a localized depression in the groundwater elevation near PL5-12. This well is located within the landfill footprint, and the irregular contour pattern likely reflects localized influences from the waste footprint and/or subsurface heterogeneity. Despite this localized variability, the overall interpreted groundwater flow direction across the Site remains toward the south.

Fall 2025 groundwater elevation data indicate a similar flow pattern, with continued southward flow toward PL7-16 and a localized depression at PL5-12 with reverse gradient to this location from PL7-16. Fall horizontal hydraulic gradients toward PL7-16 are 0.0103 m/m from PL6-12, 0.0014 m/m from PL4-12, and 0.0011 m/m from PL2-06, with a reverse gradient of -0.0131 m/m between PL5-12 and PL7-16.

These flow directions and gradients are consistent with recent historical observations, confirming an overall predominant southward groundwater flow direction, with a depression noted in the vicinity of PL5-12. Spring and fall 2025 groundwater elevation contours are presented on Figures 04 and 05, respectively. Vertical hydraulic gradients cannot currently be determined, as there are no "nested" monitoring wells on Site and no monitoring wells located adjacent to surface water bodies.

3.2.2 Surface Water Monitoring

Surface water monitoring is not specifically required at the Papineau Lake WDS. In 2022, the MECP recommended that ponding water no longer be sampled, as it remains onsite and does not contribute to off-site discharge. Consequently, no surface water samples were collected during the 2025 sampling events. For reference, the former surface water sampling station (SW1) is shown on Figure 02.

3.2.3 Landfill Gas Monitoring

The primary gas present at landfill sites is methane. Methane cannot cause an explosion unless it accumulates to a concentration above its lower explosive limit (LEL) in an enclosed area. The LEL for methane is 5% in air. O.Reg. 232/98 methane concentration limits are:

- Less than 2.5% methane gas (25,000 ppm, LEL=50%) in the subsurface at the property;
- Less than 1.0% methane gas (10,000 ppm, LEL-20%) in an on-site building, or its foundation; and
- Less than 0.05 % methane gas (500 ppm, LEL=1%) in a building, or its foundation, which is located off-site.

Routine landfill gas monitoring within any buildings or structures is required at the Site.

3.3 Trigger Mechanisms and Contingency Plan

The trigger mechanisms and contingency plan for the Site was approved with the Notice No. 2 approval of the ECA, Condition 8 (8) (a) and (b). In November 2022, the MECP approved revisions regarding the surface water trigger values. The revised trigger mechanisms and contingency plan is provided in **Appendix G**.

Previous correspondence with the MECP indicated that it would be suitable to increase the trigger concentrations for the groundwater wells since they are over 500 m away from the Kitts Creek. The groundwater trigger concentrations have not been revised to date.

3.4 Monitoring Procedures and Methods

3.4.1 Groundwater Monitoring

Groundwater monitors were purged a minimum of three borehole volumes or until the monitor purged dry. In the case where a monitor was purged dry, samples were collected after sufficient water had returned for sampling purposes. Field temperature, pH, and conductivity measurements were recorded at the time of sampling using a YSI multi-meter. The instrument was calibrated for pH and conductivity. Samples were field filtered for DOC and metals analyses. Samples were collected in laboratory prepared and supplied bottles and submitted to Bureau Veritas (BV) Laboratories for analyses. BV is an accredited members of the Canadian Association of Laboratory Accreditation (CALA). Groundwater samples were stored at approximately 4°C during shipment for chemical analyses. Holding times for samples conformed to Canadian Council of Ministers of the Environment (CCME) Standards, where applicable (CCME, 1993). Chain of Custody (COC) forms accompanied the samples from submittal to the laboratory until the chemical results were provided to BluMetric. Laboratory reports and COC forms are compiled in **Appendix D (D2)**.

3.4.2 Surface Water Monitoring

Field observations in the spring indicated that the southern portion of the Site and Aggregate Pit were largely underwater. As detailed in Section 3.2.2, the MECP recommended that ponded water no longer be sampled, assuming it remains onsite and does not contribute to off-site discharge. There is no direct evidence of surface water flowing off site in 2025 based on field observations and therefore no surface water samples were collected.

3.4.3 Landfill Gas Monitoring

There are no sampling valves, ports, or vapour monitors on-site. Gas monitoring using a RKI Eagle gas monitor was collected from the on-site Attendant's building and all monitoring wells during both sampling events in 2025. Gas monitoring measurements from the building are collected by inserting the intake of the gas monitoring equipment through a small hole or gap within the structure while the structure remains closed. Gas monitoring measurements from the groundwater monitoring wells are collected, prior to collecting groundwater levels or samples, by inserting the intake of the gas monitoring equipment under the cap of the monitoring well prior to removal of the cap and by keeping the best seal possible around the cap and gas equipment intake.

3.4.4 Field QA/QC Program

The Quality Assurance/Quality Control (QA/QC) program for the Site included the collection of field duplicate samples to demonstrate that field sampling techniques utilized by BluMetric personnel are capable of yielding reproducible results. Field duplicates were collected concurrently with the original sample. Field duplicates were collected at a 10% frequency during the sampling program at the WDS.

Precision is a measure of the reproducibility of analytical results and can be expressed quantitatively by the relative percent difference (RPD) between the original sample(s) and their corresponding field blind duplicate sample(s). The RPD is defined by the following equation:

$$RPD = 2 \times \frac{|(S - D)|}{(S + D)} \times 100$$

Where: S = concentration in the original sample
D = Concentration in the duplicate

An RPD is calculated where the average of the measured parameter concentrations of the original (S) and duplicate (D) samples are greater than 5X the laboratory readable detection limits (RDL), which represents the RPD qualification criteria. A lower level of precision is expected where the above criteria are not met. A high level of reproducibility with respect to sample results collected at the Site is indicated by an RPD value below 10% for electrical conductivity and 20% for metals and inorganics.

These criteria are used as a general guideline and correspond to those recommended within the O. Reg. 153/04 Analytical Protocol (MOE, 2011) and by the Ontario QA/QC Interpretation Guide – Environmental Services (Maxxam, 2015). An RPD below the recommended criteria is considered acceptable, indicating that the sampling methodology is capable of producing repeatable results.

One blind field duplicate was sampled and submitted for analyses per sampling event. The field duplicate bottles are filled simultaneously to the sample location selected for duplication. The laboratory prepared bottles (identified and duplicate) for each group of chemical parameters (e.g. metals, nutrients etc.) is first filled for the identified location and then the duplicate for that same group of chemical parameters is immediately filled. This continues until the two sample bottles for each group of parameters are filled.

4 Monitoring Results

4.1 Groundwater Quality

The groundwater chemistry results for the nine groundwater monitors sampled during the May 6, 2025, and October 20, 2025, events at Papineau Lake WDS are tabulated in Table 11 (end of text). The groundwater chemistry results were compared to the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG), calculated Reasonable Use Values (RUVs), and Provincial Water Quality Objectives (PWQO).

Ontario Drinking Water Standards and Operational Guidelines (ODWSOG)

The summary of the 2025 groundwater results exceeding the ODWSOG criteria is summarized in Table 5.

Table 5: Groundwater Quality Parameters Exceeding ODWSOG Criteria

Groundwater Monitoring Location	Parameter
PL1-06	DOC (fall), Manganese
PL2-06*	DOC (Spring), Manganese (Spring)
PL3-06 (background)	Alkalinity (below criteria)
PL4-12*	Manganese (Spring)
PL5-12*	Iron (Spring), Manganese (Spring)
PL6-12*	Alkalinity (below criteria, Spring)
PL7-16	Manganese
PL8-16	Alkalinity (below criteria)
PL9-16	N/A

Notes: - Alkalinity concentrations are naturally below the lower criteria.
*Location sampled only during the spring event

Reasonable Use Values (RUVs)

Monitoring well PL3-06 is located hydraulically upgradient from the waste mound and is considered to represent background groundwater conditions at the Site. The water quality results for monitoring well PL3-06 were used to calculate Reasonable Use Values (RUVs) as per the guidance offered by Policies B-7 and B-7-1 of the MECP.

The following calculations are based on the median background groundwater (PL3-06) values from the 2006 to 2025 results. Table 6 summarizes the data used to calculate Cm values (RUVs).

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

Where:

- Cm: maximum allowable concentration in groundwater beneath adjacent property (Reasonable Use Values)
- Cb: median background concentration before any effects from human activity
- Cr: maximum concentration that should be present based on use (ODWSOG)
- x: constant that reduces the contamination to a level considered by the MECP to have only a negligible effect on the use of the water (0.25 for a health-related parameter and 0.5 for an aesthetic or physical parameter)

Table 6: Reasonable Use Calculations

Parameter	Cb (mg/L)	Cr (mg/L)	x	RUV (mg/L)
Alkalinity as $CaCO_3$ - Lower	23.0	30	0.5	26.5
Alkalinity as $CaCO_3$ - Upper	23.0	500	0.5	261.5
Chloride	5.0	250	0.5	127.5
Dissolved Organic Carbon	1.0	5	0.5	3.0
N-NO_3 (Nitrate)	0.290	10	0.25	2.718
N-NO_2 (Nitrite)	0.025	1	0.25	0.27
pH - Lower	6.930	6.5	0.5	6.72
pH - Upper	6.930	8.5	0.5	7.72
Sulphate	3.395	500	0.5	251.7
TDS (COND - CALC)	54.0	500	0.5	277.0
Sodium	1.960	200	0.5	100.98
Arsenic	0.002	0.01	0.25	0.004
Barium	0.005	1	0.25	0.25
Boron	0.005	5	0.25	1.254
Cadmium	0.00005	0.005	0.25	0.001
Chromium	0.0005	0.05	0.25	0.013
Copper	0.0005	1	0.5	0.5
Iron	0.005	0.3	0.5	0.15
Lead	0.0005	0.01	0.25	0.003
Manganese	0.001	0.05	0.5	0.026
Mercury	0.00005	0.001	0.25	0.00029
Zinc	0.0025	5	0.5	2.5

Parameters from the 2025 Papineau Lake WDS monitoring program that exceed the RUVs are shown in Table 7.

Table 7: Groundwater Quality Parameters Exceeding RUV

Groundwater Monitoring Location	Parameter
PL1-06	DOC, TDS, Manganese
PL2-06*	Alkalinity (Spring), DOC (Spring), TDS (Spring), Manganese (Spring)
PL3-06 (background)	Alkalinity (below criteria)
PL4-12*	TDS (Spring), Manganese (Spring)
PL5-12*	pH (Spring), Iron (Spring), Manganese (Spring)
PL6-12*	Alkalinity (below criteria, Spring)
PL7-16	DOC (Fall), Manganese
PL8-16	Alkalinity (below criteria)
PL9-16	N/A

Notes: - Alkalinity concentrations are naturally below the lower criteria.
*Location sampled only during the spring event

PWQO

Groundwater results were compared to the PWQO criteria based on MECP input that groundwater data should be compared to surface water criteria to screen for potential impacts to Kitts Creek located downgradient from the WDS. Parameters from the 2025 WDS monitoring program that exceed the PWQOs are shown in the following Table 8.

Table 8: Groundwater Quality Results Exceeding PWQOs

Groundwater Monitoring Location	Parameter Exceeding PWQO
PL1-06	Copper (Spring), TP (Spring), Boron (Fall)
PL2-06*	TP (Spring), Boron (Spring), Copper (Spring)
PL3-06 (background)	TP (Spring)
PL4-12*	TP (Spring)
PL5-12*	TP (Spring), Iron (Spring)
PL6-12*	TP (Spring)
PL7-16	None
PL8-16	Alkalinity (Fall), TP (Spring)
PL9-16	TP (Spring)

Notes: - Copper and total phosphorus only analyzed during the spring event.
*Location sampled only during the spring event.

Based on PWQO criteria, alkalinity should not be decreased by more than 25% of the natural concentration. The PWQO value for alkalinity was calculated using background monitoring well PL3-06 to represent to natural concentration of alkalinity. The mean concentration for background alkalinity from 2006 to 2025 is 23.6 mg/L. Based on the PWQO criteria, the minimum acceptable alkalinity concentrations is 17.7 mg/L.

The alkalinity concentration measured at PL3-06 during the Fall 2025 monitoring event was 16 mg/L, which is slightly below this value; however, as this well represents background conditions, the result is considered reflective of natural variability in alkalinity concentrations at the Site.

4.2 Landfill Gas Concentrations

Table 9 presents the 2025 gas monitoring results which ranged from 0 to 20 ppm for the spring event and from 0 to 10 ppm in the fall event.

Table 9: Combustible Gas Monitoring Results

Monitoring Location	RKI Reading (ppm) 6-May-2025	RKI Reading (ppm) 20-Oct-2025
Attendant's Building	0	-
PL1-06	0	0
PL2-06	0	0
PL3-06 (background)	0	0
PL4-12	0	5
PL5-12	20	10
PL6-12	0	5
PL7-16	0	0
PL8-16	0	5
PL9-16	0	0

4.3 QA/QC Results

One groundwater duplicate sample was collected during each sampling event in 2025. The consistency of the results was evaluated based on the relative percentage difference (RPD) of each field duplicate pair. No field duplicate pairs exceeded the recommended percentage difference. The QA/QC comparison calculations are provided in **Appendix D, Item D-3.**

5 Assessment, Interpretation, and Discussion

5.1 Groundwater Assessment

Upgradient Water Quality

Monitoring well PL3-06 is considered representative of background water quality. Alkalinity concentrations in 2025 were below the ODWQS criterion in both the spring and fall, continuing a consistent trend of low alkalinity at this well since 2012, with the only exception being a single measurement within the criterion in 2019.

A PWQO exceedance for total phosphorus was observed in the spring (TP is not analyzed in the fall), consistent with historical results, as PL3-06 has exceeded the PWQO for total phosphorus in every spring sampling event since 2013. These trends are considered to reflect natural variations in groundwater quality in the region.

Monitoring well PL6-12 is also located upgradient of the landfill however is not considered representative of background groundwater quality. PL6-12 is only sampled in the spring monitoring event. In 2025, alkalinity was below the ODWQS criterion, while TP exceeded the PWQO. Historically, alkalinity was frequently below the ODWQS from 2013–2018, with only two below criteria measurements between 2019 and 2025 (2021 and 2025). TP has remained below the PWQO since it was first analyzed in 2013. Following installation, PL6-12 had two ODWQS exceedances for manganese (2012 and 2013) and a PWQO cobalt exceedance in 2012, with a single PWQO zinc exceedance in 2017. In spring 2021 and 2022, ODWQS exceedances for iron and PWQO exceedances for copper and lead were observed; however, concentrations returned to below detection limits (iron and lead) or within historic ranges (copper) in subsequent sampling events and have remained stable since. Low alkalinity and elevated TP are also observed at the background well (PL3-06) and are considered naturally occurring.

Leachate Monitoring Wells

Monitoring well PL2-06, located immediately south of the southeastern border of the landfill, is representative of leachate water quality and is sampled only during the spring event. In 2025, concentrations exceeded the ODWQS for DOC and manganese, and the PWQO for TP, boron, and copper. Historically, PL2-06 has frequently exceeded ODWQS for DOC, iron, and manganese, with occasional ODWQS exceedances for pH and a single exceedance for TDS in 2023. PWQO exceedances have been frequently observed for TP, iron, and boron, while phenols consistently exceeded the PWQO from 2019 to 2023, although results in 2024 and 2025 were below detection limits. Compared to background conditions, concentrations of alkalinity, boron, chloride,

conductivity, TDS, sulphate, calcium, potassium, and magnesium are elevated, but generally remain below ODWQS criteria.

Monitoring well PL4-12, located immediately south of the southern corner of the approved landfill area, is sampled only in the spring. In 2025, it exhibited an ODWQS exceedance for manganese, an RUV exceedance for TDS, and a PWQO exceedance for TP. Historically, PL4-12 has consistently exceeded ODWQS and RUV criteria for manganese, frequently exceeded RUV criteria for pH, and consistently exceeded RUV criteria for TDS from 2020–2025, with occasional TDS RUV exceedances from 2012–2020. PWQO exceedances for TP have been consistent since it was first analyzed in 2013, with isolated RUV exceedances for DOC, most recently in 2021.

Elevated concentrations of alkalinity, boron, chloride, conductivity, TDS, sulphate, calcium, potassium, and magnesium are observed relative to background conditions, but generally remain within ODWQS.

Monitoring well PL5-12, located within the waste mound, is sampled only in the spring. In 2025, it exceeded ODWQS criteria for iron and manganese, and PWQO for iron and TP. Historically, PL5-12 has consistently exceeded ODWQS and PWQO for iron, and ODWQS for manganese, and consistently exceeded PWQO for TP. PWQO exceedances for Phenols occurred in 2021–2022, with 2024 and 2025 results below the detection limit. Elevated alkalinity, boron, chloride, conductivity, TDS, sulphate, calcium, potassium, and magnesium are noted relative to background conditions but generally remain within ODWQS.

Downgradient Monitoring Wells

Monitoring wells PL1-06, PL8-16, PL9-16, and PL7-16 are located downgradient of the WDS, adjacent to or outside of the 7.3 ha site boundary.

PL1-06, situated immediately south of the southwestern property boundary, is used to assess compliance with Guideline B-7. In 2025, PL1-06 exceeded ODWQS for manganese, RUVs for DOC, TDS, and manganese, and PWQO criteria for TP and copper. Historically, PL1-06 has consistently exceeded ODWQS and RUV for manganese, frequently exceeded RUV for DOC and TDS (mainly in the fall, with spring exceedances observed since 2021), and occasionally exceeded RUV for pH, most recently in spring 2024. PWQO exceedances for boron have been frequent, particularly in the fall, and PWQO exceedances for copper have been consistently observed in the spring since 2022. PL1-06 is considered impacted by leachate. The site is considered not in compliance with Guideline B-7 along the southwestern property boundary.

PL9-16, located along the southeastern property boundary, is used to assess compliance with Guideline B-7. In 2025, the well had a single exceedance, a PWQO exceedance for TP. Elevated TP concentrations are considered naturally occurring in the area. Historically, PL9-16 has consistently exceeded the PWQO for TP. It has also experienced two ODWQS and RUV exceedances for DOC and occasional exceedances for alkalinity, although no such exceedances have been observed since fall 2023. A single PWQO exceedance for phenols occurred in 2021, with subsequent results below detection or at the detection limit. PL9-16 is not considered impacted by leachate, and the Site is considered in compliance with Guideline B-7 along the southeastern boundary.

PL8-16 is located southwest of the property boundary within the aggregate pit, further downgradient and south-southwest of PL1-06. In 2025, the well exhibited ODWQS (below criteria) and RUV exceedances for alkalinity in both spring and fall, a spring PWQO exceedance for TP and a fall PWQO exceedance for alkalinity. Elevated TP concentrations are considered naturally occurring and the alkalinity PWQO exceedance is considered reflective of natural variation. Historically, PL8-16 has consistently shown ODWQS (below criteria) and RUV exceedances for alkalinity, which are also considered naturally occurring. Occasional RUV and ODWQS (below criteria) exceedances for pH have been observed, most recently in 2022, along with a single ODWQS and RUV exceedance for DOC, reflecting natural variation in groundwater quality. PL8-16 is not considered impacted by leachate.

PL7-19 is the southernmost monitoring well, located within the aggregate pit south of the property boundary. Groundwater across the property boundary and aggregate pit is interpreted to flow toward PL7-19. In 2025, the well exhibited ODWQS and RUV exceedances for manganese in both spring and fall, and an RUV exceedance for DOC in the fall. Historically, PL7-19 has frequently exceeded ODWQS and consistently exceeded RUV criteria for manganese, with isolated RUV and ODWQS exceedances for DOC and occasional RUV exceedances for pH. Two PWQO exceedances for phenols occurred in 2021 and 2022, with concentrations remaining below detection limits since. Occasional PWQO exceedances for boron have been observed, most recently in 2024. Compared to background concentrations, elevated alkalinity is observed, with slightly elevated conductivity and concentrations of calcium, magnesium, and potassium; however, all remain within ODWQS criteria. PL7-19 is considered impacted by leachate.

Based on the 2025 groundwater results, the Site is not in compliance with Guideline B-7 along the downgradient southwestern and southern property boundaries. A 4.11 ha CAZ has been proposed for the Site (Figures 2 and 3) to address these areas. Registration of the CAZ is anticipated to bring the Site into compliance. Further review of the proposed CAZ lands is recommended, as

groundwater data collected since the lands were approved in 2018 (2019–2025) can now be used to refine the CAZ design and ensure it appropriately addresses the areas of non-compliance.

Groundwater / Surface Water Interaction
The ponded/depression area southwest of the WDS that was historically used as a surface water sampling location has been filled in. The low area just south of the waste footprint (where aggregate has been excavated) contains ponded water during spring freshet and/or periods of heavy rain. It does not runoff to surface waters but infiltrates into the subsurface. The MECP surface water review of the 2015 Annual Monitoring Report indicated that groundwater data should be compared to surface water criteria to screen for potential impacts to Kitts Creek located downgradient from the WDS.

Four parameters in the groundwater (total phosphorus, copper, boron, and iron) exceeded the PWQO criteria during 2025. Exceedances associated with total phosphorus are attributed to natural variation in water quality as these exceeding parameters tend to vary between non-detectable concentrations and slight PWQO exceedances.

Boron exceeded the PWQO criteria at PL1-06 (fall) and PL2-06 (spring), but concentrations remain stable. While boron did not exceed the PWQO criteria at PL4-12, a slight upwards trend is apparent from 2017 to 2025. This is likely associated with waste disposal activities in close proximity to PL4-12. Continued monitoring is required to assess this slight increasing trend in boron concentrations.

5.2 Mann-Kendall Trend Analysis

In order to support the assessment of groundwater quality at the site, a Mann-Kendall trend analysis was conducted for each monitoring location using the analytical results since 2006 (for wells drilled in 2006), 2012 (for wells drilled in 2012) and 2016 (for wells drilled in 2016). The trend analysis was limited to the parameters that have been previously discussed to be leachate indicator parameters and parameters that have historically exceeded at the monitoring location. The Mann-Kendall trend analysis is provided in **Appendix F** and summarized below.

PL1-06
PL1-06 exhibited increasing trends for alkalinity, TDS, and manganese, while no apparent trend was observed for DOC.

PL2-06
PL2-06 exhibited increasing trends for alkalinity, DOC, TDS and manganese.

PL3-06
PL3-06 exhibited decreasing trends for alkalinity, DOC, TDS and manganese.

PL4-12
PL4-12 exhibited increasing trends for alkalinity and manganese, while no apparent trends were observed for DOC and TDS.

PL5-12
PL5-12 exhibited a decreasing trend for alkalinity and an increasing trend for manganese. A stable trend was observed for TDS, while no apparent trend was identified for DOC.

PL6-12
PL6-12 exhibited a decreasing trend for TDS. An increasing trend was observed for manganese, and a probable increasing trend was identified for alkalinity. A stable trend was observed for DOC.

PL7-16
PL7-16 exhibited increasing trends for alkalinity and manganese, and a probable increasing trend for TDS. No apparent trend was observed for DOC.

PL8-16
PL8-16 exhibited a probable increasing trend for alkalinity. Stable trends were observed for TDS and manganese, while no apparent trend was observed for DOC.

PL9-16
PL9-16 exhibited a decreasing trend for alkalinity and a probable increasing trend for manganese. No apparent trends were observed for DOC and TDS.

5.3 Trigger Mechanisms and Contingency Plan Assessment

The trigger plan is assessed using monitoring wells PL7-16, PL8-16, PL9-16 for both groundwater and surface water impacts. The groundwater chemical results in 2025 did not trigger the Tier 1 Contingency Plan response for surface water and groundwater.

5.4 Landfill Gas Assessment

The gas readings collected in the Attendant's building and monitoring wells ranged from 0 to 20 ppm in 2025. These results indicated methane gas concentrations are well below the 10,000-ppm concentration of concern for the structure on-site and the 25,000-ppm concentration of concern for the sub-surface.

6 On-Site Operations

6.1 Annual Waste Summary

Although access to the landfill site is controlled via a locked security gate, residents occasionally deposit garbage at the disposal site outside of the landfill's normal operating hours. The Municipality takes steps to deter these occurrences. This contribution is collected by site personnel, recorded, and included in the total waste volumes identified for the Site.

The annual recycling (R) and waste (W) tonnages for 2024 and 2025, excluding the segregated materials discussed in Section 6.2.1, are tabulated in Table 10. Tonnages of recycled goods and waste are monitored to ensure that recyclables are not being deposited in the landfill. In 2025, it is estimated that 17% of waste, excluding the segregated materials discussed in Section 6.2.1, was diverted from the landfill by recycling.

The 2025 residential/commercial waste calculations are based on bag counts at the waste site. There were 13,037 bags deposited at the Papineau Lake WDS in 2025. An assumed density of 15 kg/bag (based on experience of the MHH's Operations Manager at similar waste sites) was used in the tonnage calculations.

Table 10: Annual Recycling and Waste Tonnages

Q1		Q2		Q3		Q4		Year end	
R	W	R	W	R	W	R	W	R	W
2024									
7.3	29.8	11.2	47.6	16.7	69.9	7.8	37.8	43.1	185.1
2025									
6.8	33.8	10.4	48.9	14.0	71.3	9.0	41.5	40.1	195.6

Based on these reported quantities, the mass of recyclables collected in 2025 is approximately 7% less than collected in 2024. The amount of waste received has increased by 5.6% since 2024.

6.1.1 Annual Segregated Materials Removed Summary

Segregated materials are collected at each of the nine WDSs/WTSs in Hastings Highlands. The breakdown of these wastes in 2025 at the Papineau Lake WDS was:

- Scrap Metal – 0 tonnes
- Bulky Wastes – 0 tonnes
- Electrical and Electronic Equipment – 0 tonnes
- 15 Tires

Household hazardous wastes are not accepted at the Papineau Lake WDS; however, the Municipality ensures that any batteries left at the Site are disposed of properly. In 2025, no batteries were collected across the nine WDS/WTS locations in Hastings Highlands.

6.2 Annual Complaints & Emergency Situations Summary

There were no documented complaints, rejected waste, or emergency situations report at the Papineau Lake WDS in 2025.

6.3 Capacity

In 2025, a review of the remaining volumetric capacity at the Papineau Lake WDS was completed. This review confirmed discrepancies in the capacity calculations and design dating back to 2008–2010. The 2010 D&O Plan (WESA, 2010) listed both the existing waste mound volume and the remaining capacity as 13,600 m^3, which is highly improbable. A detailed review of the supporting figures in the 2010 D&O Plan (**Appendix H – Figures 4–7**) highlighted inconsistencies with the reported remaining capacity, including differences between Figures 4 and 5 (**Appendix H**) in terms of footprint extent, proposed final waste contours, and design volumes. For example, portions of the Figure 5 (**Appendix H)** footprint extend into the access road and at some locations lie below the existing ground surface.

Topographic surveys conducted by BluMetric in 2023 (prior to excavation of Fill Beyond Approved Limits [FBAL]) and 2024 (following excavation and relocation of FBAL material) provide updated in-footprint measurements, reflecting post-remediation conditions. Historical records indicate that a net volume of approximately 14,900 m^3 of waste has been placed on Site from 2008 to June 2024. Based on the 2010 D&O Plan designs (WESA, 2010), the Site would be considered over capacity: by 3,411 m^3 using Figure 4 (**Appendix H)** and by 9,514 m^3 using Figure 5 (**Appendix H**). However, a significant portion of the footprint, particularly along the entrance road, remains unfilled and contains native material that was previously included in the landfill capacity

calculations. Cross-sections (Figures 6 and 7 - **Appendix H**) align with Figure 5 (**Appendix H)** rather than Figure 4 (**Appendix H)**, and the identical 13,600 m^3 values reported for mound volume and remaining capacity are unsupported.

Updated capacity calculations, which exclude native material, were completed using two scenarios to account for discrepancies in the 2010 D&O Plan figures. Scenario 1 (**Appendix H – Figure A**) is based on the Figure 4 design (**Appendix H**), resulting in a remaining landfill volume of 838 m^3 as of June 2024, while Scenario 2 (**Appendix H – Figure B**) is based on the Figure 5 design (**Appendix H**), resulting in a remaining volume of 2,500 m^3 as of June 2024.

The mass of waste received between June and December 2024 was approximately 124.67 tonnes (BluMetric, 2025), and the mass of waste received in 2025 was approximately 195.6 tonnes. Using a compaction density assumption of 500 kg/m^3 (BluMetric, 2025), the estimated remaining landfill capacity as of December 31, 225 is as follows:

Estimated Remaining Capacity (as of December 31, 2025):

- Scenario 1: 197.46 m^3
- Scenario 2: 1,859.46 m^3

The Municipality is currently considering a Site expansion (less than 40,000 m3), which would require an amendment to the ECA to authorize additional fill. Engineering designs for the expansion are anticipated to be completed in 2026. Once finalized, these designs will establish updated maximum allowable fill volumes and footprint, slope, and top-of-waste elevation limits and the Municipality will apply to amend the ECA at that time.

Note, based on this discussion, the MECP Checklist in **Appendix B** does not list an estimated remaining capacity at this time.

7 Summary Statements, Conclusions and Recommendations

The following summary statements, conclusions, and recommendations are based on the results of the 2025 monitoring program at the Papineau Lake WDS:

7.1 Site Operations

- According to the Site's ECA, the Municipality had until January 5, 2021, to obtain the easement rights for the contaminant attenuation zone (CAZ) for the Site. Work to obtain the easement was initiated in 2019. In August 2025, an amendment to the Aggregate Resources Permit resulted in the transfer of additional lands to the landfill; however, these lands did not include the full CAZ. An ECA amendment is required to formally register the lands transferred in 2025, and a separate amendment will be required to register the CAZ easement once the CAZ lands are acquired. The Municipality should determine next steps in 2026 to complete the registration process.
- As the Land Use Permit (LUP) expires on May 31, 2026, the LUP must be renewed in 2026.
- New survey stakes should be placed in 2026 and be utilized to ensure that waste is placed within the proper footprint.
- Site inspections indicate that, overall, the WDS is in good condition; however, operational issues such as large scrap/bulky piles, open electronics bins, uncovered active trenches, and scattered debris were observed during the 2025 field visits.
- It is recommended that waste transferred to the Site continue to be accounted for and documented by tracking the number of loads of waste deposited at the Site. Detailed descriptions and quantities of rejected waste should continue to be documented.
- Public Education with respect to waste reduction and recycling should be an on-going effort by the Municipality.
- Records of public concerns and/or complaints and emergency occurrences regarding the Papineau Lake WDS, and the response taken by the Municipality to each, should be documented.

7.2 Groundwater

- Groundwater monitoring should continue on a semi-annual basis for the Papineau Lake WDS (spring and fall).
- It is recommended that all wells continue to be sampled in the spring, with the continuation of only PL1-06, PL3-06 (background), PL4-12, PL7-16, PL8-16, and PL9-16 being sampled in the fall. Groundwater elevation data should continue to be collected from all wells during both semi-annual sampling events.
- Leachate monitoring wells (PL2-06, PL4-12, and PL5-12) continue to show elevated concentrations of iron, manganese, TP, and other parameters relative to background conditions, consistent with historical trends.

- Groundwater monitoring in 2025 confirms that the Site is not in compliance with Guideline B-7 along the downgradient southwestern and southern property boundaries (PL1-06 and PL7-19). PL1-06 is impacted by leachate, while PL7-19 reflects leachate influence from groundwater flow through the aggregate pit. PL9-16 and PL8-16 are not considered impacted by leachate, and concentrations are generally consistent with natural variation.
- PWQO exceedances in 2025 for TP, copper, boron, and iron are observed, with most exceeding parameters attributed to natural variation in groundwater chemistry, except for localized impacts near the landfill footprint. Boron at PL4-12 shows a slight upward trend, requiring continued observation.
- Mann-Kendall trend analysis indicates generally stable or slightly increasing trends in leachate indicator parameters (manganese, alkalinity, TDS) at select wells, particularly PL1-06, PL2-03, PL4-12, PL5-12, and PL7-19, highlighting continued influence of the waste mound and downgradient migration.
- Further review of the proposed CAZ lands is recommended, as groundwater data collected since the lands were approved in 2018 (2019–2025) can now be used to refine the CAZ design and ensure it appropriately addresses the areas of non-compliance.
- It is recommended to assess potential off-site impacts along the southwestern and southern property boundaries and implement corrective actions as required once the CAZ easement lands are registered.

7.3 Surface Water

- Surface water monitoring is not required at the Papineau Lake WDS. Ponded water remains onsite and does not contribute to off-site discharge.
- Groundwater data should continue to be compared to surface water criteria to screen for potential impacts to downgradient waters, such as Kitts Creek.
- PWQO exceedances observed in 2025 (total phosphorus, copper, boron, iron) reflect natural groundwater variability, with no evidence of off-site surface water impact.
- A slight upward trend in boron at PL4-12 should be monitored to detect any future changes.

7.4 Trigger Mechanisms and Contingency Plan

- The groundwater chemical results in 2025 did not trigger the Tier 1 Contingency Plan response for surface water and groundwater.

7.5 Landfill Gas

- The RKI Eagle gas monitoring results for 2025 (0 to 20 ppm) indicated methane gas concentrations are well below the 25,000 ppm concentration of concern.
- Landfill gas should continue to be monitored at the on-site structures during the semi-annual monitoring events.

7.6 Landfill Capacity

- A review of the remaining volumetric capacity at the Papineau Lake WDS in 2025 confirmed discrepancies in the 2008–2010 design and capacity calculations. The 2010 D&O Plan listed both the existing mound volume and remaining capacity as 13,600 m^3, which is not supported by detailed review of the figures.
- Updated topographic surveys (2023 pre-FBAL excavation, 2024 post-FBAL relocation) indicate that a significant portion of the footprint contains native material previously included in capacity calculations.
- Revised capacity calculations, excluding native material, were completed using two scenarios:
  - Scenario 1 (Figure 4 design) – remaining landfill volume of 838 m^3
  - Scenario 2 (Figure 5 design) – remaining landfill volume of 2,500 m^3
- The Municipality is considering a Site expansion, which would require an amendment to the ECA to authorize additional fill.
- Engineering designs for the expansion are anticipated to be completed in 2026.

8 Limiting Conditions

The conclusions presented in this report represent our professional opinion and are based upon the work described in this report and any limiting conditions in the terms of reference, scope of work, or conditions noted herein.

The findings presented in this report are based on conditions observed at the specified dates and locations, the analysis of samples for the specified parameters, and information obtained for this project. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, locations that were not investigated directly, or types of analysis not performed.

BluMetric Environmental Inc. makes no warranty as to the accuracy or completeness of the information provided by others, or of conclusions and recommendations predicated on the accuracy of that information.

This report has been prepared for The Corporation of the Municipality of Hastings Highlands. Any use a third party makes of this report, any reliance on the report, or decisions based upon the report, are the responsibility of those third parties unless authorization is received from BluMetric Environmental Inc. in writing. BluMetric Environmental Inc. accepts no responsibility for any loss or damages suffered by any unauthorized third party as a result of decisions made or actions taken based on this report.

Respectfully submitted,
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Table

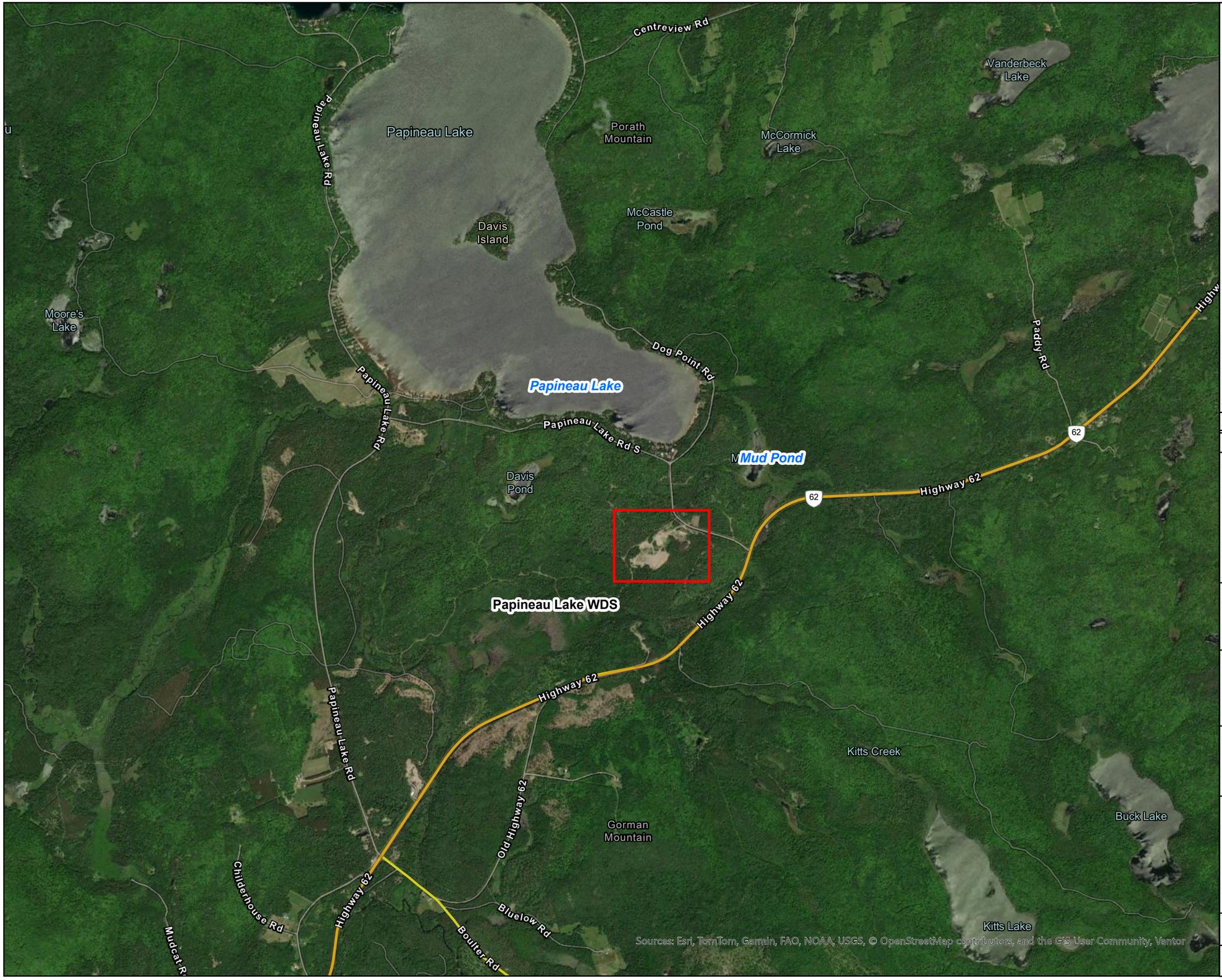
Table 11. 2025 Groundwater Chemistry Results - Papineau Lake WDS

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Sample ID	PL1-06	PL1-06	PL2-06	PL3-06	PL3-06	PL4-12	PL5-12	PL6-12	PL7-16	PL-QAQC-GW1 (PL7-16)	PL7-16	PL-QAQC-GW1 (PL7-16)	PL8-16	PL8-16	PL9-16	PL9-16
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2025-May-06	2025-Oct-20	2025-May-06	2025-May-06	2025-Oct-20	2025-May-06	2025-May-06	2025-May-06	2025-May-06	2025-May-06	2025-Oct-20	2025-Oct-20	2025-May-06	2025-Oct-20	2025-May-06	2025-Oct-20
Anions						Detection Limit																
Chloride	mg/L	127.5	250	-	-	1	46	45	49	22	53	27	49	<1	28	27	32	32	<1	<1	25	19
Nitrate as N	mg/L	2.7175	10	-	-	0.1	0.18	<0.1	1.43	0.18	0.23	<0.1	<0.1	<0.1	0.46	0.48	0.29	0.33	0.23	<0.1	0.67	0.55
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.01	-	0.014	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01	-	<0.01	-
Sulphate	mg/L	251.697	500	-	-	1	22	30	25	3.3	2.8	37	12	11	19	18	15	15	6.3	5.9	9.9	9.6
Cations																						
Calcium (diss)	mg/L	-	-	-	-	0.2	54	71	68	12	21	69	40	11	38	39	40	41	6.1	4.8	17	15
Magnesium (diss)	mg/L	-	-	-	-	0.05	13	17	13	4.2	7	18	8.5	1.4	9	9.2	9.6	9.3	1.8	1.3	4.9	4.3
Potassium (diss)	mg/L	-	-	-	-	0.2	6	-	13	1.8	-	4.3	3.7	1	4.9	5.1	-	-	1.1	-	2.5	-
Sodium (diss)	mg/L	100.98	200	-	-	0.1	25	37	51	4.7	7.9	11	19	1.3	19	19	19	19	1.8	1.8	8.7	7.7
General Chemistry																						
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	160	250	270	23	16	190	96	26	100	110	95	96	24	15	34	34
Ammonia as N	mg/L	-	-	-	-	0.05	0.18	0.31	4.8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	5.9	9.5	48	<4	<4	<4	6.3	4.6	6.3	4.3	<4	<4	<4	<4	<4	<4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	3.9	6.5	17	1	1.1	1.9	2.1	2.4	2.6	2.5	3.2	3.2	1.2	1.7	1.1	2
Electrical Conductivity	uS/cm	-	-	-	-	2	520	670	760	140	270	540	410	76	360	350	330	340	62	52	200	170
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		6.82	7.38	7.27	7.23	7.3	7.37	6.7	6.93	6.76	7.19	7.23	7.18	7.15	7.06	7.05	7.03
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10	310	380	460	150	205	365	275	90	220	200	180	155	35	40	165	110
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.29	-	5.5	<0.1	-	<0.1	<0.1	0.14	<0.1	0.1	-	-	<0.1	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**0.073**	-	**0.44**	**6.6**	-	**0.34**	**0.47**	**1.9**	<0.02	<0.02	-	-	**0.8**	-	**0.65**	-
Metals																						
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	-	<0.001	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.037	0.05	0.16	0.01	0.017	0.048	0.031	0.0044	0.032	0.034	0.034	0.033	0.0046	0.004	0.014	0.012
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.15	0.38	0.65	<0.01	0.012	0.1	0.041	<0.01	0.12	0.12	0.12	0.12	<0.01	<0.01	0.033	0.031
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.00009	-	0.0003	<0.00009	-	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	-	-	<0.00009	-	<0.00009	-
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	<0.005	-
Copper (diss)	mg/L	0.50025	1	-	0.005	0.0009	0.0086	-	0.022	<0.0009	-	0.00092	<0.0009	<0.0009	0.0035	0.0036	-	-	<0.0009	-	<0.0009	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	**10**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (diss)	mg/L	0.002875	0.01	Calculated	Calculated	0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	-	-	<0.0005	-	<0.0005	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	1.3	2	3.4	<0.002	<0.002	0.2	1.3	0.0069	0.43	0.44	0.56	0.55	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	<0.0001	-	<0.0001	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	-	<0.005	-

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Figures



LEGEND

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

PROPRIETARY INFORMATION MAY NOT BE REPRODUCED OR DIVULGED WITHOUT PRIOR WRITTEN CONSENT OF BLUMETRIC ENVIRONMENTAL INC.
DO NOT SCALE DRAWING.
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N W E S

0 500 1,000 1,500 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Site Location Map

BluMetric Environmental

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
250253-03	February 19, 2026

DRAWN	CHECKED	FIG NO.	REV
EB	LH	01	0

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LEGEND

- Former Surface Water Location
- Monitoring Well Locations
- Property Boundary (7.3 ha)
- Buffer Lands Transferred in 2025 (0.5 ha)
- Proposed Contaminant Attenuation Zone (4.11 ha)
- Limit of Aggregate Permit Area (Crown) (15.4 ha)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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N W E S

0 25 50 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Site Plan

BluMetric Environmental

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
250253-03	March 13, 2026

DRAWN	CHECKED	FIG NO.	REV
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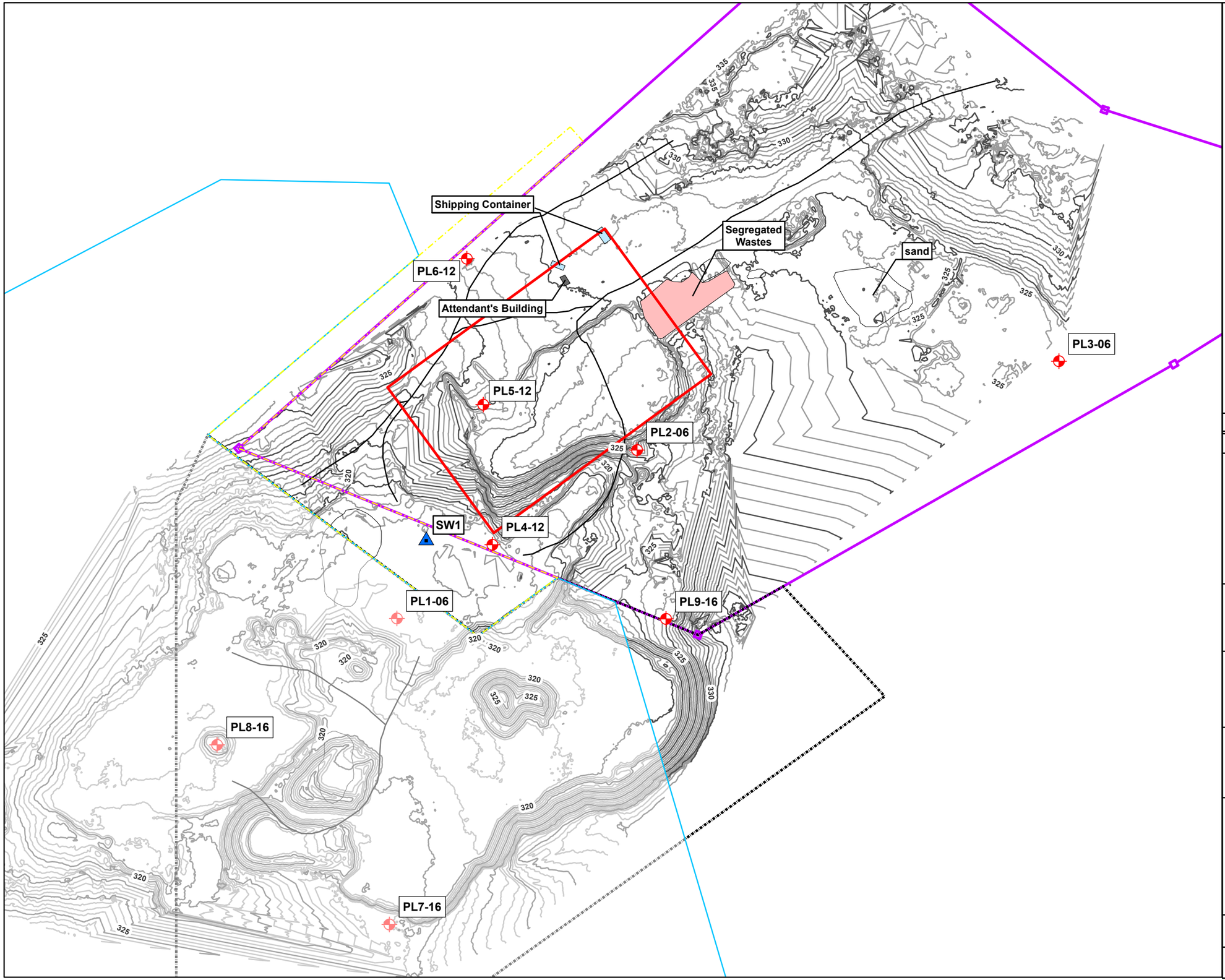

LEGEND

- Former Surface Water Location
- Monitoring Well Locations
- Property Boundary (7.3 ha)
- Development and Operations Plan Approved Landfilling Area (0.8ha)
- Shipping Container
- Segregated Wastes
- Attendant's Building
- Site Features
- Limit of Aggregate Permit Area (Crown) (15.4 ha)
- Buffer Lands Transferred in 2025 (0.5 ha)
- Proposed Contaminant Attenuation Zone (4.11 ha)
- Road

2025 Elevation Contours

- Elevation Contour (0.5 m)
- Elevation Contour (1.0 m)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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N W E S

0 25 50 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Site Plan with Contours

BluMetric Environmental

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE		
250253-03	March 13, 2026		
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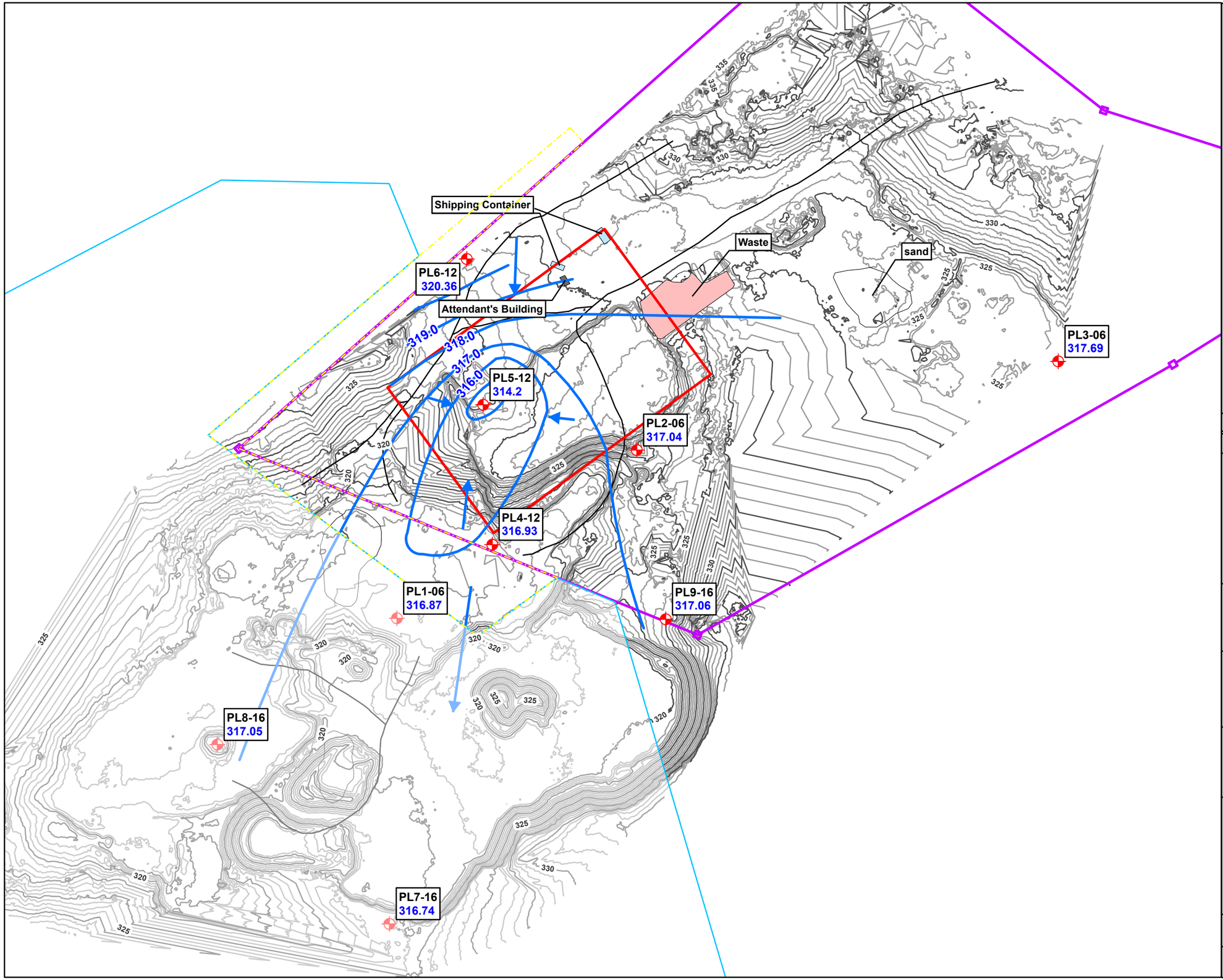

LEGEND

- Monitoring Well Locations
- Development and Operations Plan Approved Landfilling Area (0.8ha)
- Buffer Lands Transferred in 2025 (0.5 ha)
- Limit of Aggregate Permit Area (Crown) (15.4 ha)
- Road
- Property Boundary (7.3 ha)
- Groundwater Contour (1.0 m)
- Inferred Groundwater Flow Direction

2025 Elevation Contours

- Elevation Contour (0.5 m)
- Elevation Contour (1.0 m)
- 317.14 Groundwater Elevation (masl) (Spring 2025)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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N W E S

0 25 50 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Groundwater Flow Direction – Spring 2025

BluMetric Environmental

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
250253-03	March 13, 2026

DRAWN	CHECKED	FIG NO.	REV
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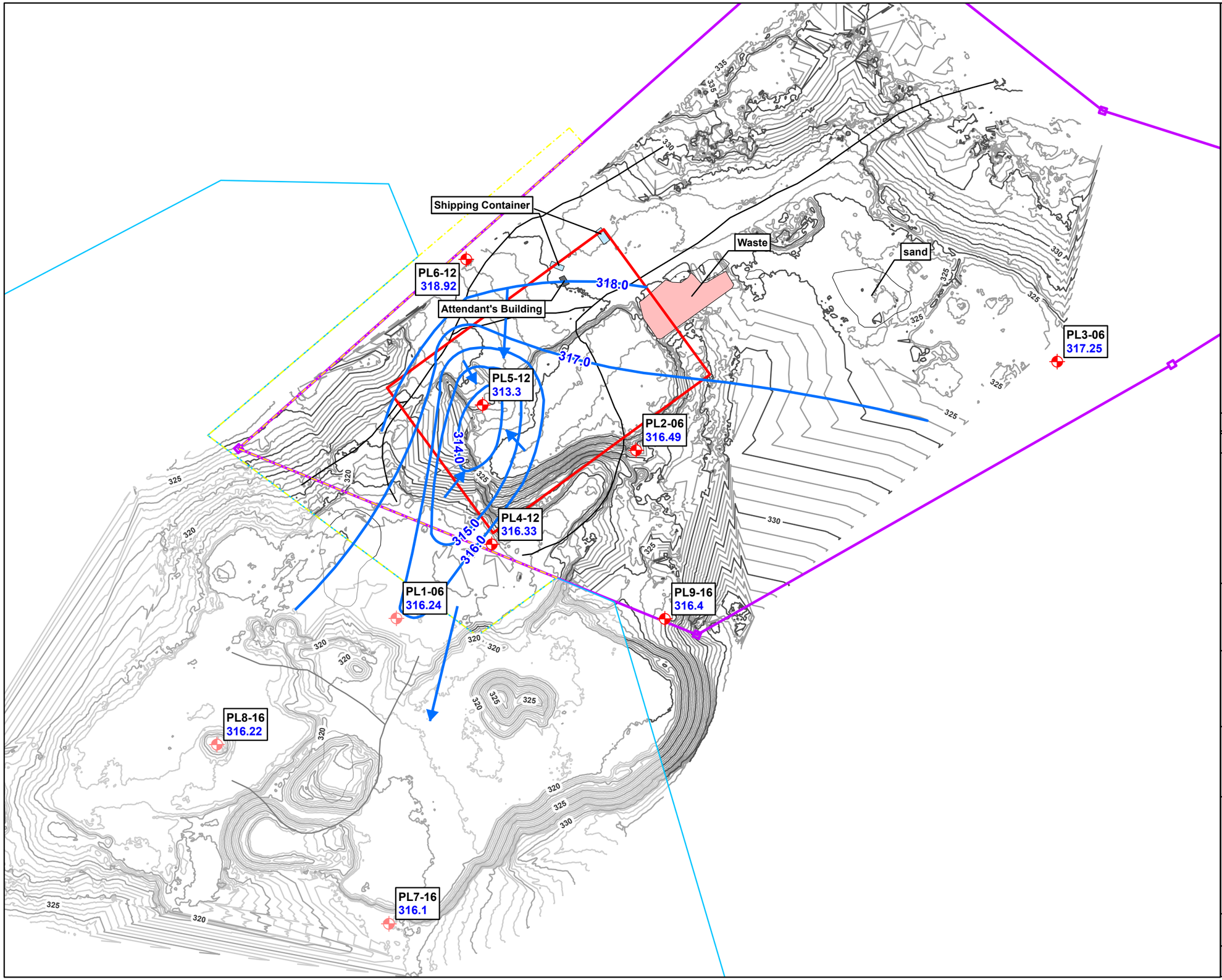

LEGEND

- Monitoring Well Locations
- Development and Operations Plan Approved Landfilling Area (0.8ha)
- Buffer Lands Transferred in 2025 (0.5 ha)
- Limit of Aggregate Permit Area (Crown) (15.4 ha)
- Property Boundary (7.3 ha)
- Road
- Inferred Groundwater Flow Direction
- Groundwater Contour (1.0 m)

2025 Elevation Contours

- Elevation Contour (0.5 m)
- Elevation Contour (1.0 m)
- 317.14 Groundwater Elevation (masl) (Fall 2025)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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N W E S

0 25 50 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Groundwater Flow Direction – Fall 2025

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
250253-03	March 13, 2026

DRAWN	CHECKED	FIG NO.	REV
EB	LH	05	0

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Site Photographs



Photo 1: Site entrance – May 6, 2025.



Photo 2: Site hours and signage – May 6, 2025.



Photo 3: Segregated Recycling Bins – May 6, 2025.



Photo 4: Active landfill trench – May 6, 2025.



Photo 5: Scrap Metal pile – May 6, 2025.



Photo 6: Tires pile – May 6, 2025.



Photo 7: Bulk Waste Pile – May 6, 2025.



Photo 8: Electronics Waste – May 6, 2025.



Photo 9: Landfill Mound, facing northeast – May 6, 2025



Photo 10: Landfill Mound, facing northeast – May 6, 2025



Photo 11: Entrance Road – May 6, 2025.



Photo 12: Site entrance – October 20, 2025



Photo 13: Site hours and signage – October 20, 2025



Photo 14: Segregated Recycling bins – October 20, 2025



Photo 15: Active landfill trench – October 20, 2025



Photo 16: Brush pile – October 20, 2025.



Photo 17: Tires pile – October 20, 2025.



Photo 18: Bulk Waste pile – October 20, 2025.



Photo 19: Electronics Waste – October 20, 2025.



Photo 20: Aggregate Pit South of Landfill Boundary – October 20, 2025



Photo 21: Scrap Metal Pile Overflowing – October 20, 2025



Photo 22: Entrance Road – October 20, 2025

Appendix A

A-1 Environmental Compliance Approval

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER A361105
Issue Date: May 26, 2011

The Corporation of the Municipality of Hastings Highlands
33011 Highway 62 N
Post Office Box, No. 130
Maynooth, Ontario K0L 2S0

Site Location: Papineau Lake Road WDS
Lot Part of 2 & 3, Concession 5
Hastings Highlands Municipality, County of Hastings

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

the use and operation of 0.8 hectare waste disposal/transfer site within a total site area of 7.3 hectares.

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

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

"Contaminating Life Span" means,

(a) in respect of a landfilling site, the period of time during which the site will produce contaminants at concentrations that could have an unacceptable impact if they were to be discharged from the site, and

(b) in respect of a landfilling site and a contaminant or group of contaminants, the period of time during which the site will produce the contaminant or a contaminant in the group at concentrations that could have an unacceptable impact if they were to be discharged from the site;

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

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

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

"Ministry" means the Ontario Ministry of the Environment;

"*NMA* " means *Nutrient Management Act* , 2002, S.O. 2002, c. 4, as amended from time to time;

"*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* and includes its successors or assigns;

"*Owner"* means any person that is responsible for the establishment or operation of the *Site* being approved by this *Certificate,* and includes The Corporation of the Municipality of Hastings Highlands its successors and assigns;

"*OWRA* " means the *Ontario Water Resources Act* , R.S.O. 1990, c. O.40, as amended;

"*PA* " means the *Pesticides Act* , R.S.O. 1990, c. P-11, as amended from time to time;

"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 *EPA* or Section 17 of *PA* or Section 4 of *NMA* or Section 8 of *SDWA* .

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

"*Regulation 347* " or "*Reg. 347* " means Regulation 347, R.R.O. 1990, made under the EPA, as amended;
"*SDWA"* means *Safe Drinking Water Act,* 2002, S.O. 2002, c. 32, as amended from time to time;

"*Site* " means the entire waste disposal site, including the buffer lands, and contaminant attenuation zone at Part lots 2 and 3 of Concession 5; and

"Trained personnel" means knowledgeable in the following through instruction and/or practice:

a. relevant waste management legislation, regulations and guidelines;
b. major environmental concerns pertaining to the waste to be handled;
c. occupational health and safety concerns pertaining to the processes and wastes to be handled;
d. management procedures including the use and operation of equipment for the processes and wastes to be handled;
e. emergency response procedures;
f. specific written procedures for the control of nuisance conditions;
g. specific written procedures for refusal of unacceptable waste loads; and
h. the requirements of this *Certificate.*

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

TERMS AND CONDITIONS

1. GENERAL

Compliance

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

(2) Any person authorized to carry out work on or operate any aspect of the *Site* shall comply with the conditions of this *Certificate* .

In Accordance

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

Interpretation

(4) Where there is a conflict between a provision of any document listed in Schedule "A" in this *Certificate,* and the conditions of this *Certificate,* the conditions in this *Certificate* shall take precedence.

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

(6) Where there is a conflict between any two documents listed in Schedule "A", the document bearing the most recent date shall take precedence.

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

Other Legal Obligations

(8) The issuance of, and compliance with, this *Certificate* does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or

(b) limit in any way the authority of the *Ministry* to require certain steps be taken or to require the *Owner* and *Operator* to furnish any further information related to compliance with this *Certificate* .

Adverse Effect

(9) The *Owner* and *Operator* shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the *Site,* including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

(10) Despite an *Owner, 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.

Change of Ownership

(11) The *Owner* shall notify the *Director,* in writing, and forward a copy of the notification to the *District Manager,* within 30 days of the occurrence of any changes in the following information:

(a) the ownership of the *Site;*

(b) the *Operator* of the *Site;*

(c) the address of the *Owner or Operator;* and

(d) the partners, where the *Owner or Operator* is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act* , R. S. O. 1990, c. B.17, shall be included in the notification.

(12) No portion of this *Site* shall be transferred or encumbered prior to or after closing of the *Site* unless the *Director* is notified in advance and sufficient financial assurance is deposited with the *Ministry* to ensure that these conditions will be carried out.

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

Certificate of Requirement/Registration on Title

(14) The Owner shall:

(a) Within sixty (60) days of the date of the issuance of this *Certificate,* submit to the

Director for review, two copies of a completed Certificate of Requirement with a registerable description of the *Site;* and

(b) Within 10 calendar days of receiving the Certificate of Requirement authorized by the *Director,* register the Certificate of Requirement in the appropriate Land Registry Office on title to the *Site* and submit to the *Director* and the *District Manager* the duplicate registered copy immediately following registration.

(15) Pursuant to Section 197 of the Environmental Protection Act, neither the *Owner* nor any person having an interest in the *Site* shall deal with the *Site* in any way without first giving a copy of this *Certificate* to each person acquiring an interest in the *Site* as a result of the dealing.

Inspections by the Ministry

(16) No person shall hinder or obstruct a *Provincial Officer* from carrying out any and all inspections authorized by the *OWRA, the EPA,* the *PA,* the *SDWA* or the *NMA,* 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 *EPA,* the *OWRA,* the *PA,* the *SDWA* or the *NMA.*

Information and Record Retention

(17) 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. Records shall be retained for the *contaminating life span* of the *Site* except for as otherwise authorized in writing by the *Director.*

(18) 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.

(19) The *Owner* shall ensure that a copy of this *Certificate,* in its entirety and including all its Notices of Amendment, and documentation listed in Schedule "A", are retained at the *Site* at all times.

2. SITE OPERATION

Operation

(1) The *Site* shall be operated and maintained at all time including management and disposal of all waste in accordance with the *EPA, Regulation 347,* and the conditions of this *Certificate.* At no time shall the discharge of a contaminant that causes or is likely to cause an adverse effect be permitted.

Signs

(2) A sign shall be installed and maintained at the main entrance/exit to the *Site* on which is legibly displayed the following information:

(a) the name of the *Site* and *Owner;*
(b) the number of the *Certificate;*
(c) the name of the *Operator;*
(d) the normal hours of operation;
(e) the allowable and prohibited waste types;
(f) the telephone number to which complaints may be directed;
(g) a warning against unauthorized access;
(h) a twenty-four (24) hour emergency telephone number (if different from above); and
(i) a warning against dumping outside the *Site.*

(3) The Owner shall install and maintain signs to direct vehicles to working face and recycling areas.

(4) The Owner shall provide signs at recycling depot informing users what materials are acceptable and directing users to appropriate storage area.

Vermin, Vectors, Dust, Litter, Odour, Noise and Traffic

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

Burning Waste Prohibited

(6) (a) Burning of waste at the *Site* is prohibited.

(b) Notwithstanding Condition 2. (6) (a) above, burning of segregated, clean wood and brush at the landfill may be carried out in strict compliance with the Ministry of the Environment Document titled "Guideline C-7, Burning at Landfill Sites" dated April 1994.

Site Access

(7) Waste shall only be accepted during the following time periods:

Winter (Thanksgiving Day to Victoria Day)

Sunday	:	12 noon - 5:00 p.m.

Summer (Victoria Day to Thanksgiving Day)

Sunday	:	12 noon - 8:00 p.m.
Statutory Holiday Monday	:	12 noon - 5:00 p.m.
Thursday	:	12 noon - 5:00 p.m.

(8) On-site equipment used for daily site preparation and closing activities may be operated one (1) hour before and one (1) hour after the hours of operation approved by this *Certificate.*

(9) With the prior written approval from the *District Manager,* the time periods may be extended to accommodate seasonal or unusual quantities of waste.

Site Security

(10) No waste shall be received, landfilled or removed from the *Site* unless a site supervisor or attendant is present and supervises the operations during operating hours. The *Site* shall be closed when a site attendant is not present to supervise landfilling operations.

(11) The *Site* shall be operated and maintained in a safe and secure manner. During non-operating hours, the *Site* entrance and exit gates shall be locked and the *Site* shall be secured against access by unauthorized persons.

3. EMPLOYEE TRAINING

(1) A training plan for all employees that operate any aspect of the *Site* shall be developed and implemented by the *Operator.* Only *Trained Personnel* shall operate any aspect of the *Site* or carry out any activity required under this *Certificate* .

4. COMPLAINTS RESPONSE PROCEDURE

(1) If at any time the *Owner* receives complaints regarding the operation of the *Site,* the *Owner* shall respond to these complaints according to the following procedure:

(a) The *Owner* shall record and number each complaint, either electronically or in a

log book, and shall include the following information: the nature of the complaint, the name, address and the telephone number of the complainant if the complainant will provide this information and the time and date of the complaint;

(b) The *Owner,* upon notification of the complaint, shall initiate appropriate steps to determine all possible causes of the complaint, proceed to take the necessary actions to eliminate the cause of the complaint and forward a formal reply to the complainant; and

(c) The *Owner* shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to resolve the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

5. EMERGENCY RESPONSE

(1) Any spills, fires or other emergency situations shall be forthwith reported directly to the *Ministry's* Spills Action Centre (1-800-268-6060) and shall be cleaned up immediately.

(2) In addition, the *Owner* shall submit, to the *District Manager* a written report within three (3) business days of the emergency situation, outlining the nature of the incident, remedial measures taken, handling of waste generated as a result of the emergency situation and the measures taken to prevent future occurrences at the *Site.*

(3) All wastes resulting from an emergency situation shall be managed and disposed of in accordance with *O.Reg. 347.*

(4) All equipment and materials required to handle the emergency situations shall be:
- (a) kept on hand at all times that waste landfilling and/or handling is undertaken at the *Site;* and
- (b) adequately maintained and kept in good repair.

(5) The *Owner* shall ensure that the emergency response personnel are familiar with the use of such equipment and its location(s).

6. RECORD KEEPING AND REPORTING

Log Book

(1) A log shall be maintained in written format and shall include the following information:
- (a) the type, date and time of arrival, hauler, and quantity (tonnes) of all industrial and commercial waste and cover material received at the *Site;*
- (b) the area of the *Site* in which waste disposal operations are taking place;
- (c) a record of litter collection activities and the application of any dust suppressants;
- (d) a record of the daily inspections; and
- (e) a description of any out-of-service period of any control, treatment, disposal or monitoring facilities, the reasons for the loss of service, and action taken to restore

and maintain service.

(2) Any information requested, by the *Director* or a *Provincial Officer,* 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.

Inspections and Log Book

(3) An inspection of the entire *Site* and all equipment on the *Site* shall be conducted each day the *Site* is in operation to ensure that: the *Site* is secure; that the operation of the *Site* is not causing any nuisances; that the operation of the *Site* is not causing any adverse effects on the environment and that the *Site* is being operated in compliance with this *Certificate.* Any deficiencies discovered as a result of the inspection shall be remedied immediately, including temporarily ceasing operations at the *Site* if needed.

(4) A record of the inspections shall be kept in a 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.

(5) A record shall be kept in the log book of all refusals of waste shipments, the reason(s) for refusal, and the origin of the waste, if known.

Annual Report

(6) A written report on the development, operation and monitoring of the *Site,* shall be completed annually (the "Annual Report"). The Annual Report shall be submitted to the *District Manager,* by June 11th of the year following the period being reported upon.

(7) The Annual Report shall include the following:
- (a) the results and an interpretive analysis of the results of all leachate, groundwater surface water and landfill gas monitoring, including an assessment of the need to amend the monitoring programs;
- (b) an assessment of the operation and performance of all engineered facilities, the need to amend the design or operation of the *Site* , and the adequacy of and need to implement the contingency plans;
- (c) 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 site facilities; facilities installed during the reporting period; and site preparations and facilities planned for installation during the next reporting period;

(d) calculations of the volume of waste, daily and intermediate cover, and final cover deposited or placed at the *Site* during the reporting period and a calculation of the total volume of *Site* capacity used during the reporting period;

(e) a calculation of the remaining capacity of the *Site* and an estimate of the remaining *Site* life;

(f) a summary of the weekly, maximum daily and total annual quantity (tonnes) of waste received at the *Site;*

(g) a summary of any complaints received and the responses made;

(h) a discussion of any operational problems encountered at the *Site* and corrective action taken;

(i) any changes to the Design and Operations Report and the Closure Plan that have been approved by the *Director* since the last *Annual Report;*

(j) a report on the status of all monitoring wells and a statement as to compliance with *Ontario Regulation 903;*

(k) any other information with respect to the *Site* which the *Regional Director* may require from time to time; and

(l) a summary and analysis of all hydraulic and geochemical monitoring results.

7. LANDFILL DESIGN AND DEVELOPMENT

Approved Waste Types

(1) Only solid non-hazardous municipal waste as defined under *Reg.* 347 shall be accepted at the *Site* for landfilling.

(2) The *Owner* shall develop and implement a program to inspect waste to ensure that the waste received at the *Site* is of a type approved for acceptance under this *Certificate.*

(3) The *Owner* shall ensure that all loads of waste are properly inspected by *Trained personnel* prior to acceptance at the *Site* and that the waste vehicles are directed to the appropriate areas for disposal or transfer of the waste. The *Owner* shall notify the *District Manager,* in writing, of load rejections at the *Site* within one (1) business day from their occurrence.

Capacity

(4) The remaining volumetric capacity (as of January 2010) approved for this *Site,* consisting of the waste, daily cover and intermediate cover, but excluding the final cover is 13,600 cubic metres.

Service Area

(5) Only waste that is generated within the boundaries of the former Townships of Bangor, Wiclow, McClure, Herschel, and Monteagle may be accepted at the *Site.*

Cover

(6) Alternative materials to soil may be used as weekly and interim cover material, based on an application with supporting information and applicable fee for a trial use or permanent use, submitted by the *Owner* to the *Director,* copied to the *District Manager* and as approved by the *Director* via an amendment to this *Certificate.* The alternative material shall be non-hazardous according to *Reg. 347* and will be expected to 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 *Site;*

(c) Provision for vehicle access to the active tipping face; and

(d) Compatibility with the design of the *Site* for groundwater protection, leachate management and landfill gas management.

(7) Cover material shall be applied as follows:

(a) Periodic Cover - Weather permitting, deposited waste shall be covered triweekly in a manner acceptable to the *District Manager* so that no waste is exposed to the atmosphere;

(b) Intermediate Cover - In areas where landfilling has been temporarily discontinued for six (6) months or more, a minimum thickness of 300 millimetre of soil cover or an approved thickness of alternative cover material shall be placed; and

(c) Final Cover - In areas where landfilling has been completed to final contours, a minimum 600 millimetre thick layer of soil of medium permeability and 100 millimetres of top soil (vegetative cover) shall be placed. Fill areas shall be progressively completed and rehabilitated as landfill development reaches final contours.

(8) Alternative Periodic Cover approved for this *Site* are chipped clean wood, compost, and non-hazardous contaminated soil.

8. LANDFILL MONITORING

Landfill Gas

(1) The *Owner* shall ensure that any buildings or structures at the *Site* contain adequate ventilation systems to relieve any possible landfill gas accumulation. Routine monitoring for explosive methane gas levels shall be conducted in all buildings or structures at the *Site,* especially enclosed structures which at times are occupied by people.

Compliance

(2) The *Site* shall be operated in such a way as to ensure compliance with the following:

(a) Reasonable Use Guideline B-7 for the protection of the groundwater at the *Site;* and

(b) Provincial Water Quality Objectives included in the July 1994 publication entitled *Water Management Policies, Guidelines, Provincial Water Quality Objectives,* as amended from time to time or limits set by the *Regional Director,* for the protection of the surface water at and off the *Site.*

Surface Water and Ground Water

(3) (a) The Municipality shall construct and maintain to the satisfaction of the *Ministry* , a groundwater monitoring network which fully delineates the horizontal and vertical extent of leachate migration resulting from the landfilling activities at the Site. The groundwater monitoring network shall include at least one up-gradient or trans-gradient monitoring well measuring natural uncontaminated groundwater quality and at least one well measuring representative source leachate quality.

(b) Groundwater samples from all wells in the above-described monitoring network will be obtained and analyzed at least once during maximum water level conditions and at least once during the minimum water level conditions. Groundwater elevations in all monitoring wells shall be measured during each monitoring event prior to obtaining water quality samples.

(c) The proposed design and locations of the groundwater monitoring network shall be submitted to the *Director* for approval, within twelve (12) months from the date of this *Certificate.*

(4) A certified Professional Geoscientist or Engineer possessing appropriate hydrogeologic training and experience shall execute or directly supervise the execution of the groundwater monitoring and reporting program.

Groundwater Wells and Monitors

(5) The *Owner* shall ensure that all groundwater monitoring wells which form part of the monitoring program are properly capped, locked and protected from damage.

(6) Where landfilling is to proceed around monitoring wells, suitable extensions shall be added to the wells and the wells shall be properly re-secured.

(7) Any groundwater monitoring well included in the on-going monitoring program that are damaged shall be assessed, repaired, replaced or decommissioned by the *Owner,* as required.

(a) The *Owner* shall repair or replace any monitoring well which is destroyed or in any way made to be inoperable for sampling such that no more than one regular

sampling event is missed.

(b) All monitoring wells which are no longer required as part of the groundwater monitoring program, and have been approved by the *Director* for abandonment, shall be decommissioned by the *Owner,* as required, in accordance with *O.Reg. 903,* that will prevent contamination through the abandoned well. A report on the decommissioning of the well shall be included in the Annual Report for the period during which the well was decommissioned.

Trigger Mechanisms and Contingency Plans

(8) (a) Within one (1) year from the date of this *Certificate,* the *Owner* shall submit to the *Director,* for approval, and copies to the *District Manager,* details of a trigger mechanisms plan for surface water and groundwater quality monitoring for the purpose of initiating investigative activities into the cause of increased contaminant concentrations

(b) Within one (1) year from the date of this *Certificate,* the *Owner* shall submit to the *Director* for approval, and copies to the *District Manager,* details of a contingency plan to be implemented in the event that the surface water or groundwater quality exceeds the a trigger mechanism.

(9) In the event of a confirmed exceedence of a site-specific trigger level relating to leachate mounding or groundwater or surface water impacts due to leachate, the *Owner* shall immediately notify the *District Manager,* and an investigation into the cause and the need for implementation of remedial or contingency actions shall be carried out by the *Owner* in accordance with the approved trigger mechanisms and associated contingency plans.

(10) If monitoring results, investigative activities and/or trigger mechanisms indicate the need to implement contingency measures, the *Owner* shall ensure that the following steps are taken:

(a) The *Owner* shall notify the *District Manager,* in writing of the need to implement contingency measures, no later than 30 days after confirmation of the exceedences;

(b) Detailed plans, specifications and descriptions for the design, operation and maintenance of the contingency measures shall be prepared and submitted by the *Owner* to the *District Manager* for approval; and

(c) The contingency measures shall be implemented by the *Owner* upon approval by the *District Manager* .

(11) The *Owner* shall ensure that any proposed changes to the site-specific trigger levels for leachate impacts to the surface water or groundwater, are approved in advance by the *Director* via an amendment to this *Certificate.*

Changes to the Monitoring Plan

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

(13) Within fourteen (14) days of receiving the written correspondence from the *District Manager* confirming that the *District Manager* is in agreement with the proposed changes to the environmental monitoring program, the *Owner* shall forward a letter identifying the proposed changes and a copy of the correspondences from the *District Manager* and all other correspondences and responses related to the changes to the monitoring program, to the *Director* requesting the *Certificate* be amended to approve the proposed changes to the environmental monitoring plan prior to implementation.

(14) In the event any other changes to the environmental monitoring program are proposed outside of the recommendation of the annual report, the *Owner* shall follow current ministry procedures for seeking approval for amending the *Certificate.*

9. CLOSURE PLAN

(1) At least 3 years prior to the anticipated date of closure of this *Site,* the *Owner* shall submit to the *Director* for approval, with copies to the *District Manager,* a detailed *Site* closure plan pertaining to the termination of landfilling operations at this *Site,* post-closure inspection, maintenance and monitoring, and end use. The plan shall include the following:

- (a) a plan showing *Site* appearance after closure;
- (b) a description of the proposed end use of the *Site;*
- (c) a descriptions of the procedures for closure of the *Site,* including:
  - (i) advance notification of the public of the landfill closure;
  - (ii) posting of a sign at the *Site* entrance indicating the landfill is closed and identifying any alternative waste disposal arrangements;
  - (iii) completion, inspection and maintenance of the final cover and landscaping;
  - (iv) *Site* security;
  - (v) removal of unnecessary landfill-related structures, buildings and facilities;
  - (vi) final construction of any control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas; and
  - (vii) a schedule indicating the time-period for implementing sub-conditions (i) to (vi) above;
- (d) descriptions of the procedures for post-closure care of the *Site,* including:
  - (i) operation, inspection and maintenance of the control, treatment, disposal and monitoring facilities for leachate, groundwater, surface water and landfill gas;

(ii) record keeping and reporting; and
(iii) complaint contact and response procedures;

(e) an assessment of the adequacy of and need to implement the contingency plans for leachate and methane gas; and

(f) an updated estimate of the contaminating life span of the *Site,* based on the results of the monitoring programs to date.

(2) The *Site* shall be closed in accordance with the closure plan as approved by the *Director.*

10. WASTE DIVERSION

(1) The *Owner* shall ensure that:

(a) all bins and waste storage areas are clearly labelled;

(b) all lids or doors on bins shall be kept closed during non-operating hours and during the high wind events; and

(c) if necessary to prevent litter, waste storage areas shall be covered during the high winds events.

(2) The *Owner* shall provide a segregated area for the storage of *Refrigerant Appliances* so that the following are ensured:

(a) all *Refrigerant Appliances* have been tagged to indicate that the refrigerant has been removed by a licensed technician. The tag number shall be recorded in the log book and shall remain affixed to the appliance until transferred from the *Site;* **or**

(b) all *Refrigerant Appliances* accepted at the *Site,* which have not been tagged by a licensed technician to verify that the equipment no longer contains refrigerants, are stored segregated, in a clearly marked area, in an upright position and in a manner which allows for the safe handling and transfer from the *Site* for removal of refrigerants as required by O.Reg. 189; and

(c) all *Refrigerant Appliances* received on-site shall either have the refrigerant removed prior to being transferred from the *Site* or shall be shipped off-site only to facilities where the refrigerants can be removed by a licensed technician in accordance with O.Reg. 189.

(3) Propane cylinders shall be stored in a segregated area in a manner which prevents cylinders from being knocked over or cylinder valves from breaking.

(4) The *Owner* shall transfer waste and recyclable materials from the *Site* as follows:

(a) recyclable materials shall be transferred off-site once their storage bins are full;

(b) scrap metal shall be transferred off-site at least twice a year;

(c) tires shall be transferred off-site as soon as a load for the contractor hired by the *Owner* has accumulated or as soon as the accumulated volume exceeds the storage capacity of its bunker; and

(d) immediately, in the event that waste is creating an odour or vector problem.

(5) The *Owner* shall notify the appropriate contractors that waste and recyclable wastes that are to be transferred off-site are ready for removal. Appropriate notice time, as determined by the contract shall be accommodated in the notification procedure.

(6) The *Owner* may collect, store and transfer Electronic waste in accordance with the document titled "Organizing & Operating waste Electrical and Electronic Equipment (WEEE) collection sites" dated September 27, 2009" prepared by Ontario Electronic Stewardship.

(7) The *Owner* may collect empty oil containers for transfer in leak proof drums. These waste containers shall be protected from precipitation either with lids or other means.

SCHEDULE "A"

1. Sketch entitled "Site A361105, N.W. Pt. Lot 3, Conc. 4, Township of Bangor dated October 26, 1979.

2. Letter from J. Tooley to R.M. Sears, Clerk-Treasurer, dated August 29, 1974.

3. Application for a Certificate of Approval for a Waste Disposal Site dated June 23, 2010 and signed by Frank Mills, CBO.

4. Report titled "Design and Operations Plan, Papineau Lake Waste Disposal Site" dated January 2010 prepared by WESA Inc.

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

GENERAL

1. The reason for Conditions 1(1), (2), (4), (5), (6), (7), (8), (9), (10), (17), (18) and (19) is to clarify the legal rights and responsibilities of the *Owner* and *Operator* under this Certificate of Approval.

2. The reasons for Condition 1(3) is to ensure that the *Site* is designed, operated, monitored and maintained in accordance with the application and supporting documentation submitted by the *Owner,* and not in a manner which the *Director* has not been asked to consider.

3. The reasons for Condition 1(11) are to ensure that the *Site* is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the *Director* is informed of any changes.

4. The reasons for Condition 1(12) are to restrict potential transfer or encumbrance of the *Site* without the approval of the *Director* and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Certificate of Approval.

5. The reason for Condition 1(13) is to ensure that the successor is aware of its legal responsibilities.

6. Conditions 1 (14) and (15) are included, pursuant to subsection 197(1) of the *EPA* , to provide that any persons having an interest in the *Site* are aware that the land has been approved and used for the purposes of waste disposal.

7. The reason for Condition 1(16) is to ensure that appropriate Ministry staff has ready access to the Site for inspection of facilities, equipment, practices and operations required by the conditions in this Certificate of Approval. This Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the *Act* , the *OWRA* , the *PA* , the *NMA* and the *SDWA* .

SITE OPERATION

8. The reasons for Conditions 2(1), 2(5) and 6(3) are to ensure that the *Site* is operated, inspected and maintained in an environmentally acceptable manner and does not result in a hazard or nuisance to the natural environment or any person.

9. The reason for Conditions 2 (2), 2(3) and 2(4) is to ensure that users of the *Site* are fully aware of important information and restrictions related to *Site* operations and access under this *Certificate.*

10. The reasons for Condition 2(6) (a), (b) and (c) are open burning of municipal waste is unacceptable because of concerns with air emissions, smoke and other nuisance affects, and the potential fire hazard and to make sure burning of brush and wood are carried out in accordance with Ministry guidelines.

11. The reasons for Condition 2(7), 2(8) and 2(9) are to specify the hours of operation for the landfill site and a mechanism for amendment of the hours of operation, as required.

12. The reasons for Condition 2(10) and 2(11) are to ensure that the *Site* is supervised by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person and to ensure the controlled access and integrity of the *Site* by preventing unauthorized access when the Site is closed and no site attendant is on duty.

EMPLOYEE TRAINING

13. The reason for Condition 3(1) is to ensure that the *Site* is supervised and operated by properly trained staff in a manner which does not result in a hazard or nuisance to the natural environment or any person.

COMPLAINTS RESPONSE PROCEDURE

14. The reason for Condition 4(1) is to ensure that any complaints regarding landfill operations at this *Site* are responded to in a timely and efficient manner.

EMERGENCY RESPONSE

15. Conditions 5(1) and 5(2) are included to ensure that emergency situations are reported to the Ministry to ensure public health and safety and environmental protection.

16. Conditions 5(3), 5(4) and 5(5) are included to ensure that emergency situations are handled in a manner to minimize the likelihood of an adverse effect and to ensure public health and safety and environmental protection.

RECORD KEEPING AND REPORTING

17. The reason for Conditions 6(1) and 6(2) is to ensure that accurate waste records are maintained to ensure compliance with the conditions in this Certificate of Approval (such as fill rate, site capacity, record keeping, annual reporting, and financial assurance requirements), the *EPA* and its regulations.

18. The reason for Conditions 6(4) and 6(5) is to ensure that detailed records of *Site* inspections are recorded and maintained for inspection and information purposes.

19. The reasons for Conditions 6(6) and 6(7) are to ensure that regular review of site development, operations and monitoring data is documented and any possible improvements to site design, operations or monitoring programs are identified. An annual report is an important tool used in reviewing site activities and for determining the effectiveness of site design.

LANDFILL DESIGN AND DEVELOPMENT

20. The reason for Conditions 7(1) to 7(5) inclusive is to specify the approved areas from which waste may be accepted at the *Site* and the types and amounts of waste that may be accepted for disposal at the *Site,* based on the *Owner* 's application and supporting documentation.

21. Condition 7(6) and 7(8) are to approve alternative cover material and to provide the *Owner* the process for getting approval for alternative daily and intermediate cover material.

22. The reasons for Condition 7(7) are to ensure that periodic and intermediate cover are used to control potential nuisance effects, to facilitate vehicle access on the *Site,* and to ensure an acceptable site appearance is maintained. The proper closure of a landfill site requires the application of a final cover which is aesthetically pleasing, controls infiltration, and is suitable for the end use planned for the *Site.*

LANDFILL MONITORING

24. Reasons for Condition 8(1) are to ensure that off-site migration of landfill gas is monitored and all buildings at the *Site* are free of any landfill gas accumulation, which due to a methane gas component may be explosive and thus create a danger to any persons at the *Site.*

25. Condition 8(2) is included to provide the groundwater and surface water limits to prevent water pollution at the *Site*.

26. Conditions 8(3) and 8(4) are included to require the Owner to demonstrate that the *Site* is performing as designed and the impacts on the natural environment are acceptable. Regular monitoring allows for the analysis of trends over time and ensures that there is an early warning of potential problems so that any necessary remedial/contingency action can be taken.

27. Conditions 8(5), 8(6) and 8(7) are included to ensure the integrity of the groundwater monitoring network so that accurate monitoring results are achieved and the natural environment is protected.

28. Conditions 8(8) to 8(11) inclusive are added to ensure the *Owner* has a plan with an organized set of procedures for identifying and responding to potential issues relating to groundwater and surface water contamination at the *Site's* compliance point.

29. Conditions 8(12), 8(13) and 8(14) are included to streamline the approval of the changes to the monitoring plan.

CLOSURE PLAN

31. The reasons for Condition 9 are to ensure that final closure of the *Site* is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure the long-term protection of the health and safety of the public and the environment.

WASTE DIVERSION

32. Condition 10 is included to ensure that the recyclable materials are stored in their temporary storage location in a manner as to minimize a likelihood of an adverse effect or a hazard to the natural environment or any person.

This Provisional Certificate of Approval revokes and replaces Certificate(s) of Approval No. A361105 issued on April 2, 1980 and associated notices.

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 26th day of May, 2011

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

RM/
c: District Manager, MOE Belleville
Tony Guerrera, The Greer Galloway Group

Received
Jan 12/2018

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER A361105
Notice No. 2
Issue Date: January 5, 2018

The Corporation of the Municipality of Hastings Highlands
33011 Highway 62 N
Post Office Box, No. 130
Maynooth, Ontario
K0L 2S0

Site Location: Papineau Lake Road WDS
113 South Papineau Lake Road
Part of Lots 2 & 3, Concession 5, Bangor Ward
Hastings Highlands Municipality, County of Hastings

You are hereby notified that I have amended Approval No. A361105 issued on May 26, 2011 and amended on June 6, 2013 for the use and operation of 0.8 hectare waste disposal/transfer site within a total site area of 7.3 hectares , as follows:

Conditions 2(7), 7(1) and 8(8) are hereby revoked and replaced with the following:

Site Access

2. (7) Waste shall only be accepted during the following time periods:

Winter (Thanksgiving Day to Victoria Day)
Saturday, Sunday and Wednesday: 12 p.m. - 5:00 p.m.

Summer (Victoria Day to Thanksgiving Weekend)

Sunday:	2:00 p.m.	-7:00 p.m.
Saturday:	7:00 a.m.	-12:00 p.m.
Wednesday:	12:00 p.m.	-5:00 p.m.

7. (1) Only solid non-hazardous municipal waste as defined under *Reg.* 347 shall be accepted at the *Site* for landfilling. This includes non-hazardous industrial, commercial and institutional waste but limited to one load per day of commercial and demolition waste.

Condition 8 (8) is amended to read as follows:

8. (8) (a) Trigger mechanisms shall be in accordance with the documents in Schedule "A".

(b) Contingency plan proposed in the Item 7 of Schedule "A" is hereby approved.

8.(8) (c) is hereby added to this *Approval:*

8. (8) (c) If the *Owner* is unable to acquire the groundwater easement or to own the property for CAZ fee simple within three (3) years from the date of this *Approval,* the *Owner* shall propose an alternative contingency measure. The contingency plan should be submitted to the *Director* for approval within three (3) years from the date of this *Approval.*

Item 6 and 7 are added to the Schedule "A"

Schedule "A"

6. Environmental Compliance Approval Application dated September 1, 2017 and signed by Pat Pilgrim, Chief Administrator Officer, The Corporation of the Municipality of Hastings Highlands, including the attached supporting documentation.

7. Document titled "Papineau Lake Waste Disposal Site, Trigger Mechanisms, December 2017" prepared by BluMetric Environmental Inc.

- The reasons for this amendment to the *Approval* is to change the hours of operation, limit the quantity of commercial and demolition waste and to approve the amended trigger mechanisms as proposed in Item 7 in Schedule "A".

This Notice shall constitute part of the approval issued under Approval No. A361105 dated May 26, 2011 as amended.

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:

a. 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;
b. 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:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. 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
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** 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) 326-5370 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 5th day of January, 2018

THIS APPROVAL WAS MAILED
ON JAN 0 9 2018
(Signed)

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

RM/
c: Area Manager, MOECC Belleville
c: District Manager, MOECC Kingston - District
iris O'Connor, BluMetric Environmental Inc.

Appendix A

A-2 Land Use Permit

Ontario

Land Use Permit

Public Lands Act

File: (MAY)

RECEIVED
JUL 7 - 2017

Permit No.
LUP1634-1004189

Use shaded areas for corrections.

Name of Applicant/Permittee (insert Corporate Name if Applicant is "Limited" or "Incorporated")	Area Code	Telephone No.
Municipality of Hastings Highlands	613	338-2811

As Trustee for

Postal Address of Applicant/Permittee
33011 Hwy. 62 P.O. Box 130

City, Town or Village	Prov./State	Country	Postal Code
Maynooth	ON	Canada	KOL 2SO

Location of Land

Lot	Concession/Block No.	Geographic Township	Municipality
Pt. 2&3	5	BANGOR	HASTINGS HIGHLANDS M

U.T.M. Grid	Geographic Location	Area in ha.
Zone 18 E 281233 N 5021402	Papineau Lake Waste Disposal Site.	7.30

As per sketch and description which is attached to the original permit for this site and forms part of this permit. A copy of this sketch and description is on file at the District Office and available for inspection by the applicant at any time during normal business hours.

Improvement Type	Sales Tax I.D. Number
WASTE DISPOSAL, GARBAGE	R124668666

Fee(s) and Period of Land Use

Amount Due	Annual Fee (subject to adjustment)	Permit Effective Date	Permit Termination Date
$676.31	$448.50 + $58.31 (HST)	Jun 1, 2016	May 31, 2026

Note: Terms and Conditions applicable to all Land Use Permits are on the reverse side of this form.

Terms and Conditions applicable to this permit

MINISTRY OF NATURAL RESOURCES
RECEIVED
JUN 26 2017
BANCROFT, ONTARIO

Purpose

Waste Disposal Site

Sub-Purpose

Dump

Applicant's certification

I certify that the information given herein is true and complete, and that I have read, fully understand, and agree to comply with all of the terms and conditions set out in this permit and that I am of the age of majority. I agree that this is the complete agreement between the parties hereto.

Signature of Applicant (Incl. Corporation Official)	Date Signed
	May 30/17

Corporation Use Only

I have authority to bind the herein-named Corporation

Initials and Surname of Corporation Official (Please Print)	Signature of Corporation Official	Position
P PILGRIM		CAO/Clerk

Ministry Approval

Under authority of the Regulations under the Public Lands Act, this Land Use Permit is hereby issued to the above applicant, subject to all terms and conditions contained herein and no other, and these shall be the exclusive terms and conditions applicable to the use of this land.

Signature of MNRF Official	Date Signed	Cash Register Validation or Receipt No.	Amount Paid
	06/28/2017	13770	$676.31

Personal information on this form is collected under authority of the Public Lands Act and will be used for the administration of that Act. Questions about this information should be directed to the local MNRF Office, whose address and telephone number appear in the Ontario Government Telephone Directory.

1620(95-03)

Return all parts of this form to the District/Area Office for authorization.

Terms and Conditions

It is agreed by the parties hereto that:

1. This Land Use Permit gives the permittee only the right to use the described site for the purpose specified in this permit and does not convey any right, title or interest in the land or in any trees standing, growing or being on the permit area, or in any minerals, sand, gravel or similar materials, in, on, or under the land. Use of any such materials, unless authorized herein, must have separate written approval from the MNRF Official. Without limiting the generality of the foregoing, this agreement is a Land Use Permit and is not a Grant, Licence of Occupation, or Lease of Land.

2. (i) A permittee is an occupier under the Trespass to Property Act and the Occupier's Liability Act and shall take such care as in all circumstances of the case is reasonable to see that persons entering on the premises, and the property brought on the premises by these persons, are reasonably safe while on the premises;
   (ii) Any posting of signs or notices pursuant to the Trespass to Property Act and the Occupier's Liability Act, on the land use permit area, shall be subject to prior approval of the issuing officer;
   (iii) The permittee agrees to remove all signs or notices on termination of the permit, or at the direction of the issuing officer.

3. Any building, structure, or works, erected or to be erected on the site, or any alteration, renovation, enlargement or reconstruction of improvements, including any land improvements or alterations whatsoever, must be approved by a MNRF official and any other applicable agencies or authorities. The application to the MNRF Official for approval must contain a written description of the work and the permittee's evaluation of the cost of work.

4. The permittee will maintain the site in a clean, sanitary and fire-safe condition in accordance with any applicable Acts or municipal by-laws, and dispose of all garbage in an approved waste disposal site.

5. Access to the site, and quality of that access, is strictly the responsibility of the permittee. A work permit must be obtained from the MNRF Official prior to the construction of any road or other access facilities. The Crown reserves the right to enter and inspect the site and the right of access for Crown purposes.

6. If the term of this Land Use Permit is longer than one year, the permittee will pay the prescribed annual fee, which is subject to change, at the beginning of each year of the term. The MNRF Official may terminate this permit if the fee is not paid by the due date.

7. The permittee will pay any municipal or other taxes that may be levied against the property, in the manner prescribed by the taxing authority.

8. The permittee covenants to indemnify and forever save and keep harmless the Crown, its officer, servants and agents from and against any and all claims, demands, suits, actions, damages, loss, cost or expenses arising out of any injury to persons including death, or loss or damage to property of others which may be or be alleged to be caused by or suffered as a result of or in any manner associated with the exercise of any right or privilege granted to the permittee by this Land Use permit.

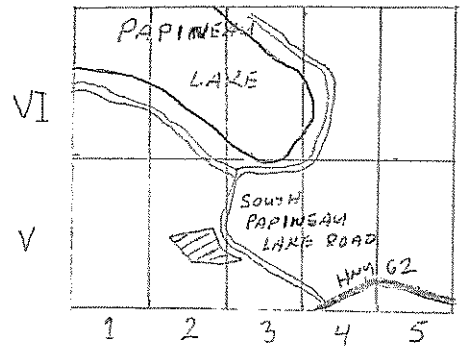
9. This Land Use Permit shall not be assigned or transferred, mortgaged or pledged.

10. This permit will automatically terminate, and all rights of the permittee will expire, on the stated termination date, or on the death or bankruptcy of the permittee, or on the winding up or dissolution of the permittee's affairs. This condition cannot be waived by the Crown and, if further use of the land is desired, an application for a new Land Use Permit must be submitted.

11. The MNRF Official may refuse to issue a new permit, or may, upon sixty (60) days written notice or such further period of time as the MNRF Official prescribes, revoke or cancels an existing permit when:
   (i) the permittee has violated any condition or provision of this permit;
   (ii) the hereby authorized land use comes into conflict with a new or revised land zoning plan; or
   (iii) it is, in the opinion of the MNRF Official or the Crown, considered to be in the public interest so to do.
   It is, hereby agreed that any decision, made by the MNRF Official or the Crown pursuant to this condition, is final.

12. Upon expiry, cancellation, revocation or other termination of this Land Use Permit:
   (i) Unless an MNRF Official orders otherwise, all improvements, property or other assets remaining on the site automatically become the property of the Crown and the Crown has no obligation whatsoever to pay compensation therefor;
   (ii) The permittee will at the MNRF Official's request, remove the improvements, property or other assets from the site, and leave the site in a clean and safe condition, restored as much as possible to it's original state except where the requirement to restore has been waived in writing by the MNRF Official;
   (iii) Where the permittee fails to remove the improvements, property or other assets from the site and/or fails to restore the site to a clean and safe condition, within a reasonable time, the permittee will pay to the Ministry any costs incurred by the Ministry in, disposing of or destroying the said improvements, property or other assets pursuant to subject 24(5) of the Public Lands Act, and/or restoring the site to a clean and safe condition.

13. The permittee acknowledges and confirms that:
   (i) upon termination of this permit, the decision to issue a new permit is at the sole discretion of the MNRF Official, and the permittee has no right to, nor reasonable expectation for, the issuance of a new permit based on prior use of the land;
   (ii) the successive issuance of any permit or permits for the use of the land described herein will not create any future rights or interests whatsoever in the land;
   (iii) should any improvements whatsoever be made to or on the land, this will not confer upon the permittee any right to use the land other than within the terms of this permit, nor will it give the permittee any right to an expectation of future permits;
   (iv) no additional terms and conditions to this permit, if inserted on the face hereof, shall alter, vary, qualify, or diminish the terms and conditions set out on this page;
   (v) there are no other representations, warranties or conditions between the Crown and the permittee, for the use of this land.



PAPINEAU DUMP SITE
BANGOR TOWNSHIP

LOT 2
CONCESSION V



LAND USE
PERMIT
PART LOTS 2 & 3
CONCESSION V
BANGOR TWP
APRIL 19 2000
18.1 ACRES/7.3 ha NOT TO SCALE

Appendix A

A-3 –2025 Aggregate Permit Approval

Ministry of Natural Resources

Aggregates Section

Divisional Delivery Branch
300 Water Street
Peterborough, ON K9J 3C7

E: ARAApprovals@ontario.ca

Ministère des Richesses naturelles

Section des Agrégats

Direction de la prestation des services de la Division
300, rue Water
Peterborough (ON) K9J 3C7

E : ARAApprovals@ontario.ca

Ontario

August 21, 2025

Denver Mayhew
Municipality of Hastings Highlands
Box 130
Maynooth, ON K0L 2S0

Dear Denver Mayhew:

Subject: Site Plan Amendment for Permit # 10473 under the *Aggregate Resources Act*
Lot 1, 2, Concession 4 & 5, Geographic Township of Bangor
Municipality of Hastings Highlands, County of Hastings

Further to your site plan amendment request of August 10, 2020, please be advised that the Ministry of Natural Resources (MNR) approves your request under the *Aggregate Resources Act* for the following amendments to the site plan:

Update site plan to include the following:

- Reduction of current permit area from 15.9ha to 15.4ha
- Addition of survey as part of site plan, titled “Existing Features Page Supplement”, now page 2 of 5
- Removal of landfill hours of operation
- Removal of unlimited tonnage condition (as permit indicates 50,000 tonnes annually)
- Creation of new header on each page with title, page number and brief note

Page 3

- Revised access point into site from adjacent landfill

Page 4

- Addition of note to indicate these partially surrendered lands are part of the adjacent MECP landfills current ECA and will be restored as laid out in the landfill Closure Plan

Attached is the revised site plan (all 5 pages) approved by the MNR on August 21, 2025. The MNR will forward a copy to the agencies listed below. Please replace the previous version of the site plan with the attached.

Also attached is an amended permit under the *Aggregate Resources Act* for the above noted permitted property. As you have requested, the amendment reflects:

- Partial surrender of Permit # 10473. The permit area has been reduced from 15.9ha to 15.4ha.

In processing the partial surrender, an inspection was completed on June 25, 2025. MECP has confirmed that this area is part of the adjacent landfill’s current ECA and will be rehabilitated as per the landfill’s Closure Plan requirements.

Should you have any questions regarding this amendment please contact Kristy Ferguson, Aggregate Specialist, at Kristy.Ferguson@ontario.ca.

Sincerely,

M. Larochelle

Mahnaz Larochelle
A/Aggregate Resources Manager
Aggregates Section

Attachment
Permit #10473 site plan (5 pages)
Permit # 10473 with Schedule A

c. Clerk – County of Hastings
MNR District – Peterborough Bancroft
Bernie Fuhrmann, Fuhrmann Aggregate Consulting Service
The Ontario Aggregate Resources Corporation
Ministry of Labour, Immigration, Training and Skills Development
Ministry of the Environment, Parks and Conservation – Jon Morrish

Ontario

AGGREGATE PERMIT
Aggregate Resources Act

PERMIS D'EXTRACTION D'AGRÉ GATS

Loi sur les ressources en agrégats

Permit No.
No du permis 10473

Pursuant to the Aggregate Resources Act and Regulations thereunder, and subject to the limitations thereof and to the conditions of the Permit and the requirements of the site plan,

Conformément à la Loi sur les ressources en agrégats et à ses réglements, et sujet aux restrictions qu'ils comportent, aux conditions d'octroi du permis et aux exigences du plan du site,

this Permit is issued to:
nous délivrons ce permis à:

Municipality of Hastings Highlands

Box 130
Maynooth, ON
Canada
K0L2S0

to operate a
pour exploiter un/une Pit (Pit / Quarry / Puits / Carri re) from a
sur le terrain de 15.4 hectare site located in:
hectares situé à l'endroit suivant:

1,2	4 & 5		BANGOR	HASTINGS HIGHLANDS M	HASTINGS CO
Lot	Concession	Section	Geographic Township	Local Municipality	County / Regional Municipality / District

Location Name:
Nom d'emplacement: Lots 1 & 2, Conc. IV & V

The Permit is subject to the following conditions:
Ce permis est assujetti aux conditions suivantes: As shown on attached Schedule A

Effective the 21 day of
En vigueur le jour de August 2025

M. Larochelle per
for Minister of Natural Resources
Ministre des Richesses Naturelles

Ontario

AGGREGATE PERMIT
Aggregate Resources Act

PERMIS D'EXTRACTION D'AGRÉ GATS

Loi sur les ressources en agrégats

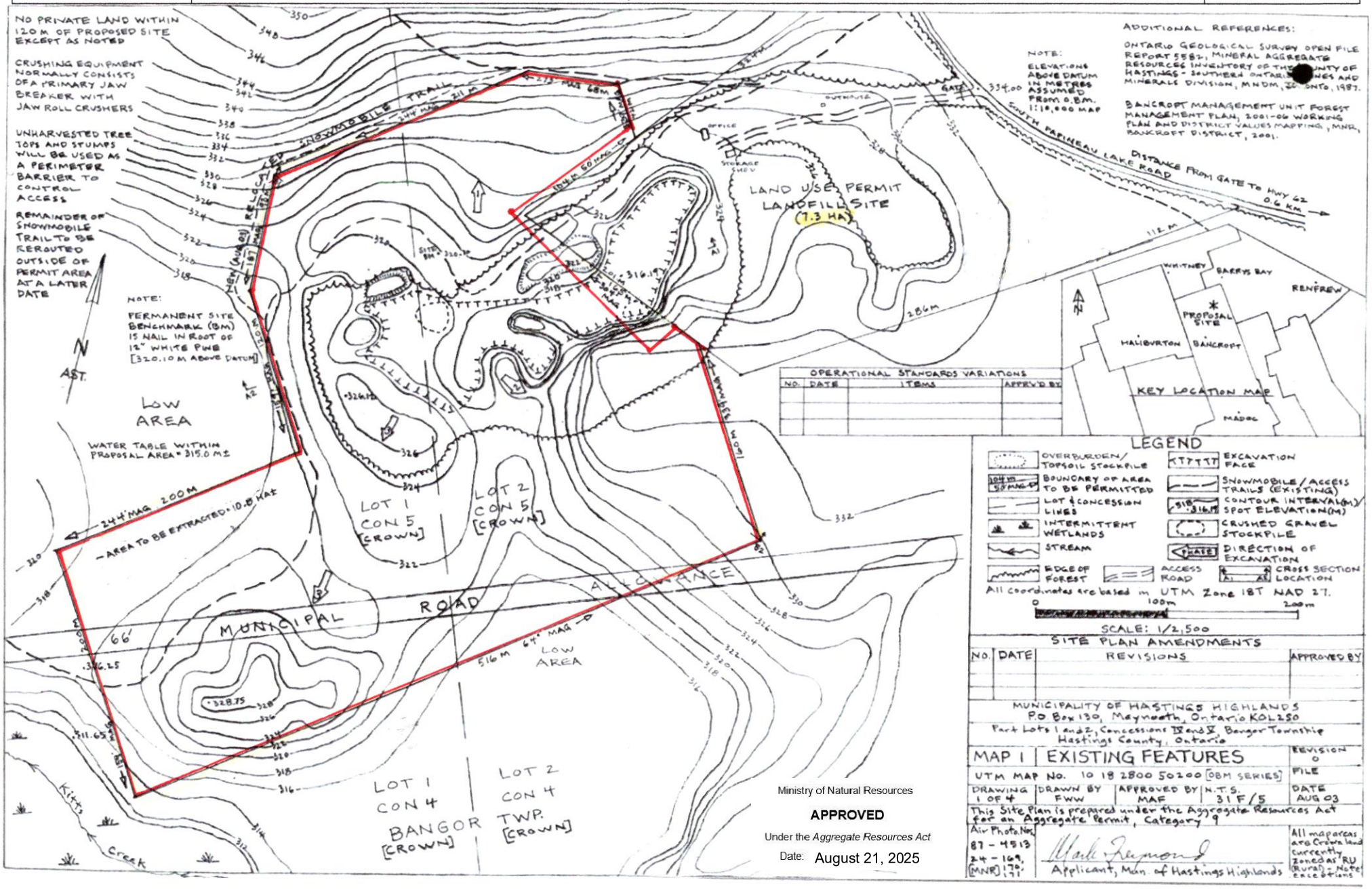
Permit No.
No du permis 10473

SCHEDULE A

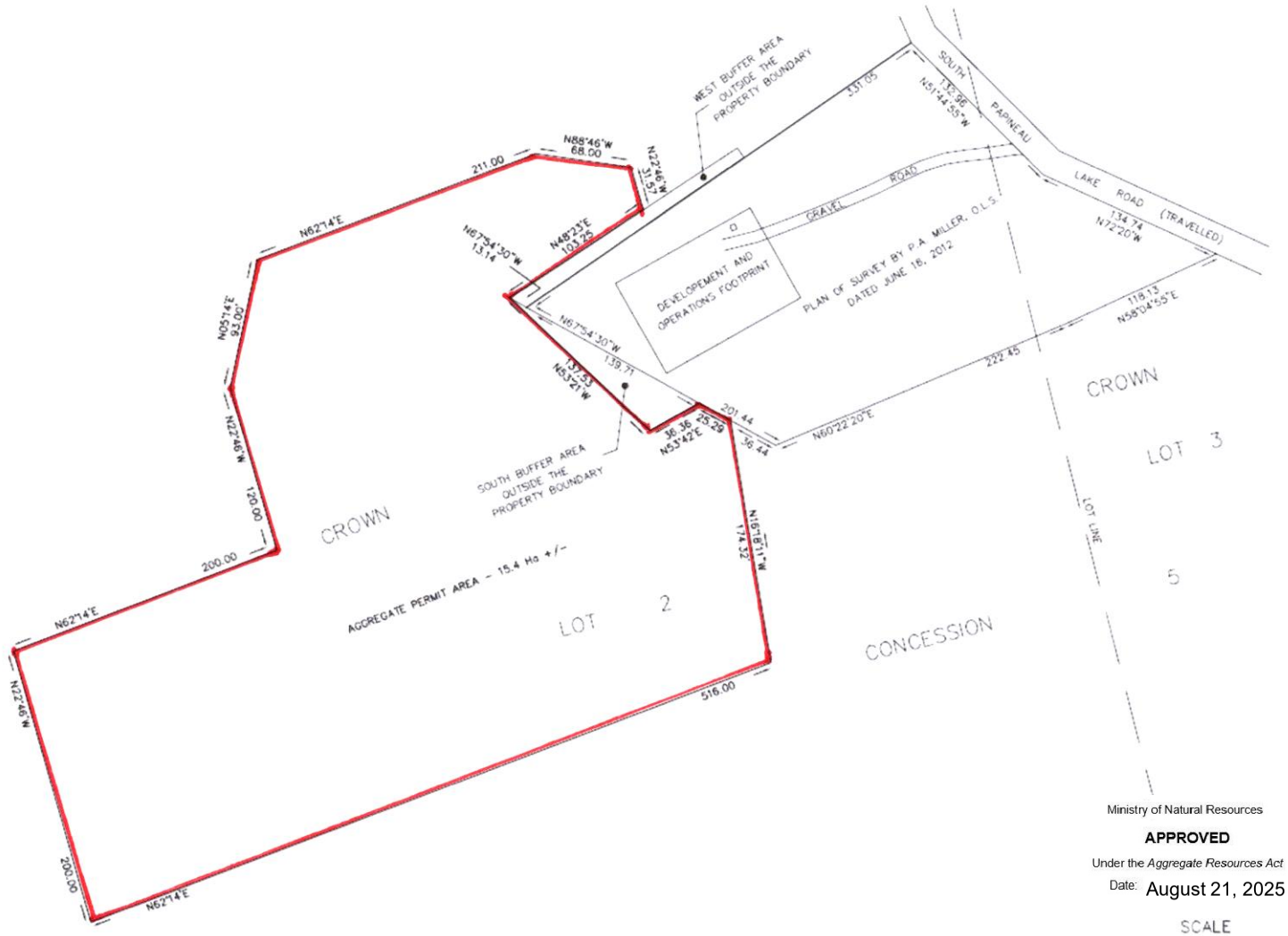
1. The permittee shall maintain the area in a clean and tidy state during operations and shall, before the expiry of the permit, remove and dispose of all waste, refuse and debris in a proper manner.
2. The permittee shall be responsible for proper fencing and gating of the permit area to prevent removals made by unauthorized individuals.

AGGREGATE RESOURCES ACT - SITE PLAN – PERMIT # 10473 – REVISED AUGUST 2025

EXISTING FEATURES PAGE	NOTE: THIS PAGE HAS BEEN REVISED TO REFLECT A REDUCTION IN THE PERMIT AREA FROM 15.9 HECTARES TO 15.4 HECTARES AND UPDATE A NOTE TO REFLECT THAT THE MAXIMUM NUMBER OF TONNES TO BE REMOVED FROM THE SITE PER YEAR SHALL NOT EXCEED 50,000 TONNES.	PAGE 1 OF 5



EXISTING FEATURES PAGE SUPPLIMENT	THIS PAGE IS A SITE PLAN SUPPLIMENT TO PROVIDE INFORMATION ON THE BOUNDARIES OF THE PERMIT AREA. THESE BOUNDARIES APPLY TO ALL OTHER PAGES OF THIS PLAN.	THIS SURVEY WAS COMPLETED BY WSP CANADA INC. WHERE BEST EFFORTS WERE MADE TO UTILIZE THE ORIGINAL SURVEY INFORMATION PROVIDED ON THE SITE PLAN TOGETHER WITH ALL OTHER RELEVANT INFORMATION FROM A SURVEY PLAN BY P.A. MILLER, O.L.S, DATED JUNE 18, 2012. THE BOUNDARIES SHOWN ON THIS PLAN APPLY TO ALL SITE PLAN PAGES. (HIGHLIGHTED AS FOLLOWS:	PAGE 2 OF 5



CLIENT:

MUNICIPALITY OF HASTINGS HIGHLANDS

PROJECT:

PAPINEAU LAKE WDS

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION

PROJECT NO: ####

SCALE: 1:3000

DESIGNED BY:

DRAWN BY:

CHECKED BY:

IF THIS BAR IS NOT 60m LONG, ADJUST YOUR PLOTTING SCALE

60m

DISCIPLINE:

TITLE:

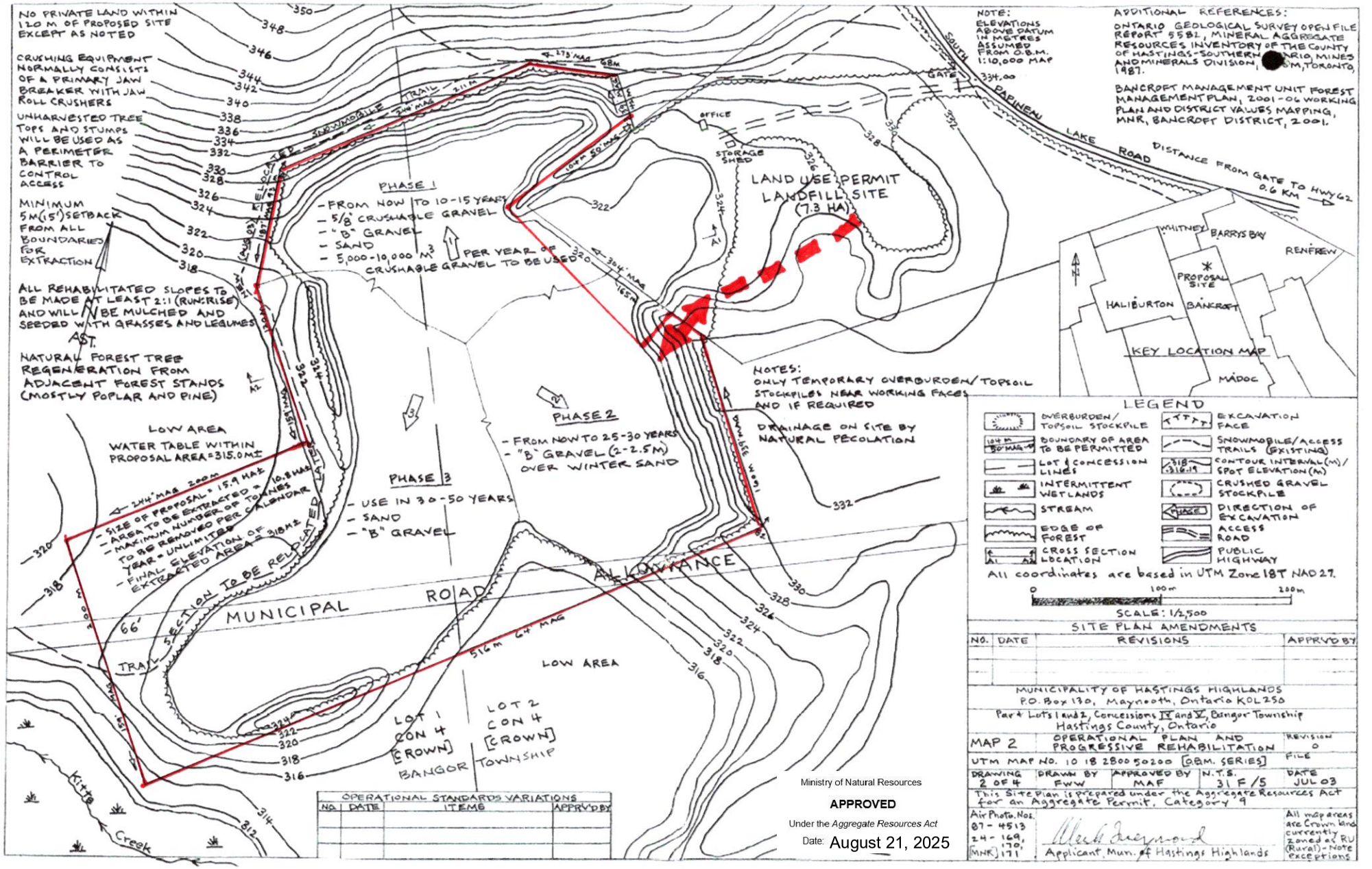
AGGREGATE PERMIT (10473)
REVISED PERMIT BOUNDARY SKETCH

SHEET NUMBER:

ISSUE: REV #

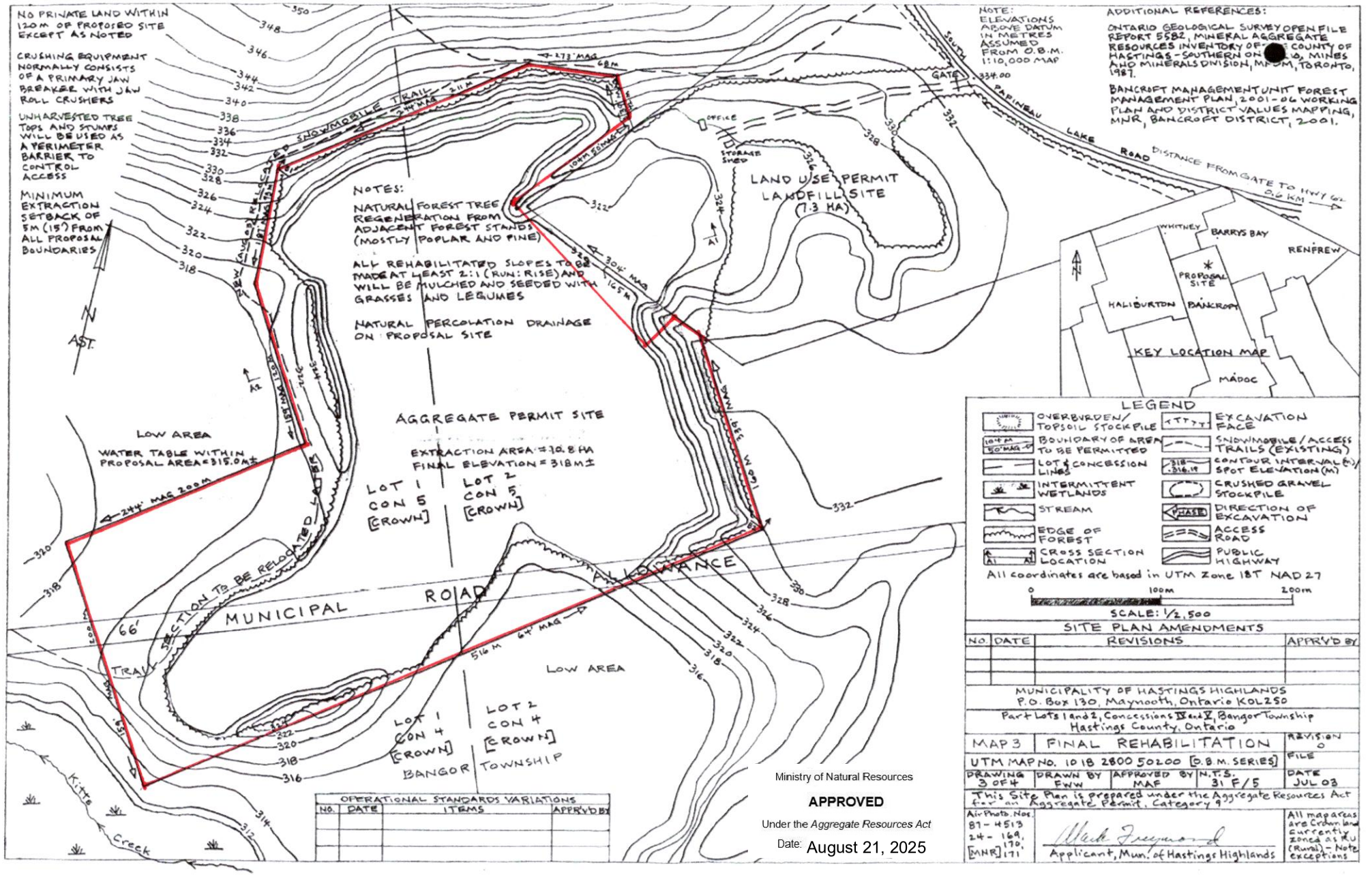
DATE OF:

OPERATIONAL PLAN AND PROGRESSIVE REHABILITATION PAGE	NOTE: THIS PAGE HAS BEEN REVISED TO REFLECT A REDUCTION IN THE PERMIT AREA AND UPDATE A NOTE TO REFLECT THAT THE MAXIMUM NUMBER OF TONNES TO BE REMOVED FROM THE SITE PER YEAR SHALL NOT EXCEED 50,000 TONNES.	PAGE 3 OF 5



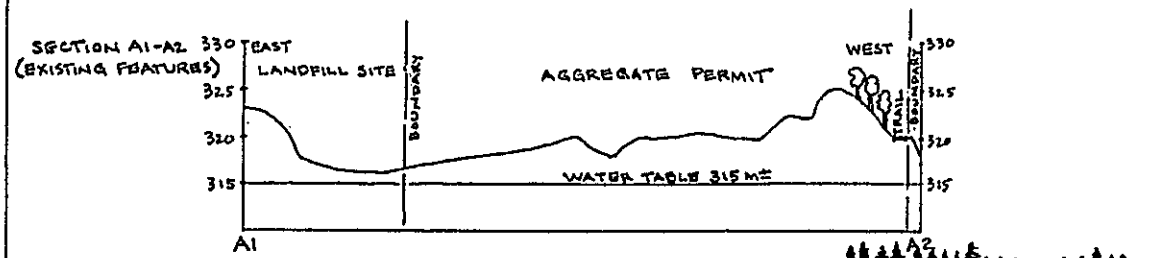
AGGREGATE ACCESS POINT (UNGATED) AND GENERAL OFF-SITE ACCESS ROAD

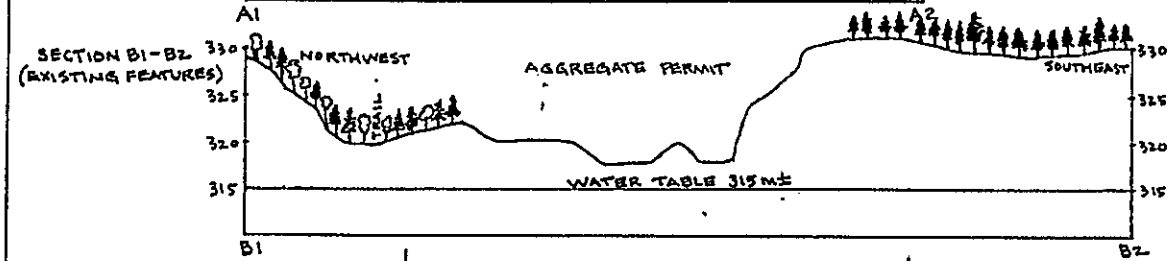
FINAL REHABILITATION PAGE	NOTE: THIS PAGE HAS BEEN REVISED TO REFLECT A REDUCTION IN THE PERMIT AREA FROM 15.9 HECTARES TO 15.4 HECTARES.	PAGE 4 OF 5

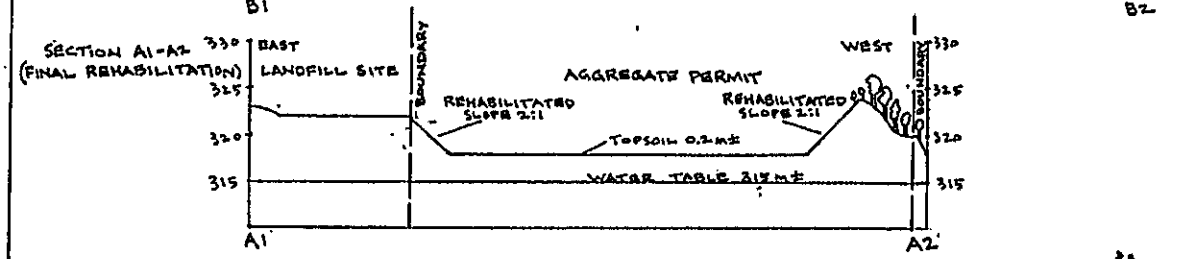


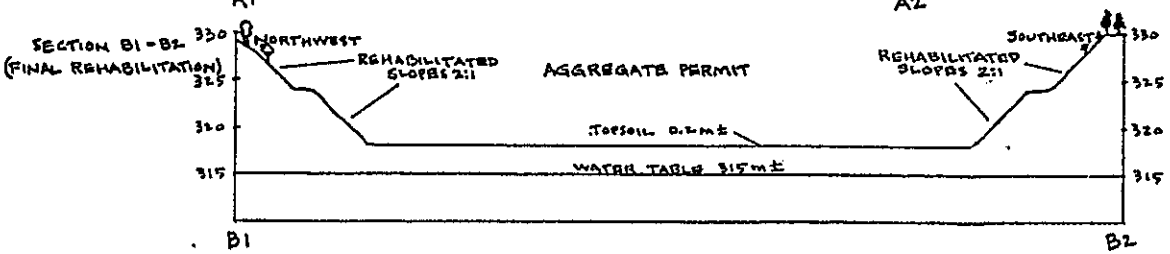
THE REDUCTION IN THE ORIGINAL LICENCE AREA IS REFLECTS THE NEED TO PARTIALLY SURRENDER A SMALL PORTION OF THE PERMIT AREA TO SATISFY THE ADJACENT REQUIREMENTS OF THE MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS (MECP) LANDFILL ECA APPROVAL.

SECTIONS PAGE	NOTE: THIS PAGE HAS BEEN REVISED TO REFLECT A REDUCTION IN THE PERMIT AREA FROM 15.9 HECTARES TO 15.4 HECTARES.	PAGE 5 OF 5









ADDITIONAL REFERENCES:

ONTARIO GEOLOGICAL SURVEY OPEN FILE REPORT 5582, MINERAL RESOURCES INVENTORY OF THE COUNTY OF HASTINGS - SOUTHERN ONTARIO, MINES AND MINERALS DIVISION, MNDM, TORONTO, 1987.

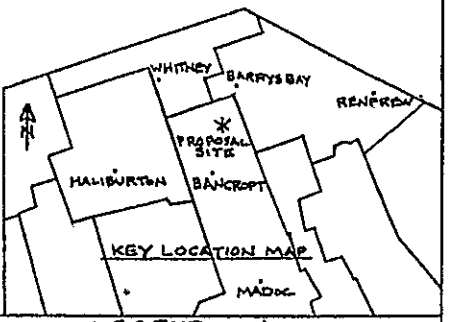
BANCROFT MANAGEMENT UNIT FOREST MANAGEMENT PLAN, 2001-06 WORKING PLAN AND DISTRICT VALUES MAPPING, MNR, BANCROFT DISTRICT, 2001.

Ministry of Natural Resources

APPROVED

Under the *Aggregate Resources Act*

Date: August 21, 2025



LEGEND

- OVERBURDEN/ TOPSOIL STOCKPILE
- EXCAVATION FACE
- BOUNDARY OF AREA TO BE PERMITTED
- SNOWMOBILE/ ACCESS TRAILS (EXISTING)
- LOT / CONCESSION LINES
- CONTOUR INTERVAL (M) / SPOT ELEVATION (M)
- INTERMITTENT WETLANDS
- CRUSHED GRAVEL STOCKPILE
- STREAM
- DIRECTION OF EXCAVATION
- EDGE OF FOREST
- ACCESS ROAD
- CROSS SECTION LOCATION
- PUBLIC HIGHWAY

All coordinates are based in UTM Zone 18T NAD 27.

0 100m 200m

SCALE: 1/2,500

SITE PLAN AMENDMENTS

NO.	DATE	REVISIONS	APPR'V'D BY

MUNICIPALITY OF HASTINGS HIGHLANDS
P.O. Box 130, Maynooth, Ontario K0L 2S0

Part Lots 1 and 2, Concessions IX and X, Bangor Township
Hastings County, Ontario

MAP #	SECTIONS	REVISION
		0

UTM MAP No. 10 18 2800 50200 (OBM SERIES) FILE

DRAWING #	DRAWN BY	APPROVED BY	N.T.S.	DATE
4 OF 4	FWW	MAF	31 F/5	AUG 03

This Site Plan is prepared under the Aggregate Resources Act for an Aggregate Permit, Category 9

Air Photo Nos. 87-4513 24-169, 170, [MNR] 171

Applicant, Mun. of Hastings Highlands

All map areas are Crown land currently zoned as RU (Rural) - Note exceptions

NOTES:

1. VERTICAL ELEVATIONS ARE EXAGGERATED BY A FACTOR OF TWO. ALL ELEVATIONS ARE IN METRES ABOVE SEA LEVEL DATUM AND BASED ON MNR OBM 1/10,000 MAPPING.
2. UNHARVESTED TREE TOPS AND STUMPS WILL BE USED AS A PERIMETER BARRIER TO CONTROL ACCESS.
3. MINIMUM EXTRACTION SETBACK OF 5m(15') FROM ALL PROPOSAL BOUNDARIES.
4. ALL REHABILITATED SLOPES TO BE MADE AT LEAST 2:1 (RUN:RISE) AND WILL BE MULCHED AND SEEDED WITH GRASSES AND LEGUMES. NATURAL FOREST TREE REGENERATION WILL COME FROM ADJACENT FOREST STANDS (MOSTLY POPLAR AND PINE).
5. NATURAL PERCOLATION DRAINAGE IS SUFFICIENT FOR PROPOSAL SITE.

OPERATIONAL STANDARDS VARIATIONS

NO.	DATE	ITEMS	APPR'V'D BY

Appendix A

A-4 2022 Papineau ECA Amendment - Correspondence

Megan Williamson

From: Carolyn Miller
Sent: Monday, September 11, 2023 2:39 PM
To: Morrish, Jon (MECP)
Cc: David Stewart; Denver Mayhew; Chisholm, Cathy (She/Her) (MECP)
Subject: RE: 2022 Annual Monitoring Report, Papineau WDS

Hi Jon,

Thank you for forwarding the comments. We will implement the approved reduction this fall, with groundwater sampling at PL1-06, PL3-06 (background), PL7-16, PL8-16, and PL9-16.

Thanks,
Carolyn

Carolyn Miller - Environmental Engineer - (T) 877-487-8436 x263

From: Morrish, Jon (MECP) <Jon.Morrish@ontario.ca>
Sent: Monday, September 4, 2023 2:22 PM
To: Carolyn Miller <cmiller@blumetric.ca>
Cc: David Stewart <dstewart@hastingshighlands.ca>; Denver Mayhew <dmayhew@hastingshighlands.ca>; Chisholm, Cathy (She/Her) (MECP) <Cathy.Chisholm@ontario.ca>
Subject: FW: 2022 Annual Monitoring Report, Papineau WDS

Hello Carolyn,
Please find the ministry's groundwater-related review comments on the 2022 Annual Monitoring Report for the Papineau WDS, in the email below.

As noted, the reviewer agrees with the recommendations made in the report relating to a reduction in monitoring locations for the fall sampling event…but suggests that one additional well (PL1-06) be sampled in the fall sampling. Cathy Chisholm, MECP Kingston District Manager has provided her concurrence.

Feel free to contact me if you have any questions.

Thanks,
Jon

Jon Morrish, B.Sc., C.E.T.
Senior Environmental Officer / Provincial Officer
Ontario Ministry of the Environment, Conservation and Parks
Belleville Area Office
345 College Street East, Belleville, ON K8N 4A7
Tel: 613-848-0853

From: Guo, Thomas (He/Him) (MECP) <Thomas.Guo@ontario.ca>
Sent: July 7, 2023 11:34 AM
To: Morrish, Jon (MECP) <Jon.Morrish@ontario.ca>
Cc: Baxter, Sarah (She/Her) (MECP) <Sarah.Baxter@ontario.ca>; Castro, Victor (MECP) <Victor.Castro@ontario.ca>;

Klein, Christina (She/Her) (MECP) <Christina.Klein@ontario.ca>
Subject: 2022 Annual Monitoring Report, Papineau WDS

Hi Jon,

I have reviewed the report entitled “2022 Annual Monitoring Report, Papineau Waste Disposal Site”, prepared by BluMetric and dated March 06, 2023.

In the report, BluMetric states that:

- Based on the 2022 groundwater results, the site does not comply with Guideline B-7-1 along the downgradient property line. The Municipality is in the process of obtaining the easement rights for the CAZ from the Crown to bring the site into compliance.

One the CAZ is established, I will provide you the comments whether the CAZ is appropriate.

BluMetric also recommends that:

- Groundwater monitoring should continue on a semi-annual basis for the Papineau Lake WDS (Spring and Fall);
- Upon approval by the MECP, it is recommended that all wells continue to be sampled in the spring, with a reduction in the locations monitored for the fall sampling event. We suggest that only PL3-06 (background), PL7-16, PL8-16, and PL9-16 be sampled in the fall; and
- Groundwater elevation data should continue to be collected from all wells during both semi-annual sampling events.

I concur with these recommendations. However, as monitoring wells PL1-06, PL7-16, PL8-16, and PL9-16 are located downgradient of the WDS and are adjacent to or outside of the 7.3 ha total site area, monitoring well PL1-06 should be sampled in the fall as well.

Should you have any questions, please let me know.

Best wishes,

Thomas Guo. M. Eng., P. Geo
Hydrogeologist
Technical Support Section, Eastern Region
Ministry of the Environment, Conservation and Parks
1259 Gardinars Road, Unit 3, Kingston, ON K7P 3J6
Tel: 613-549-4000 ext 2717, Cell: 613-449-8704, Email: Thomas.Guo@ontario.ca

Hear my name: https://namedrop.io/thomaszhentongguo

Appendix B

Monitoring and Screening Checklist (MECP)

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	Papineau Lake Waste Disposal Site
Location (e.g. street address, lot, concession)	Part of lots 2 and 3, Concession 5
GPS Location (taken within the property boundary at front gate/ front entry)	281394 m E, 5021521 m N
Municipality	The Corporation of the Municipality of Hastings Highlands
Client and/or Site Owner	The Corporation of the Municipality of Hasting Highlands
Monitoring Period (Year)	2025
This Monitoring Report is being submitted under the following:	
Environmental Compliance Approval Number:	A361105
Director's Order No.:	
Provincial Officer's Order No.:	
Other:	

Report Submission Frequency	◉ **Annual** ○ **Other**		
The site is: **(Operation Status)**	◉ **Open** ○ **Inactive** ○ **Closed**		
Does your Site have a Total Approved Capacity?	◉ **Yes** ○ **No**		
If yes, please specify Total Approved Capacity	13600 (2010)	*Units*	Cubic Metres
Does your Site have a Maximum Approved Fill Rate?	○ **Yes** ◉ **No**		
If yes, please specify Maximum Approved Fill Rate		*Units*	
Total Waste Received within Monitoring Period (Year)	195.6	*Units*	Tonnes
Total Waste Received within Monitoring Period (Year) *Methodology*	Estimated		
Estimated Remaining Capacity		*Units*	Cubic Metres
Estimated Remaining Capacity *Methodology*	Estimated		
Estimated Remaining Capacity *Date Last Determined*	12/31/25		
Non-Hazardous Approved Waste Types	☒ Domestic ☒ Industrial, Commercial & Institutional (IC&I) ☐ Source Separated Organics (Green Bin) ☒ Tires	☐ Contaminated Soil ☒ Wood Waste ☒ Blue Box Material ☐ Processed Organics ☒ Leaf and Yard Waste	☐ Food Processing/Preparation Operations Waste ☐ Hauled Sewage Other:
Subject Waste Approved Waste Classes: Hazardous & Liquid Industrial *(separate waste classes by comma)*			
Year Site Opened *(enter the Calendar Year only)*		**Current ECA Issue Date**	5-Jan-2018
Is your Site required to submit Financial Assurance?		○ **Yes** ◉ **No**	
Describe how your Landfill is designed.		◉ Natural Attenuation only ○ Fully engineered Facility ○ Partially engineered Facility	
Does your Site have an approved Contaminant Attenuation Zone?		◉ **Yes** ○ **No**	

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

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

Groundwater WDS Verification:

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

Sampling and Monitoring Program Status:

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

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

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

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

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	(●) **Yes** ( ) **No**	The proposed CAZ from 2019 was approved as part of the 2018 ECA amendment. Easement for the CAZ lands have not been formalized. It is recommended to revise the CAZ prior to formal registration as additional data is available from 2019-2025.	
6) The site meets compliance and assessment criteria.	( ) **Yes** (●) **No**	The Site has exceeded its ECA capacity limits. A landfill expansion application in 2026 is expected to restore compliance, and formal registration of the CAZ is anticipated to address Guideline B-7.	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	(●) **Yes** ( ) **No**		
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/ treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	(●) **Yes** ( ) **No**	**Note which practice(s):**	☐ **(a)** ☐ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	( ) **Yes** (●) **No** ( ) **Not Applicable**	The groundwater chemical results in 2025 did not trigger the Tier 1 Contingency Plan response for surface water and groundwater	

Groundwater CEP Declaration:

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

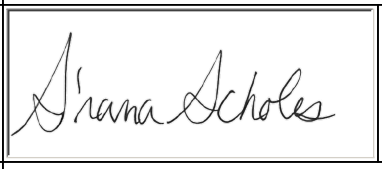
I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended),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

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

Recommendations:

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

◉ **No changes to the monitoring program are recommended**	
○ **The following change(s) to the monitoring program is/are recommended:**	
○ **No Changes to site design and operation are recommended**	
◉ **The following change(s) to the site design and operation is/ are recommended:**	It is recommended for the Municipality to apply for a landfill expansion in 2026. It is recommended to finalize the formal registration of the CAZ lands.

Name:	S'rana Scholes, P.Eng.		
Seal:			
Signature:		**Date:**	25-Mar-2026
CEP Contact Information:	S'rana Scholes, P.Eng.		
Company:	BluMetric Environmental Inc.		
Address:	209 Frederick street, Kitchener, ON, N2H 2M7		
Telephone No.:	(877) 487-8436 ext. 218	Fax No. :	
E-mail Address:	sscholes@blumetric.ca		
Co-signers for additional expertise provided:			
Signature:		**Date:**	
Signature:		**Date:**	

Surface Water WDS Verification:

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

Name (s)	The previously reported "Unnamed Pond" has been dry and currently no longer exists due to aggregate operations on site.
Distance(s)	Nearest surface water body is >500 m from site.

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

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	(●) Yes ( ) No	GW will be compared to SW criteria as requested by the MECP surface water is to be collected if any is present and flowing off site.
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	( ) Yes ( ) No (●) **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

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

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

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

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

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

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

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

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	○ **Yes** ◉ **No**	N/A

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	○ **Yes** ◉ **No**	N/A
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g. , PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	○ Yes ○ No ○ Not Known ◉ Not Applicable	Downgradient wells are compared to the PWQO criteria, however none are adjacent to a surface water body.
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**	The groundwater chemical results in 2025 did not trigger the Tier 1 Contingency Plan response for surface water and groundwater.

Surface Water CEP Declaration:

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

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

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

Recommendations:

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

◉ **No Changes to the monitoring program are recommended**	Surface water to be collected if present on site and flowing, no sampling of "ponded" water will be undertaken.
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/are recommended:**	

CEP Signature	
Relevant Discipline	Senior Environmental P.Eng. with 20 years experience assessing landfill SW at landfills. Hydrology a
Date:	25-Mar-2026
CEP Contact Information:	S'rana Scholes, P.Eng.
Company:	BluMetric Environmental Inc.
Address:	209 Frederick street, Kitchener, ON, N2H 2M7
Telephone No.:	(877) 487-8436 ext. 218
Fax No. :	
E-mail Address:	sscholes@blumetric.ca

Save As **Print Form**

Appendix C

Monitoring Well Logs

Project No: KB5082-3

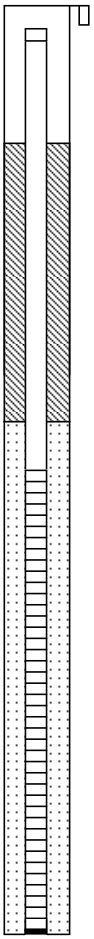
Project: Papineau Lake WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5021302, East 281140

Log of Borehole: PL1-06

Field Personnel: B.M.

SUBSURFACE PROFILE				WELL INSTALLATION	
Depth (ft / m)	Elevation (m)	Symbol	Description	Monitor Construction	Comments
0 ft / 0 m	89.86		Ground Surface		6" Steel locking protective casing
0 ft / 0 m – 4 ft / 1 m			Brown SAND, GRAVEL, and COBBLES. Saturated.		Bentonite Quickgrout
4 ft / 1 m	88.34				
4 ft / 1 m – 20 ft / 6 m			Brown SAND, GRAVEL, Cobble, and BOULDERS. Saturated Gravel layer 19 - 20'.		# 3 Silica Sand filterpack
					3.05 m Slot 10 PVC Screen
					Bottom depth 5.18 mbgs
20 ft / 6 m	83.76		End of Borehole		

Drill Method: Air Rotray X Drill

Ground Elevation: 89.86 m

Checked by:

Sheet: 1 of 1

Hole Size: 6"

TPVC Elevation: 90.81 m

Drill Date: May 8, 2006

WESA
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Project No: KB5082-3

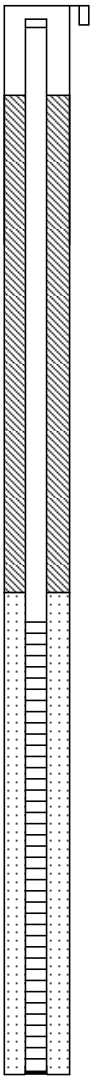
Project: Papineau Lake WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5021364, East 281238

Log of Borehole: PL2-06

Field Personnel: B.M.

SUBSURFACE PROFILE				WELL INSTALLATION	
Depth (ft / m)	Elevation (m)	Symbol	Description	Monitor Construction	Comments
0 / 0	96.89		Ground Surface		6" Steel locking protective casing
3 / 1			Light Brown SAND. Hole was advanced by mud drilling technology, no comment on moisture could be made.		Bentonite Quickgrout
16 / 5	91.71				
19 / 6			Dark Brown SAND. Hole was advanced by mud drilling technology, no comment on moisture could be made.		# 3 Silica Sand filterpack
24 / 7	89.27				4.57 m Slot 10 PVC Screen
26 / 8			Coarse GRAVEL. Hole was advanced by mud drilling technology, no comment on moisture could be made.		
32 / 9	86.99				
33 / 10			End of Borehole		Bottom depth 9.906 mbgs

Drill Method: Air Rotray X Drill

Ground Elevation: 96.936 m

Checked by:

Sheet: 1 of 1

Hole Size: 6"

TPVC Elevation: 97.886 m

Drill Date: May 8, 2006

WESA
A Better Environment For Business

Project No: KB5082-3

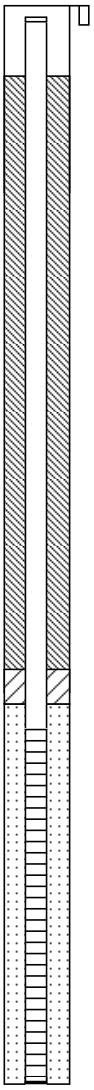
Project: Papineau Lake WDS

Client: Municipality of Hastings Highlands

Site Coordinates: Zone 18 T North 5021405, East 281404

Log of Borehole: PL3-06

Field Personnel: B.M.

SUBSURFACE PROFILE				WELL INSTALLATION	
Depth (ft / m)	Elevation (m)	Symbol	Description	Monitor Construction	Comments
0 ft / 0 m	96.89		Ground Surface		6" Steel locking protective casing
			Brown SAND, trace Gravel. Hole was advanced by mud drilling technology, no comment on moisture could be made.		Bentonite Quickgrout
26 ft / 8 m					3/8" Bentonite Holeplug
29 ft / 9 m					# 3 Silica Sand filterpack
33 ft / 10 m					4.57 m Slot 10 PVC Screen
35 ft / 11 m	85.92				
			Brown SAND and GRAVEL. Hole was advanced by mud drilling technology, no comment on moisture could be made.		
42 ft / 13 m	83.94				Bottom depth 12.95 mbgs
			End of Borehole		

Drill Method: Air Rotray X Drill

Ground Elevation: 96.895 m

Checked by:

Sheet: 1 of 1

Hole Size: 6"

TPVC Elevation: 98.795 m

Drill Date: May 8, 2006

WESA
A Better Environment For Business

WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

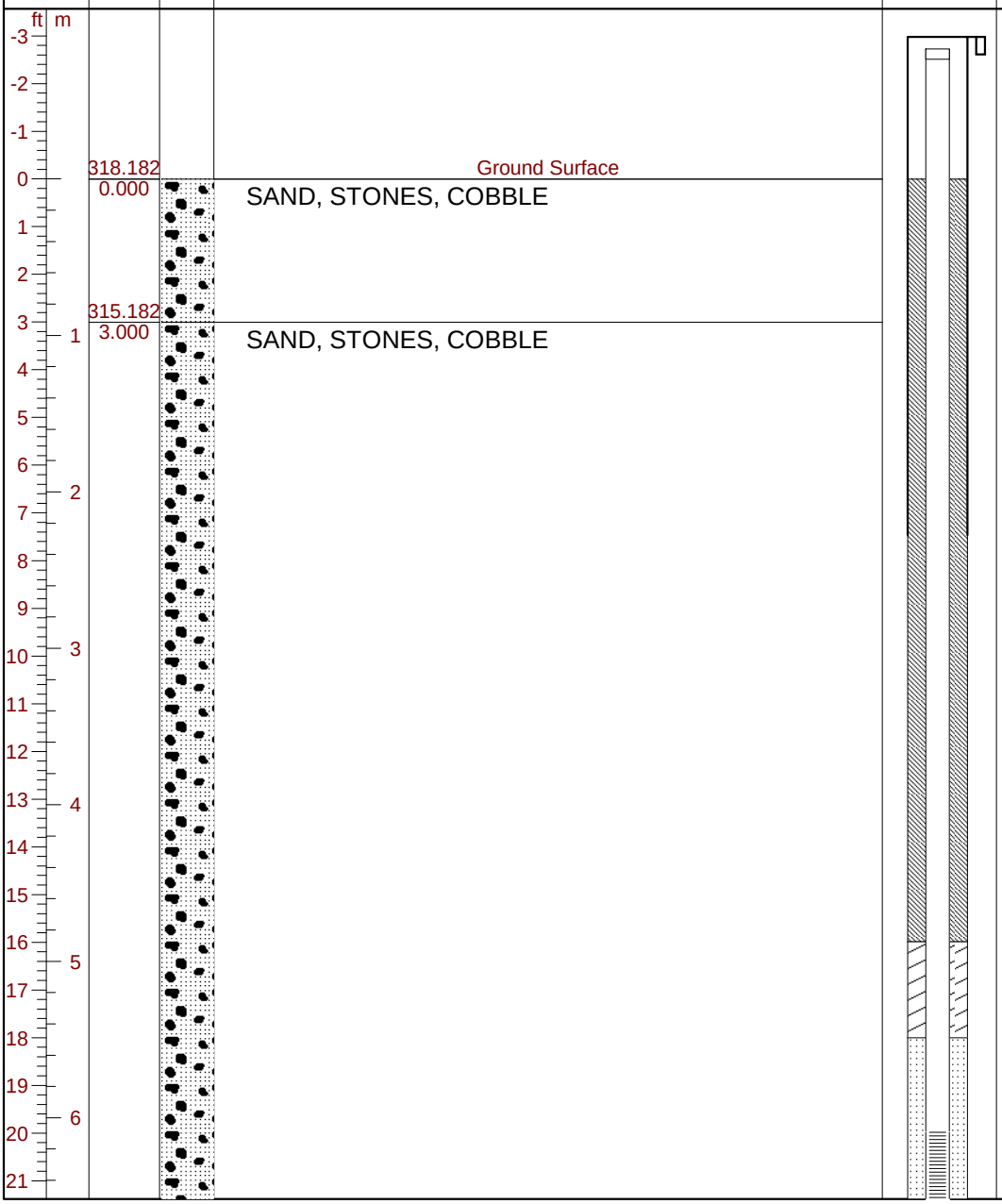
Borehole ID: PL4-12

Project No: KB5082-3 ***Northing:*** 5021332

Client: Municipality of Hastings Highlands ***Easting:*** 281179

Location: Papineau Lake WDS ***Project Manager:*** D.D.

Depth	Elevation	Symbol	Description	Monitor Constructio	Comments
ft / m					
0	318.182		Ground Surface		6" steel locking protective casing
0	0.000		SAND, STONES, COBBLE		
3	315.182		SAND, STONES, COBBLE		Bentonite quickgrout
3	3.000				
					2" pvc monitor
					3/8 bentonite holeplug



Drilled By: Marquardt Water Specialist ***Hole Size:*** 6"

Drill Method: Air Hammer ***Datum:*** NAD 83

Drill Date: October 16, 2012 ***Drilling Supervisor:*** M.L.

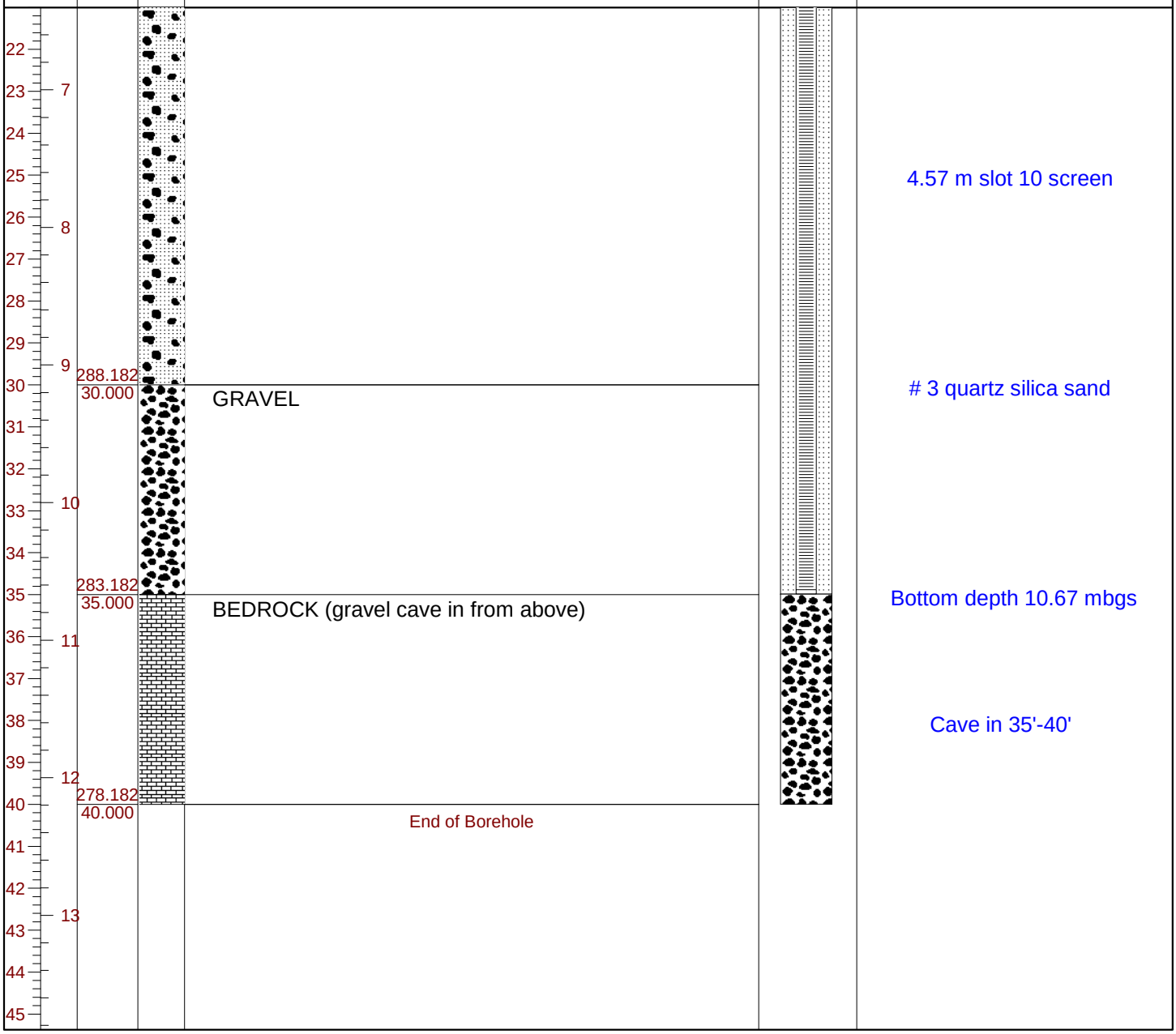
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL4-12

Project No: KB5082-3 ***Northing:*** 5021332

Client: Municipality of Hastings Highlands ***Easting:*** 281179

Location: Papineau Lake WDS ***Project Manager:*** D.D.



Drilled By: Marquardt Water Specialist ***Hole Size:*** 6"

Drill Method: Air Hammer ***Datum:*** NAD 83

Drill Date: October 16, 2012 ***Drilling Supervisor:*** M.L.

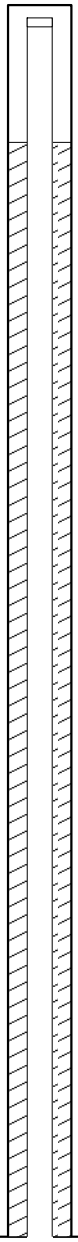
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL5-12

Project No: KB5082-3 ***Northing:*** 5021388

Client: Municipality of Hastings Highlands ***Easting:*** 280075.2

Location: Papineau Lake WDS ***Project Manager:*** D.D.

Depth (ft / m)	Elevation	Symbol	Description	Monitor Constructio	Comments
-3 to 23 ft / 1 to 7 m					6" steel locking protective casing
0 ft	325.765		Ground Surface		
0.000			Sand, FILL (garbage, asphalt shingles)		3/8 bentonite holeplug
6.000	319.765		FILL (garbage, stones) Boulder from 25'-28'		2" pvc monitor

Drilled By: Marquardt Water Specialist ***Hole Size:*** 6"

Drill Method: Air Hammer ***Datum:*** NAD 83

Drill Date: October 16, 2012 ***Drilling Supervisor:*** M.L.

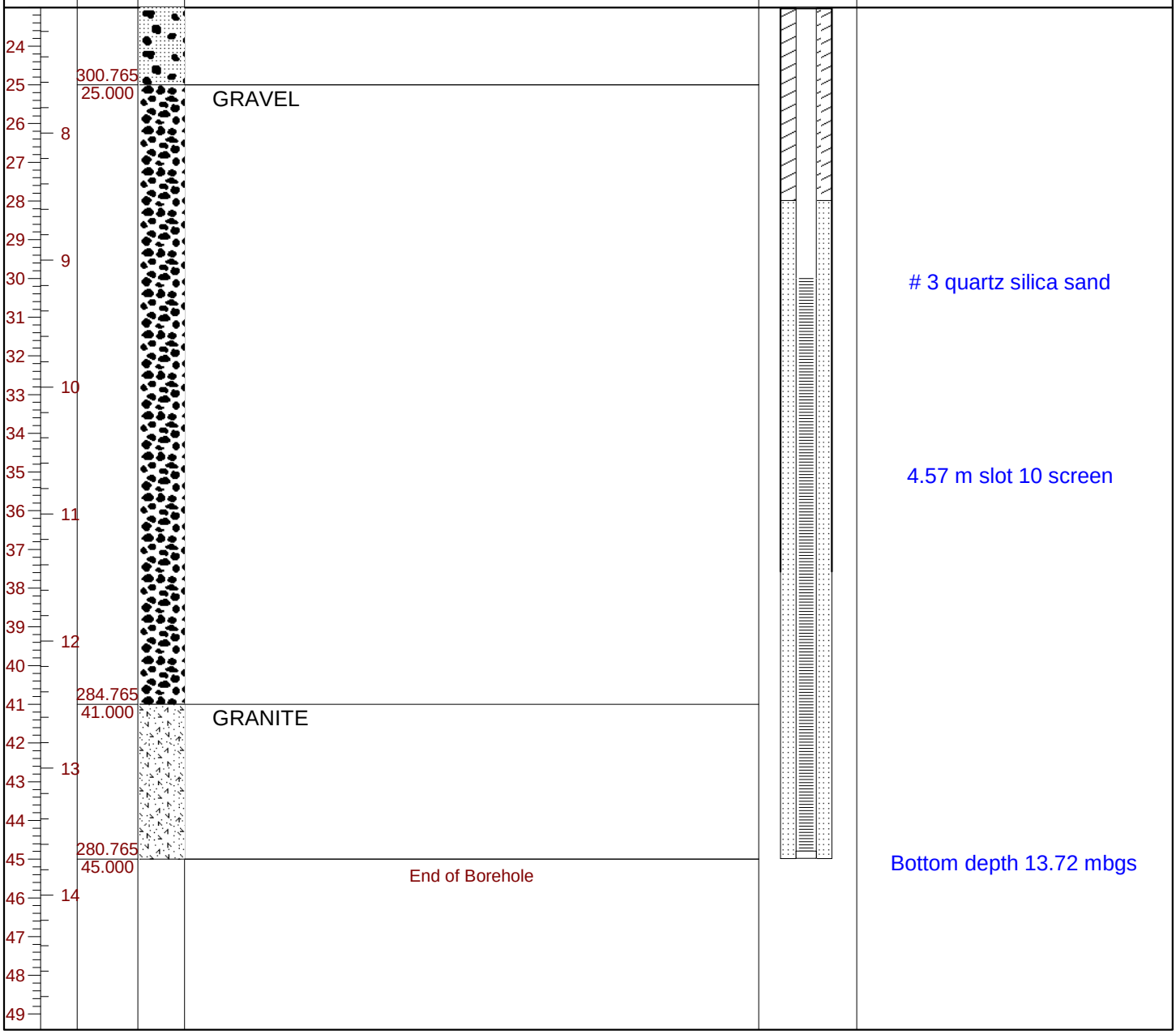
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL5-12

Project No: KB5082-3 ***Northing:*** 5021388

Client: Municipality of Hastings Highlands ***Easting:*** 280075.2

Location: Papineau Lake WDS ***Project Manager:*** D.D.



Drilled By: Marquardt Water Specialist ***Hole Size:*** 6"

Drill Method: Air Hammer ***Datum:*** NAD 83

Drill Date: October 16, 2012 ***Drilling Supervisor:*** M.L.

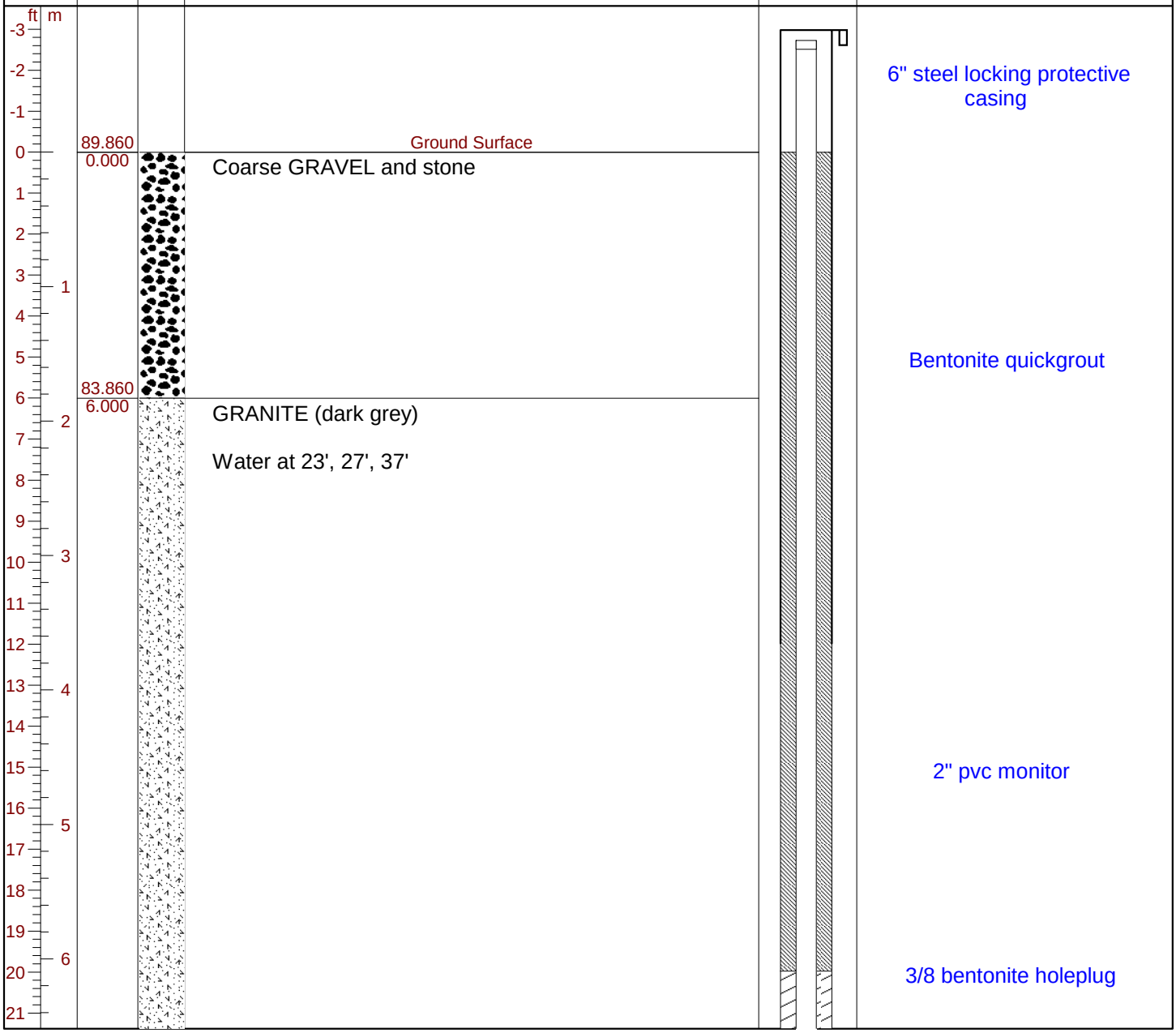
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL6-12

Project No: KB5082-3 ***Northing:*** 5021448

Client: Municipality of Hastings Highlands ***Easting:*** 281169

Location: Papineau Lake WDS ***Project Manager:*** D.D.



Drilled By: Marquardt Water Specialist ***Hole Size:*** 6"

Drill Method: Air Hammer ***Datum:*** NAD 83

Drill Date: October 16, 2012 ***Drilling Supervisor:*** M.L.

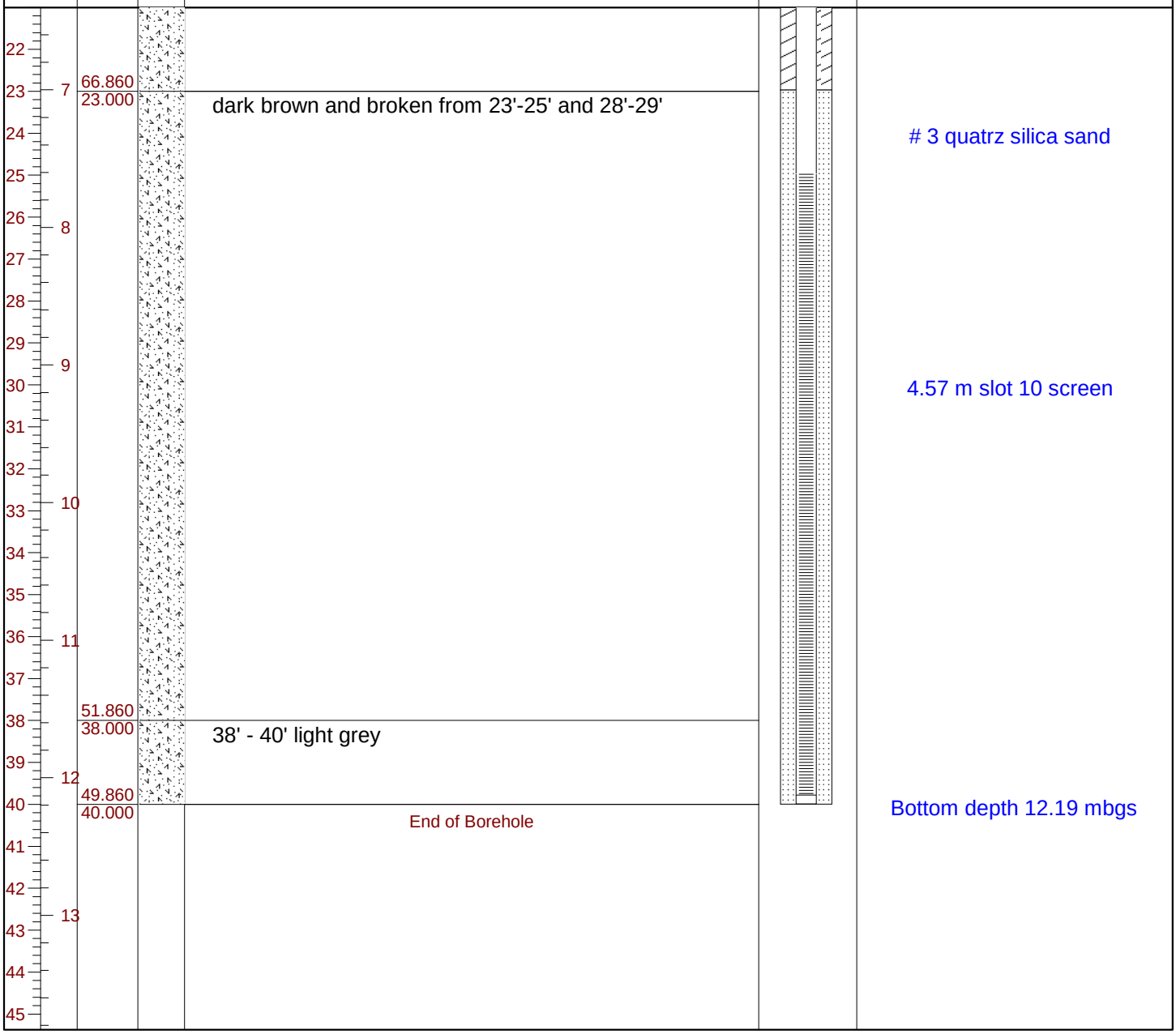
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL6-12

Project No: KB5082-3 ***Northing:*** 5021448

Client: Municipality of Hastings Highlands ***Easting:*** 281169

Location: Papineau Lake WDS ***Project Manager:*** D.D.



Drilled By: Marquardt Water Specialist ***Hole Size:*** 6"

Drill Method: Air Hammer ***Datum:*** NAD 83

Drill Date: October 16, 2012 ***Drilling Supervisor:*** M.L.

BluMetric Environmental Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL7-16

Project No: 160238-03 ***Northing:*** 5021177

Client: Municipality of Hastings Highlands ***Easting:*** 281135

Location: Papineau Lake WDS ***Project Manager:*** IOC

Depth (ft / m)	Elevation	Symbol	Description	Monitor Construction	Comments
					6" steel locking protective casing
	323.229		Ground Surface		2" PVC Stick-up 0.93 m
					TPVC Elev. - 324.161
0 ft / 0 m	0.000		Brown SAND with trace of small gravel Trace organics (roots) near surface Dry		
					3/8 bentonite holeplug
					2" pvc monitor
	302.229				
20 ft / 6 m	21.000		Brown SAND and GRAVEL Dry		
27 ft / 8 m					

Drilled By: G. Hart and Sons Well Drilling Ltd. ***Hole Size:*** 6"

Drill Method: Foremost DR12 Air Rotary ***Datum:*** NAD 83

Drill Date: May16-17, 2016 ***Drilling Supervisor:*** A.B.

BluMetric Environmental Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL7-16

Project No: 160238-03 ***Northing:*** 5021177

Client: Municipality of Hastings Highlands ***Easting:*** 281135

Location: Papineau Lake WDS ***Project Manager:*** IOC

Depth	Elevation	Symbol	Description	Monitor Construction	Comments
28					
29					
9	293.229				
30	30.000		Brown SAND and GRAVEL Water at 32'		#3 Silica sand
31					
32					
33	10				
34					
35					3.05 m slot 10 screen
36	287.229				
11	36.000		Brown Coarse SAND and GRAVEL Saturated		
37					
38					
39					
12			PVC Monitor lifted during installation of well materials. Integrity not compromised.		Bottom depth 12.19 mbgs
40					
41			Monitor estimated well yield ~ 7gpm		
42					
13			40-56 ' native material cave in.		
43					
44					
45					
46	14				
47					
48					
49					
15					
50					
51					
52					
16					
53					
54					
55					
17	267.229				
56	56.000		End of Borehole		
57					

Drilled By: G. Hart and Sons Well Drilling Ltd. ***Hole Size:*** 6"

Drill Method: Foremost DR12 Air Rotary ***Datum:*** NAD 83

Drill Date: May16-17, 2016 ***Drilling Supervisor:*** A.B.

Borehole ID: PL8-16

Project No: 160238-03
Client: Municipality of Hastings Highlands
Location: Papineau Lake WDS
Northing: 5021249
Easting: 231069
Project Manager: IOC

BluMetric Environmental Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Depth (ft)	Depth (m)	Elevation	Description	Monitor Construction	Comments
		319.309	Ground Surface		6" steel locking protective casing
		0.000	Brown SAND with trace small gravel Dry		2" PVC Stick-up 0.90 m TPVC Elev. - 320.35
		316.309			
	1	3.000	Brown SAND and GRAVEL with COBBLES Dry becoming moist near 8'		3/8 bentonite holeplug
	2	310.309			
	3	9.000	Brown, Coarse, SAND and GRAVEL with trace cobble throughout Water encountered at 9-10' Wet		2" pvc monitor
	4				
	5		Monitor estimated well yield ~10gpm		
	6				
	7				
	8				
	9				3.05 m slot 10 screen
	10				
		284.309			Bottom depth 10.67 mbgs
	11	35.000	End of Borehole		

Drilled By: G. Hart and Sons Well Drilling Ltd.
Drill Method: Foremost DR12 Air Rotary
Drill Date: May 17, 2016
Hole Size: 6"
Datum: NAD 83
Drilling Supervisor: A.B.

BluMetric Environmental Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL9-16

Project No: 160238-03 ***Northing:*** 5021298

Client: Municipality of Hastings Highlands ***Easting:*** 281244

Location: Papineau Lake WDS ***Project Manager:*** IOC

Depth (ft / m)	Elevation	Symbol	Description	Monitor Construction	Comments
					6" steel locking protective casing
	326.870		Ground Surface		2" PVC Stick-up 0.93 m
	0.000		Brown SAND and GRAVEL with trace cobbles Dry		TPVC Elev. - 326.595
	320.870				3/8 bentonite holeplug
	6.000		Brown SAND with trace gravel Gravel Seam at 15' Dry		
	310.870				2" pvc monitor
	16.000		Brown, fine to medium grain, SAND and GRAVEL Wet at 20'		

Drilled By: G. Hart and Sons Well Drilling Ltd. ***Hole Size:*** 6"

Drill Method: Foremost DR12 Air Rotary ***Datum:*** NAD 83

Drill Date: May 18, 2016 ***Drilling Supervisor:*** A.B.

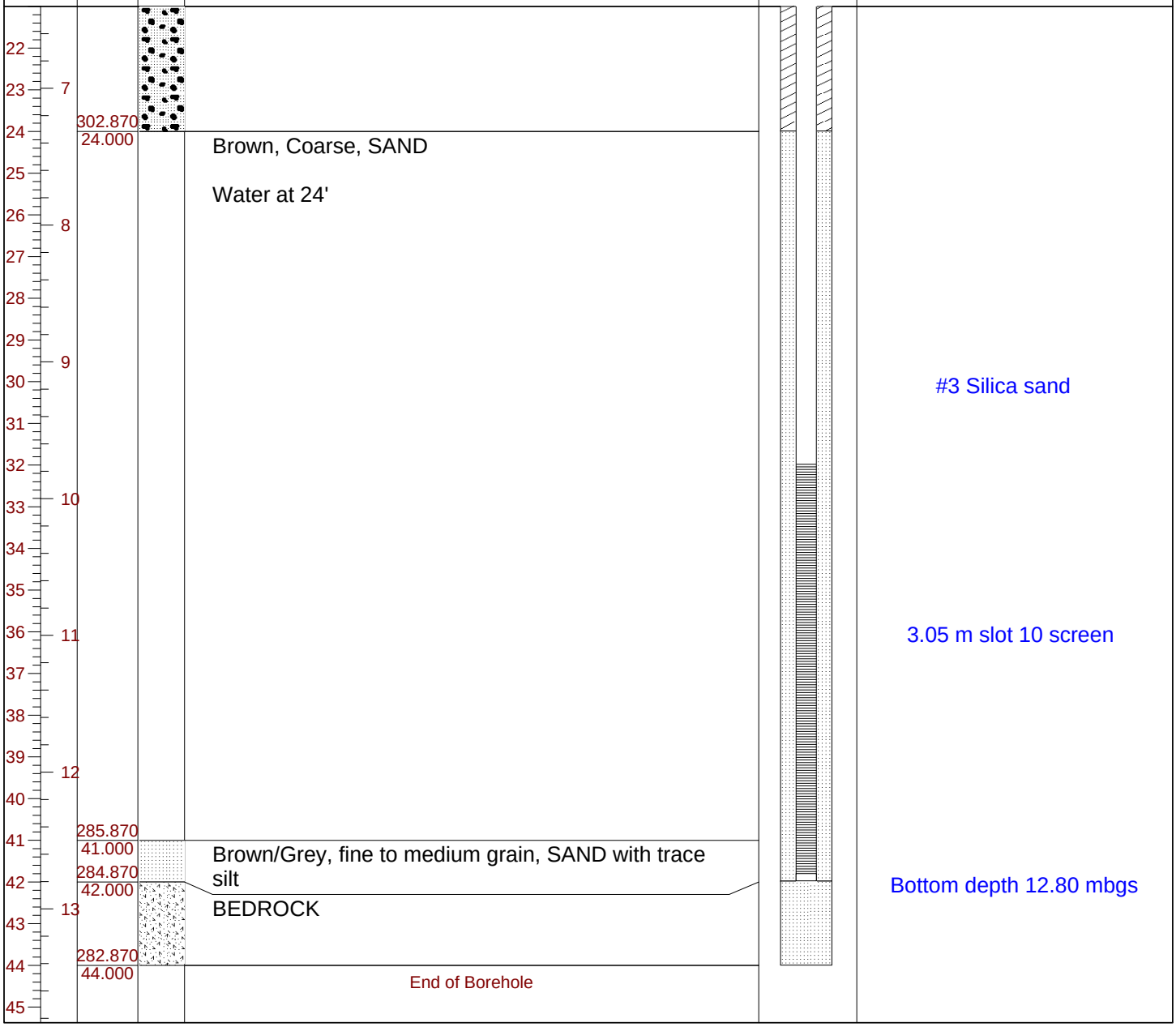
BluMetric Environmental Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

Borehole ID: PL9-16

Project No: 160238-03 ***Northing:*** 5021298

Client: Municipality of Hastings Highlands ***Easting:*** 281244

Location: Papineau Lake WDS ***Project Manager:*** IOC



Drilled By: G. Hart and Sons Well Drilling Ltd. ***Hole Size:*** 6"

Drill Method: Foremost DR12 Air Rotary ***Datum:*** NAD 83

Drill Date: May 18, 2016 ***Drilling Supervisor:*** A.B.

Appendix D

Field Forms, Laboratory Reports and Chain of Custody Records

Appendix D

D-1 Field Checklists

SMALL LANDFILL
OPERATION AND INSPECTION FORM

Site Name: Papineau Lake WDS, MHHs	**Date:** May 6, 2025	**Weather:** 16°C
Project #: 250253-03	**BluMetric Staff:** NW & BM	Sunny + Overcast

Photographs of each item below should be collected during site visits.

OVERALL INSPECTION AND OPERATION REVIEW

❑ Signage in good condition	Yes ✓	No _	
❑ ECA and emergency numbers on signage	Yes ✓	No _	
❑ Hour of operation observed	Yes ✓	No _	
❑ Site open under normal operating hours	Yes ✓	No _	→ Closed while on-site
❑ Perimeter fencing and gate in good condition	Yes ✓	No _	
❑ Gate locked if closed	Yes ✓	No_	

DESIGNATED WASTE AREA

❑ Working active/trench area (moderate size, daily cover, compacted)	Yes ✓	No _
❑ Designated waste areas are properly signed and easily accessed by public	Yes ✓	No _

RECYCLING OPERATION (if applicable)

❑ Proper signage and bins present	Yes ✓	No _
❑ Clearly signed	Yes ✓	No _
❑ Overall neat in appearance	Yes ✓	No _

SEGREGATED SCRAP PILES (metal, tires, brush, etc.)

❑ Metals neat and appropriate size	Yes ✓	No _	→ Large
❑ Tires neat and appropriate size	Yes ✓	No _	
❑ Bulky Items neat and appropriate size	Yes ✓	No _	→ Bulk pile is large } Metals & Bulky items are spilling into eachother
❑ Brush pile neat and appropriate size	Yes ✓	No _	
❑ Construction debris neat and appropriate size	~~Yes~~ _	~~No~~ _	→ Not accepted

MONITORING WELL CONDITION

❑ Casing conditions (frost heave, lock, cap)	Yes ✓	No _
❑ Monitor condition (capped, vented)	Yes ✓	No _
❑ Wells clearly labeled (re-label as required)	Yes ✓	No _
❑ Well clearly visible (clear brush if necessary)	Yes ✓	No _

LANDFILL GAS MONITORING

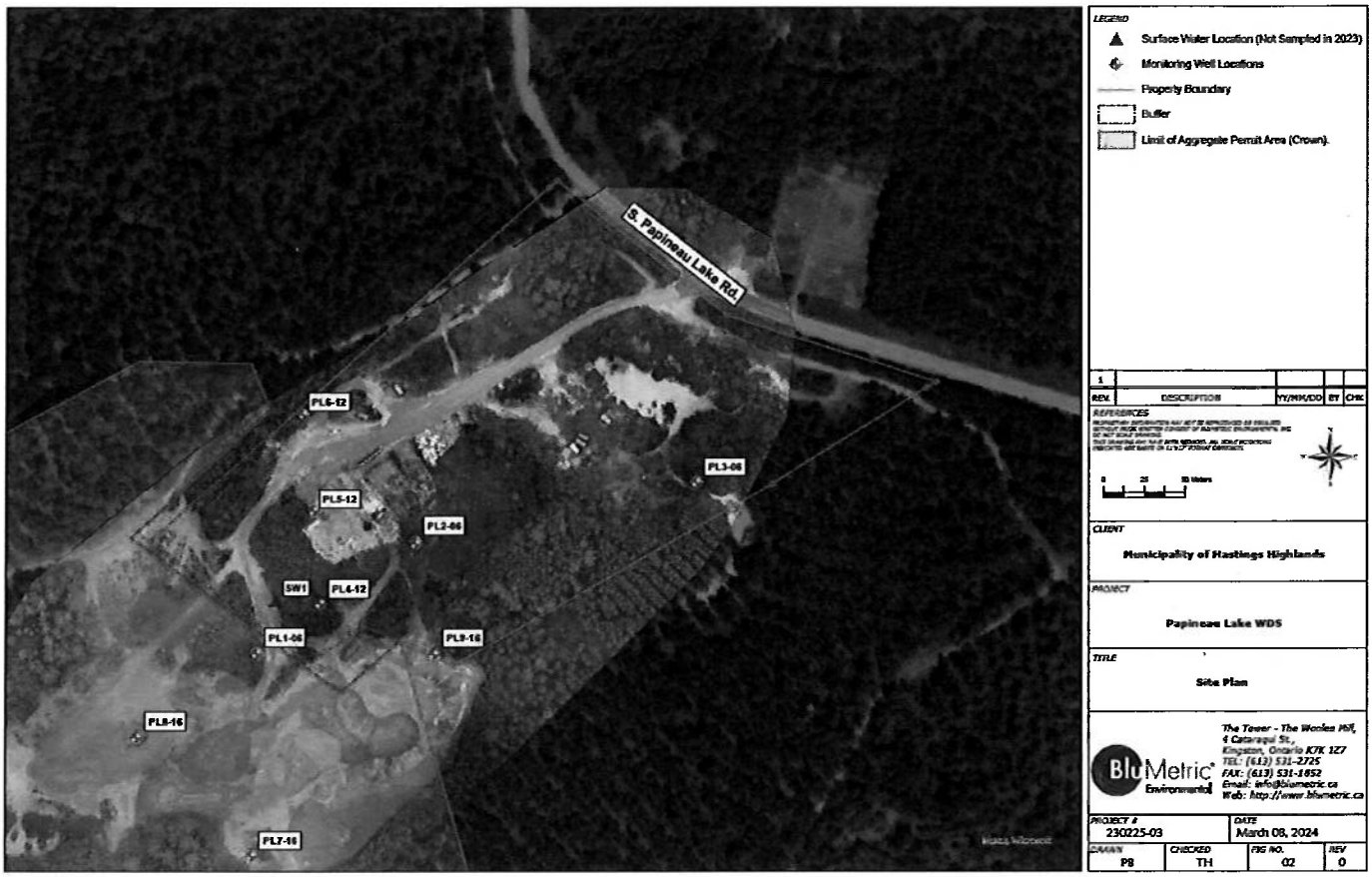
❑ Conducted at structures	Yes ✓	No _	*Attendants building = 0 ppm*
❑ Conducted at monitoring wells	Yes ✓	No _	

REPAIRS: Provide details of repairs made or materials required for repairs upon next site visit:

OBSERVATIONS OF PHYSICAL ENVIRONMENT: Please comment on any changes to the local environment (e.g. settling or slumping of waste/cover, new or altered drainage, presence of seeps, changes in vegetation cover, etc.)

→ Electronics bin was left open & unorganized.

This form is intended as a general reminder of information that should recorded during monitoring activities. The above information is a minimum guide. Any information deemed important should be recorded in the field notes for each site.



Identify any changes to site layout on drawing and/or comment:

This form is intended as a general reminder of information that should recorded during monitoring activities. The above information is a minimum guide. Any information deemed important should be recorded in the field notes for each site.

SMALL LANDFILL
OPERATION AND INSPECTION FORM

Site Name: Papineau Lake WDS, MHHs	Date: Oct 20, 2025	Weather:
Project #: 250253-03	BluMetric Staff: BM/DK	Overcast 8°C

Photographs of each item below should be collected during site visits.

OVERALL INSPECTION AND OPERATION REVIEW

❑ Signage in good condition	Yes ✓	No _	
❑ ECA and emergency numbers on signage	Yes ✓	No _	
❑ Hour of operation observed	Yes ✓	No _	Township hauling from pit behind WDS
❑ Site open under normal operating hours	Yes _	No ✓	
❑ Perimeter fencing and gate in good condition	Yes ✓	No _	
❑ Gate locked if closed	Yes ✓	No _	Gate left open

DESIGNATED WASTE AREA

❑ Working active/trench area (moderate size, daily cover, compacted)	Yes ✓	No _	Not covered/ packed
❑ Designated waste areas are properly signed and easily accessed by public	Yes ✓	No _	

RECYCLING OPERATION (if applicable)

❑ Proper signage and bins present	Yes ✓	No _
❑ Clearly signed	Yes ✓	No _
❑ Overall neat in appearance	Yes ✓	No _

SEGREGATED SCRAP PILES (metal, tires, brush, etc.)

❑ Metals neat and appropriate size	Yes ✓	No _	Metals and Bulk piles large but contractor is picking up in coming weeks
❑ Tires neat and appropriate size	Yes ✓	No _	
❑ Bulky Items neat and appropriate size	Yes ✓	No _	
❑ Brush pile neat and appropriate size	Yes ✓	No _	
❑ Construction debris neat and appropriate size	Yes _	No _	✓NA

MONITORING WELL CONDITION

❑ Casing conditions (frost heave, lock, cap)	Yes ✓	No _
❑ Monitor condition (capped, vented)	Yes ✓	No _
❑ Wells clearly labeled (re-label as required)	Yes ✓	No _
❑ Well clearly visible (clear brush if necessary)	Yes ✓	No _

LANDFILL GAS MONITORING

❑ Conducted at structures	Yes ✓	No _
❑ Conducted at monitoring wells	Yes ✓	No _

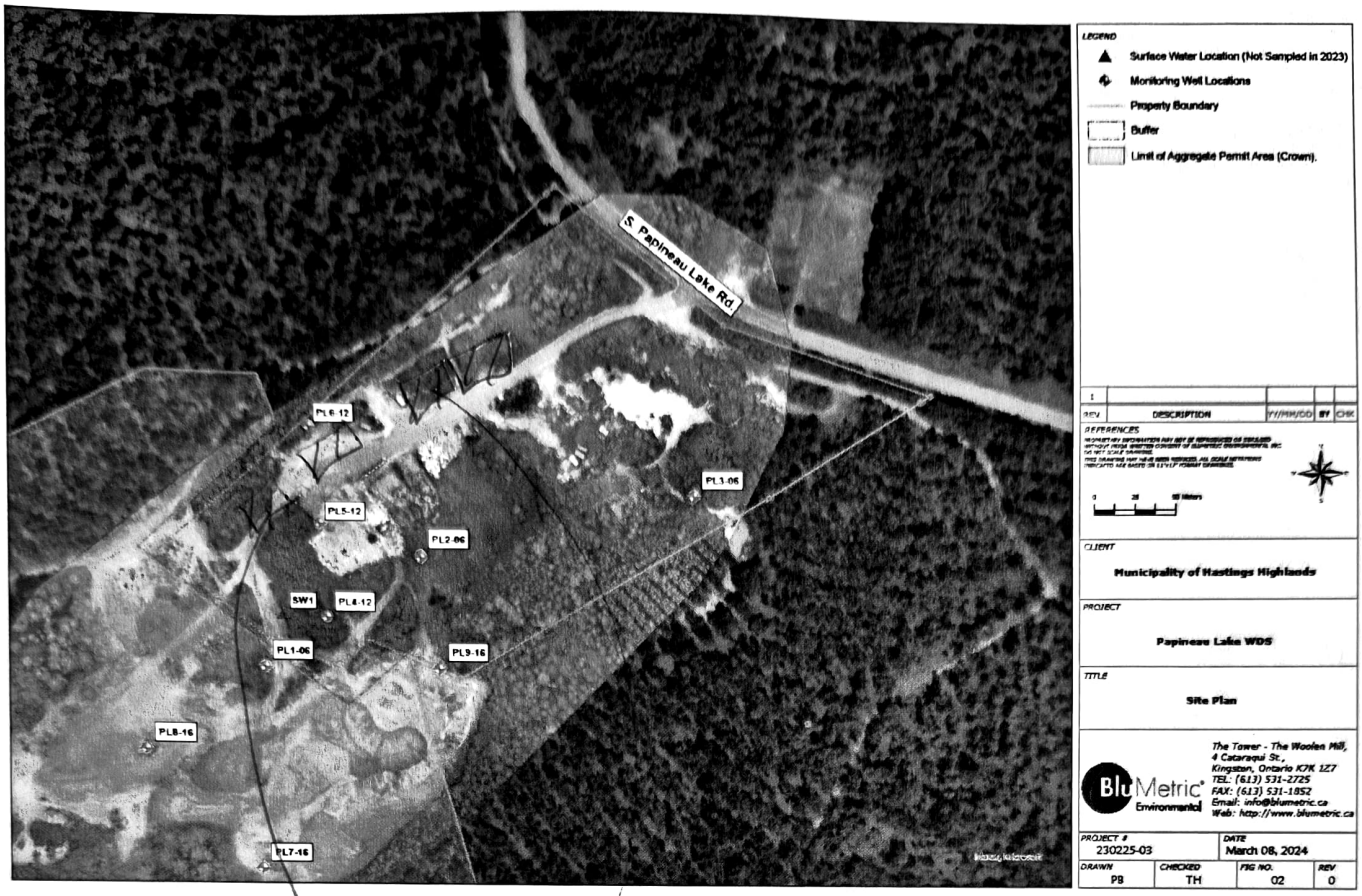
REPAIRS: Provide details of repairs made or materials required for repairs upon next site visit:

New lock added to PL4-12

OBSERVATIONS OF PHYSICAL ENVIRONMENT: Please comment on any changes to the local environment (e.g. settling or slumping of waste/cover, new or altered drainage, presence of seeps, changes in vegetation cover, etc.)

Excessive blown garbage (plastics) over most of site
(see diagram + photos)

This form is intended as a general reminder of information that should recorded during monitoring activities. The above information is a minimum guide. Any information deemed important should be recorded in the field notes for each site.



Identify any changes to site layout on drawing and/or comment:

Blawn plastics

This form is intended as a general reminder of information that should recorded during monitoring activities. The above information is a minimum guide. Any information deemed important should be recorded in the field notes for each site.

Appendix D

D-2 Groundwater Laboratory Reports

Your P.O. #: 250253-03
Your Project #: 250253-03
Site#: Papineau Lake
Your C.O.C. #: 1041552-01-01

Attention: S'rana Scholes

BluMetric Environmental Inc
The Tower - The Woolen Mill
4 Cataraqui St
Kingston, ON
CANADA K7K 1Z7

Report Date: 2025/05/14
Report #: R8538545
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C552157
Received: 2025/05/08, 10:25

Sample Matrix: Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	5	N/A	2025/05/13	CAM SOP-00448	SM 24 2320 B m
Alkalinity	5	N/A	2025/05/14	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	10	N/A	2025/05/14	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	10	N/A	2025/05/13	CAM SOP-00416	SM 24 5220 D m
Conductivity	5	N/A	2025/05/13	CAM SOP-00414	SM 24 2510 m
Conductivity	5	N/A	2025/05/14	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	10	N/A	2025/05/13	CAM SOP-00446	SM 24 5310 B m
Dissolved Mercury in Water by CVAA	5	2025/05/14	2025/05/14	CAM SOP-00453	EPA 7470A m
Dissolved Mercury in Water by CVAA	5	2025/05/09	2025/05/09	CAM SOP-00453	EPA 7470A m
Dissolved Metals by ICPMS	10	N/A	2025/05/13	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	10	N/A	2025/05/14	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	10	N/A	2025/05/12	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	4	2025/05/10	2025/05/14	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	5	2025/05/12	2025/05/13	CAM SOP-00413	SM 24th - 4500H+ B
pH (3)	1	2025/05/12	2025/05/14	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	10	N/A	2025/05/13	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	10	N/A	2025/05/14	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	10	2025/05/13	2025/05/14	CAM SOP-00428	SM 24 2540C m
Total Kjeldahl Nitrogen in Water	8	2025/05/13	2025/05/13	CAM SOP-00938	SM 4500-N B m
Total Kjeldahl Nitrogen in Water	2	2025/05/13	2025/05/14	CAM SOP-00938	SM 4500-N B m
Total Phosphorus (Colourimetric)	10	2025/05/13	2025/05/13	CAM SOP-00407	SM 24 4500-P I

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Your P.O. #: 250253-03
Your Project #: 250253-03
Site#: Papineau Lake
Your C.O.C. #: 1041552-01-01

Attention: S'rana Scholes

BluMetric Environmental Inc
The Tower - The Woolen Mill
4 Cataraqui St
Kingston, ON
CANADA K7K 1Z7

Report Date: 2025/05/14
Report #: R8538545
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C552157
Received: 2025/05/08, 10:25

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.
(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Deepthi Shaji, Project Manager
Email: Deepthi.Shaji@bureauveritas.com
Phone# (905)817-5700 Ext:7065843
==========
This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AQRG36			AQRG37		
Sampling Date		2025/05/06 11:45			2025/05/06 11:00		
COC Number		1041552-01-01			1041552-01-01		
	UNITS	PL1-06	RDL	QC Batch	PL2-06	RDL	QC Batch
Inorganics							
Total Ammonia-N	mg/L	0.18	0.050	9927867	4.8	0.050	9927867
Total Chemical Oxygen Demand (COD)	mg/L	5.9	4.0	9927475	48	4.0	9927475
Conductivity	umho/cm	520	2.0	9927201	760	2.0	9926462
Total Dissolved Solids	mg/L	310	10	9927476	460	10	9927476
Total Kjeldahl Nitrogen (TKN)	mg/L	0.29	0.10	9927477	5.5	0.20	9927477
Dissolved Organic Carbon	mg/L	3.9	0.4	9927729	17	0.4	9927729
pH	pH	6.82		9927203	7.27		9926463
Phenols-4AAP	mg/L	ND	0.0010	9927814	ND	0.0010	9927629
Total Phosphorus	mg/L	0.073	0.020	9927482	0.44	0.020	9927482
Dissolved Sulphate (SO4)	mg/L	22	1.0	9926455	25	1.0	9926455
Alkalinity (Total as CaCO3)	mg/L	160	1.0	9927198	270	1.0	9926461
Dissolved Chloride (Cl-)	mg/L	46	1.0	9926454	49	2.0	9926454
Nitrite (N)	mg/L	ND	0.010	9926449	0.014	0.010	9926449
Nitrate (N)	mg/L	0.18	0.10	9926449	1.43	0.10	9926449

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AQRG37			AQRG38		AQRG39		
Sampling Date		2025/05/06 11:00			2025/05/06 10:00		2025/05/06 11:30		
COC Number		1041552-01-01			1041552-01-01		1041552-01-01		
	UNITS	PL2-06 Lab-Dup	RDL	QC Batch	PL3-06	QC Batch	PL4-12	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L				ND	9927883	ND	0.050	9927883
Total Chemical Oxygen Demand (COD)	mg/L				ND	9927475	ND	4.0	9927475
Conductivity	umho/cm				140	9927212	540	2.0	9927201
Total Dissolved Solids	mg/L				150	9927476	365	10	9927476
Total Kjeldahl Nitrogen (TKN)	mg/L				ND	9927477	ND	0.10	9927477
Dissolved Organic Carbon	mg/L				1.0	9927729	1.9	0.4	9927729
pH	pH				7.23	9927213	7.37		9927203
Phenols-4AAP	mg/L				ND	9927629	ND	0.0010	9927814
Total Phosphorus	mg/L				6.6	9927482	0.34	0.020	9927482
Dissolved Sulphate (SO4)	mg/L				3.3	9927194	37	1.0	9926455
Alkalinity (Total as CaCO3)	mg/L				23	9927209	190	1.0	9927198
Dissolved Chloride (Cl-)	mg/L				22	9927184	27	1.0	9926454
Nitrite (N)	mg/L	0.014	0.010	9926449	ND	9926839	ND	0.010	9926449
Nitrate (N)	mg/L	1.44	0.10	9926449	0.18	9926839	ND	0.10	9926449

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AQRG39			AQRG40		AQRG41		
Sampling Date		2025/05/06 11:30			2025/05/06 10:40		2025/05/06 10:20		
COC Number		1041552-01-01			1041552-01-01		1041552-01-01		
	UNITS	PL4-12 Lab-Dup	RDL	QC Batch	PL5-12	QC Batch	PL6-12	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L				ND	9927867	ND	0.050	9927867
Total Chemical Oxygen Demand (COD)	mg/L	ND	4.0	9927475	6.3	9927475	4.6	4.0	9927475
Conductivity	umho/cm				410	9927201	76	2.0	9927201
Total Dissolved Solids	mg/L				275	9927476	90	10	9927478
Total Kjeldahl Nitrogen (TKN)	mg/L				ND	9927477	0.14	0.10	9927477
Dissolved Organic Carbon	mg/L				2.1	9927729	2.4	0.4	9927729
pH	pH				6.70	9927203	6.93		9927203
Phenols-4AAP	mg/L				ND	9927629	ND	0.0010	9927629
Total Phosphorus	mg/L				0.47	9927482	1.9	0.10	9927482
Dissolved Sulphate (SO4)	mg/L				12	9926455	11	1.0	9926455
Alkalinity (Total as CaCO3)	mg/L				96	9927198	26	1.0	9927198
Dissolved Chloride (Cl-)	mg/L				49	9926454	ND	1.0	9926454
Nitrite (N)	mg/L				ND	9926449	ND	0.010	9926449
Nitrate (N)	mg/L				ND	9926449	ND	0.10	9926449

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AQRG42			AQRG42		
Sampling Date		2025/05/06 12:05			2025/05/06 12:05		
COC Number		1041552-01-01			1041552-01-01		
	UNITS	PL7-16	RDL	QC Batch	PL7-16 Lab-Dup	RDL	QC Batch
Inorganics							
Total Ammonia-N	mg/L	ND	0.050	9927867			
Total Chemical Oxygen Demand (COD)	mg/L	6.3	4.0	9927475			
Conductivity	umho/cm	360	2.0	9927201	360	2.0	9927201
Total Dissolved Solids	mg/L	220	10	9927478			
Total Kjeldahl Nitrogen (TKN)	mg/L	ND	0.10	9927477			
Dissolved Organic Carbon	mg/L	2.6	0.4	9927729			
pH	pH	6.76		9927203	6.74		9927203
Phenols-4AAP	mg/L	ND	0.0010	9927629			
Total Phosphorus	mg/L	ND	0.020	9927482			
Dissolved Sulphate (SO4)	mg/L	19	1.0	9926455			
Alkalinity (Total as CaCO3)	mg/L	100	1.0	9927198	100	1.0	9927198
Dissolved Chloride (Cl-)	mg/L	28	1.0	9926454			
Nitrite (N)	mg/L	ND	0.010	9926449			
Nitrate (N)	mg/L	0.46	0.10	9926449			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AQRG43		AQRG44			AQRG44		
Sampling Date		2025/05/06 12:20		2025/05/06 11:10			2025/05/06 11:10		
COC Number		1041552-01-01		1041552-01-01			1041552-01-01		
	UNITS	PL8-16	QC Batch	PL9-16	RDL	QC Batch	PL9-16 Lab-Dup	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L	ND	9927883	ND	0.050	9927867			
Total Chemical Oxygen Demand (COD)	mg/L	ND	9927475	ND	4.0	9927475			
Conductivity	umho/cm	62	9926462	200	2.0	9926462			
Total Dissolved Solids	mg/L	35	9927476	165	10	9927476			
Total Kjeldahl Nitrogen (TKN)	mg/L	ND	9927477	ND	0.10	9927477			
Dissolved Organic Carbon	mg/L	1.2	9927729	1.1	0.4	9927729			
pH	pH	7.15	9926463	7.05		9926463			
Phenols-4AAP	mg/L	ND	9927814	ND	0.0010	9927814			
Total Phosphorus	mg/L	0.80	9927482	0.65	0.020	9927482	0.66	0.020	9927482
Dissolved Sulphate (SO4)	mg/L	6.3	9926455	9.9	1.0	9926455			
Alkalinity (Total as CaCO3)	mg/L	24	9926461	34	1.0	9926461			
Dissolved Chloride (Cl-)	mg/L	ND	9926454	25	1.0	9926454			
Nitrite (N)	mg/L	ND	9926449	ND	0.010	9926449			
Nitrate (N)	mg/L	0.23	9926449	0.67	0.10	9926449			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AQRG45		
Sampling Date		2025/05/06 12:05		
COC Number		1041552-01-01		
	UNITS	**PL-QAQC-GW1**	**RDL**	**QC Batch**
Inorganics				
Total Ammonia-N	mg/L	0.075	0.050	9927867
Total Chemical Oxygen Demand (COD)	mg/L	4.3	4.0	9927475
Conductivity	umho/cm	350	2.0	9926462
Total Dissolved Solids	mg/L	200	10	9927478
Total Kjeldahl Nitrogen (TKN)	mg/L	0.10	0.10	9927477
Dissolved Organic Carbon	mg/L	2.5	0.4	9927729
pH	pH	7.19		9926463
Phenols-4AAP	mg/L	ND	0.0010	9927629
Total Phosphorus	mg/L	ND	0.020	9927482
Dissolved Sulphate (SO4)	mg/L	18	1.0	9926455
Alkalinity (Total as CaCO3)	mg/L	110	1.0	9926461
Dissolved Chloride (Cl-)	mg/L	27	1.0	9926454
Nitrite (N)	mg/L	ND	0.010	9926449
Nitrate (N)	mg/L	0.48	0.10	9926449

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AQRG36		AQRG37			AQRG37		
Sampling Date		2025/05/06 11:45		2025/05/06 11:00			2025/05/06 11:00		
COC Number		1041552-01-01		1041552-01-01			1041552-01-01		
	UNITS	PL1-06	QC Batch	PL2-06	RDL	QC Batch	PL2-06 Lab-Dup	RDL	QC Batch
Metals									
Dissolved Mercury (Hg)	ug/L	ND	9928390	ND	0.10	9928390			
Dissolved Arsenic (As)	ug/L	ND	9925579	ND	1.0	9925581	ND	1.0	9925581
Dissolved Barium (Ba)	ug/L	37	9925579	160	2.0	9925581	160	2.0	9925581
Dissolved Boron (B)	ug/L	150	9925579	650	10	9925581	640	10	9925581
Dissolved Cadmium (Cd)	ug/L	ND	9925579	0.30	0.090	9925581	0.25	0.090	9925581
Dissolved Calcium (Ca)	ug/L	54000	9925579	68000	200	9925581	70000	200	9925581
Dissolved Chromium (Cr)	ug/L	ND	9925579	ND	5.0	9925581	ND	5.0	9925581
Dissolved Copper (Cu)	ug/L	8.6	9925579	22	0.90	9925581	22	0.90	9925581
Dissolved Iron (Fe)	ug/L	ND	9925579	110	100	9925581	110	100	9925581
Dissolved Lead (Pb)	ug/L	ND	9925579	ND	0.50	9925581	ND	0.50	9925581
Dissolved Magnesium (Mg)	ug/L	13000	9925579	13000	50	9925581	13000	50	9925581
Dissolved Manganese (Mn)	ug/L	1300	9925579	3400	2.0	9925581	3400	2.0	9925581
Dissolved Potassium (K)	ug/L	6000	9925579	13000	200	9925581	13000	200	9925581
Dissolved Sodium (Na)	ug/L	25000	9925579	51000	100	9925581	51000	100	9925581
Dissolved Zinc (Zn)	ug/L	ND	9925579	ND	5.0	9925581	ND	5.0	9925581

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AQRG38	AQRG39	AQRG40		AQRG41		
Sampling Date		2025/05/06 10:00	2025/05/06 11:30	2025/05/06 10:40		2025/05/06 10:20		
COC Number		1041552-01-01	1041552-01-01	1041552-01-01		1041552-01-01		
	UNITS	PL3-06	PL4-12	PL5-12	QC Batch	PL6-12	RDL	QC Batch
Metals								
Dissolved Mercury (Hg)	ug/L	ND	ND	ND	9925740	ND	0.10	9928390
Dissolved Arsenic (As)	ug/L	ND	ND	ND	9925581	ND	1.0	9925581
Dissolved Barium (Ba)	ug/L	10	48	31	9925581	4.4	2.0	9925581
Dissolved Boron (B)	ug/L	ND	100	41	9925581	ND	10	9925581
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	9925581	ND	0.090	9925581
Dissolved Calcium (Ca)	ug/L	12000	69000	40000	9925581	11000	200	9925581
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	9925581	ND	5.0	9925581
Dissolved Copper (Cu)	ug/L	ND	0.92	ND	9925581	ND	0.90	9925581
Dissolved Iron (Fe)	ug/L	ND	ND	10000	9925581	ND	100	9925581
Dissolved Lead (Pb)	ug/L	ND	ND	ND	9925581	ND	0.50	9925581
Dissolved Magnesium (Mg)	ug/L	4200	18000	8500	9925581	1400	50	9925581
Dissolved Manganese (Mn)	ug/L	ND	200	1300	9925581	6.9	2.0	9925581
Dissolved Potassium (K)	ug/L	1800	4300	3700	9925581	1000	200	9925581
Dissolved Sodium (Na)	ug/L	4700	11000	19000	9925581	1300	100	9925581
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	9925581	ND	5.0	9925581

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AQRG42	AQRG43		AQRG44	AQRG45		
Sampling Date		2025/05/06 12:05	2025/05/06 12:20		2025/05/06 11:10	2025/05/06 12:05		
COC Number		1041552-01-01	1041552-01-01		1041552-01-01	1041552-01-01		
	UNITS	PL7-16	PL8-16	QC Batch	PL9-16	PL-QAQC-GW1	RDL	QC Batch
Metals								
Dissolved Mercury (Hg)	ug/L	ND	ND	9925740	ND	ND	0.10	9928390
Dissolved Arsenic (As)	ug/L	ND	ND	9925581	ND	ND	1.0	9925581
Dissolved Barium (Ba)	ug/L	32	4.6	9925581	14	34	2.0	9925581
Dissolved Boron (B)	ug/L	120	ND	9925581	33	120	10	9925581
Dissolved Cadmium (Cd)	ug/L	ND	ND	9925581	ND	ND	0.090	9925581
Dissolved Calcium (Ca)	ug/L	38000	6100	9925581	17000	39000	200	9925581
Dissolved Chromium (Cr)	ug/L	ND	ND	9925581	ND	ND	5.0	9925581
Dissolved Copper (Cu)	ug/L	3.5	ND	9925581	ND	3.6	0.90	9925581
Dissolved Iron (Fe)	ug/L	ND	ND	9925581	ND	ND	100	9925581
Dissolved Lead (Pb)	ug/L	ND	ND	9925581	ND	ND	0.50	9925581
Dissolved Magnesium (Mg)	ug/L	9000	1800	9925581	4900	9200	50	9925581
Dissolved Manganese (Mn)	ug/L	430	ND	9925581	ND	440	2.0	9925581
Dissolved Potassium (K)	ug/L	4900	1100	9925581	2500	5100	200	9925581
Dissolved Sodium (Na)	ug/L	19000	1800	9925581	8700	19000	100	9925581
Dissolved Zinc (Zn)	ug/L	ND	ND	9925581	ND	ND	5.0	9925581

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

Bureau Veritas ID: AQRG36
Sample ID: PL1-06
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927198	N/A	2025/05/13	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9927201	N/A	2025/05/13	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9928390	2025/05/14	2025/05/14	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925579	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9927203	2025/05/12	2025/05/13	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927814	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG37
Sample ID: PL2-06
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9926461	N/A	2025/05/14	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9926462	N/A	2025/05/14	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9928390	2025/05/14	2025/05/14	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9926463	2025/05/10	2025/05/14	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927629	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/14	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG37 Dup
Sample ID: PL2-06
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

Bureau Veritas ID: AQRG38
Sample ID: PL3-06
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927209	N/A	2025/05/14	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9927184	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9927212	N/A	2025/05/14	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9925740	2025/05/09	2025/05/09	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927883	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926839	N/A	2025/05/12	Chandra Nandlal
pH	AT	9927213	2025/05/12	2025/05/14	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927629	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9927194	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG39
Sample ID: PL4-12
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927198	N/A	2025/05/13	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9927201	N/A	2025/05/13	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9925740	2025/05/09	2025/05/09	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927883	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9927203	2025/05/12	2025/05/13	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927814	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG39 Dup
Sample ID: PL4-12
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

TEST SUMMARY

Bureau Veritas ID: AQRG40
Sample ID: PL5-12
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927198	N/A	2025/05/13	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9927201	N/A	2025/05/13	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9925740	2025/05/09	2025/05/09	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9927203	2025/05/12	2025/05/13	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927629	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG41
Sample ID: PL6-12
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927198	N/A	2025/05/13	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9927201	N/A	2025/05/13	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9928390	2025/05/14	2025/05/14	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9927203	2025/05/12	2025/05/13	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927629	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927478	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/14	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG42
Sample ID: PL7-16
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927198	N/A	2025/05/13	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AQRG42
Sample ID: PL7-16
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9927201	N/A	2025/05/13	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9925740	2025/05/09	2025/05/09	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9927203	2025/05/12	2025/05/13	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927629	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927478	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG42 Dup
Sample ID: PL7-16
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9927198	N/A	2025/05/13	Nachiketa Gohil
Conductivity	AT	9927201	N/A	2025/05/13	Nachiketa Gohil
pH	AT	9927203	2025/05/12	2025/05/13	Nachiketa Gohil

Bureau Veritas ID: AQRG43
Sample ID: PL8-16
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9926461	N/A	2025/05/14	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9926462	N/A	2025/05/14	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9925740	2025/05/09	2025/05/09	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927883	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9926463	2025/05/10	2025/05/14	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927814	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AQRG44
Sample ID: PL9-16
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9926461	N/A	2025/05/14	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9926462	N/A	2025/05/14	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9928390	2025/05/14	2025/05/14	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9926463	2025/05/10	2025/05/14	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927814	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927476	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG44 Dup
Sample ID: PL9-16
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

Bureau Veritas ID: AQRG45
Sample ID: PL-QAQC-GW1
Matrix: Water

Collected: 2025/05/06
Shipped:
Received: 2025/05/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9926461	N/A	2025/05/14	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9926454	N/A	2025/05/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9927475	N/A	2025/05/13	Kruti Jitesh Patel
Conductivity	AT	9926462	N/A	2025/05/14	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9927729	N/A	2025/05/13	Gyulshen Idriz
Dissolved Mercury in Water by CVAA	CV/AA	9928390	2025/05/14	2025/05/14	Maitri PATIL
Dissolved Metals by ICPMS	ICP/MS	9925581	N/A	2025/05/13	Nan Raykha
Total Ammonia-N	SKAL/NH4	9927867	N/A	2025/05/14	Muskan
Nitrate & Nitrite as Nitrogen in Water	LACH	9926449	N/A	2025/05/12	Chandra Nandlal
pH	AT	9926463	2025/05/10	2025/05/14	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9927629	N/A	2025/05/13	Madhav Somani
Sulphate by Automated Turbidimetry	SKAL	9926455	N/A	2025/05/14	Alina Dobreanu
Total Dissolved Solids	BAL	9927478	2025/05/13	2025/05/14	Binuja Kodithuwakku Arachchilage
Total Kjeldahl Nitrogen in Water	SKAL	9927477	2025/05/13	2025/05/13	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9927482	2025/05/13	2025/05/13	Vidhi Khatri

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C
Package 2	8.7°C

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9925579	Dissolved Arsenic (As)	2025/05/12	95	80 - 120	102	80 - 120	ND, RDL=1.0	ug/L	NC	20		
9925579	Dissolved Barium (Ba)	2025/05/12	96	80 - 120	102	80 - 120	ND, RDL=2.0	ug/L	0.85	20		
9925579	Dissolved Boron (B)	2025/05/12	90	80 - 120	97	80 - 120	ND, RDL=10	ug/L	2.3	20		
9925579	Dissolved Cadmium (Cd)	2025/05/12	94	80 - 120	99	80 - 120	ND, RDL=0.090	ug/L	NC	20		
9925579	Dissolved Calcium (Ca)	2025/05/12	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L	0.76	20		
9925579	Dissolved Chromium (Cr)	2025/05/12	89	80 - 120	96	80 - 120	ND, RDL=5.0	ug/L	NC	20		
9925579	Dissolved Copper (Cu)	2025/05/12	95	80 - 120	101	80 - 120	ND, RDL=0.90	ug/L	9.2	20		
9925579	Dissolved Iron (Fe)	2025/05/12	91	80 - 120	99	80 - 120	ND, RDL=100	ug/L	NC	20		
9925579	Dissolved Lead (Pb)	2025/05/12	92	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L	NC	20		
9925579	Dissolved Magnesium (Mg)	2025/05/12	84	80 - 120	96	80 - 120	ND, RDL=50	ug/L	1.1	20		
9925579	Dissolved Manganese (Mn)	2025/05/12	90	80 - 120	99	80 - 120	ND, RDL=2.0	ug/L	NC	20		
9925579	Dissolved Potassium (K)	2025/05/12	87	80 - 120	95	80 - 120	ND, RDL=200	ug/L	0.064	20		
9925579	Dissolved Sodium (Na)	2025/05/12	83	80 - 120	100	80 - 120	ND, RDL=100	ug/L	0.41	20		
9925579	Dissolved Zinc (Zn)	2025/05/12	91	80 - 120	99	80 - 120	ND, RDL=5.0	ug/L	NC	20		
9925581	Dissolved Arsenic (As)	2025/05/13	113	80 - 120	101	80 - 120	ND, RDL=1.0	ug/L	NC	20		
9925581	Dissolved Barium (Ba)	2025/05/13	111	80 - 120	100	80 - 120	ND, RDL=2.0	ug/L	0.10	20		
9925581	Dissolved Boron (B)	2025/05/13	NC	80 - 120	92	80 - 120	ND, RDL=10	ug/L	1.2	20		
9925581	Dissolved Cadmium (Cd)	2025/05/13	112	80 - 120	98	80 - 120	ND, RDL=0.090	ug/L	17	20		
9925581	Dissolved Calcium (Ca)	2025/05/13	NC	80 - 120	98	80 - 120	ND, RDL=200	ug/L	2.1	20		
9925581	Dissolved Chromium (Cr)	2025/05/13	107	80 - 120	96	80 - 120	ND, RDL=5.0	ug/L	NC	20		
9925581	Dissolved Copper (Cu)	2025/05/13	114	80 - 120	98	80 - 120	ND, RDL=0.90	ug/L	1.4	20		
9925581	Dissolved Iron (Fe)	2025/05/13	111	80 - 120	100	80 - 120	ND, RDL=100	ug/L	0.72	20		
9925581	Dissolved Lead (Pb)	2025/05/13	111	80 - 120	99	80 - 120	ND, RDL=0.50	ug/L	NC	20		
9925581	Dissolved Magnesium (Mg)	2025/05/13	115	80 - 120	101	80 - 120	ND, RDL=50	ug/L	0.092	20		
9925581	Dissolved Manganese (Mn)	2025/05/13	NC	80 - 120	100	80 - 120	ND, RDL=2.0	ug/L	1.2	20		
9925581	Dissolved Potassium (K)	2025/05/13	116	80 - 120	93	80 - 120	ND, RDL=200	ug/L	0.49	20		
9925581	Dissolved Sodium (Na)	2025/05/13	NC	80 - 120	99	80 - 120	ND, RDL=100	ug/L	0.20	20		
9925581	Dissolved Zinc (Zn)	2025/05/13	110	80 - 120	100	80 - 120	ND, RDL=5.0	ug/L	NC	20		

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9925740	Dissolved Mercury (Hg)	2025/05/09	98	75 - 125	100	80 - 120	ND, RDL=0.10	ug/L	NC	20		
9926449	Nitrate (N)	2025/05/12	100	80 - 120	95	80 - 120	ND, RDL=0.10	mg/L	0.22	20		
9926449	Nitrite (N)	2025/05/12	99	80 - 120	98	80 - 120	ND, RDL=0.010	mg/L	0.70	20		
9926454	Dissolved Chloride (Cl-)	2025/05/14	85	80 - 120	93	80 - 120	ND, RDL=1.0	mg/L	7.1	20		
9926455	Dissolved Sulphate (SO4)	2025/05/14	85	75 - 125	96	80 - 120	ND, RDL=1.0	mg/L	0.55	20		
9926461	Alkalinity (Total as CaCO3)	2025/05/14			96	85 - 115	ND, RDL=1.0	mg/L	4.2	20		
9926462	Conductivity	2025/05/14			101	85 - 115	ND, RDL=2.0	umho/cm	1.7	10		
9926463	pH	2025/05/14			102	98 - 103			0.86	N/A		
9926839	Nitrate (N)	2025/05/12	97	80 - 120	95	80 - 120	ND, RDL=0.10	mg/L	0.14	20		
9926839	Nitrite (N)	2025/05/12	97	80 - 120	97	80 - 120	ND, RDL=0.010	mg/L	NC	20		
9927184	Dissolved Chloride (Cl-)	2025/05/14	NC	80 - 120	97	80 - 120	ND, RDL=1.0	mg/L	0.58	20		
9927194	Dissolved Sulphate (SO4)	2025/05/14	NC	75 - 125	95	80 - 120	ND, RDL=1.0	mg/L	0.86	20		
9927198	Alkalinity (Total as CaCO3)	2025/05/13			96	85 - 115	ND, RDL=1.0	mg/L	0.0043	20		
9927201	Conductivity	2025/05/13			100	85 - 115	ND, RDL=2.0	umho/cm	0.56	10		
9927203	pH	2025/05/13			102	98 - 103			0.27	N/A		
9927209	Alkalinity (Total as CaCO3)	2025/05/13			96	85 - 115	ND, RDL=1.0	mg/L	0.75	20		
9927212	Conductivity	2025/05/13			101	85 - 115	ND, RDL=2.0	umho/cm	0.17	10		
9927213	pH	2025/05/13			102	98 - 103			1.1	N/A		
9927475	Total Chemical Oxygen Demand (COD)	2025/05/13	105	80 - 120	101	80 - 120	ND, RDL=4.0	mg/L	NC	20		
9927476	Total Dissolved Solids	2025/05/14			98	80 - 120	ND, RDL=10	mg/L	5.3	20		
9927477	Total Kjeldahl Nitrogen (TKN)	2025/05/13	86	80 - 120	96	80 - 120	ND, RDL=0.10	mg/L	NC	20	101	80 - 120
9927478	Total Dissolved Solids	2025/05/14			95	80 - 120	ND, RDL=10	mg/L	5.8	20		
9927482	Total Phosphorus	2025/05/13	99	80 - 120	101	80 - 120	ND, RDL=0.020	mg/L	1.1	20	102	80 - 120
9927629	Phenols-4AAP	2025/05/13	102	80 - 120	100	80 - 120	ND, RDL=0.0010	mg/L	NC	20		

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9927729	Dissolved Organic Carbon	2025/05/13	93	80 - 120	97	80 - 120	ND, RDL=0.4	mg/L	3.7	20		
9927814	Phenols-4AAP	2025/05/13	116	80 - 120	100	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
9927867	Total Ammonia-N	2025/05/14	95	75 - 125	95	80 - 120	ND, RDL=0.050	mg/L	NC	20		
9927883	Total Ammonia-N	2025/05/14	94	75 - 125	95	80 - 120	ND, RDL=0.050	mg/L	NC	20		
9928390	Dissolved Mercury (Hg)	2025/05/14	98	75 - 125	101	80 - 120	ND, RDL=0.10	ug/L	NC	20		

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C552157
Report Date: 2025/05/14

BluMetric Environmental Inc
Client Project #: 250253-03
Your P.O. #: 250253-03
Sampler Initials: BM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Louise Harding, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

C552157
2025/05/08 10:25

Bureau Veritas
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvna.com

NONT-2025-05-1353

Bottle Order #: 1041552

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#1192 BluMetric Environmental Inc	Company Name:	#5638 BluMetric Environmental Inc	Quotation #:	C45781
Attention:	Accounts Payable	Attention:	S'rana Scholes	P.O. #:	250253-03
Address:	1682 Woodward Drive Ottawa ON K2C 3R8	Address:	The Tower - The Woolen Mill 4 Cataraqui St Kingston ON K7K 1Z7	Project:	250253-03
Tel:	(613) 839-3053 Fax: (613) 839-5376	Tel:	(613) 531-2725 Fax:	Project Name:	
Email:	ap@blumetric.ca	Email:	sscholes@blumetric.ca, cbandler@blumetric.ca, edms	Site #:	Papineau Lake
				Sampled By:	BM/NW

COC #: C#1041552-01-01 | Project Manager: Deepthi Shaji

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality _____
- ☐ PWQO ☐ Reg 406 Table _____
- ☐ Other _____

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? _____

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): GW - SPRING EVENT

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: X
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____ ☐
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	# of Bottles	Comments
1		PL1-06	25/05/06	11:45	GW	8	
2		PL2-06	25/05/06	11:00	GW	8	
3		PL3-06	25/05/06	10:00	GW	8	
4		PL4-12	25/05/06	11:30	GW	8	
5		PL5-12	25/05/06	10:40	GW	8	
6		PL6-12	25/05/06	10:20	GW	8	
7		PL7-16	25/05/06	12:05	GW	8	
8		PL8-16	25/05/06	12:20	GW	8	
9		PL9-16	25/05/06	11:10	GW	8	
10		PL-QAQC-GW1	25/05/06	12:05	GW	8	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Brad M'Callum / Brad M'Callum	2025/05/07	8:00	[illegible]	2025/05/08	10:35	

Laboratory Use Only
Time Sensitive | Temperature (°C) on Recei: 7/3/9 9/8/9 | Custody Seal Present / Intact: Yes ✓ | No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Your Project #: 250253-03
Site Location: Papineau Lake
Your C.O.C. #: 1062808-01-01

Attention: MHH Distribution

BluMetric Environmental Inc
The Tower - The Woolen Mill
4 Cataraqui St
Kingston, ON
CANADA K7K 1Z7

Report Date: 2025/10/29
Report #: R8641128
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C5D3279
Received: 2025/10/22, 09:40

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	6	N/A	2025/10/29	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	6	N/A	2025/10/29	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	6	N/A	2025/10/28	CAM SOP-00416	SM 24 5220 D m
Conductivity	6	N/A	2025/10/29	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	6	N/A	2025/10/23	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	6	N/A	2025/10/23	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	4	N/A	2025/10/24	CAM SOP-00441	USGS I-2522-90 m
Total Ammonia-N	2	N/A	2025/10/27	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2025/10/23	CAM SOP-00440	SM 24 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	3	N/A	2025/10/24	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	6	2025/10/23	2025/10/29	CAM SOP-00413	SM 24th - 4500H+ B
Sulphate by Automated Turbidimetry	6	N/A	2025/10/28	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	6	2025/10/25	2025/10/28	CAM SOP-00428	SM 24 2540C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Your Project #: 250253-03
Site Location: Papineau Lake
Your C.O.C. #: 1062808-01-01

Attention: MHH Distribution

BluMetric Environmental Inc
The Tower - The Woolen Mill
4 Cataraqui St
Kingston, ON
CANADA K7K 1Z7

Report Date: 2025/10/29
Report #: R8641128
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C5D3279

Received: 2025/10/22, 09:40

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.

(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

(3) "The CCME method and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) requires pH to be analyzed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME and Analytical Protocol (O. Reg 153/04, O. Reg. 406/19) holding time. Bureau Veritas endeavors to analyze samples as soon as possible after receipt."

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Deepthi Shaji, Project Manager
Email: Deepthi.Shaji@bureauveritas.com
Phone# (905)817-5700 Ext:7065843

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AWMJ41			AWMJ41			AWMJ42		
Sampling Date		2025/10/20 14:28			2025/10/20 14:28			2025/10/20 13:38		
COC Number		1062808-01-01			1062808-01-01			1062808-01-01		
	UNITS	PL1-06	RDL	QC Batch	PL1-06 Lab-Dup	RDL	QC Batch	PL3-06	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.31	0.050	A038734				ND	0.050	A038734
Total Chemical Oxygen Demand (COD)	mg/L	9.5	4.0	A040932	9.5	4.0	A040932	ND	4.0	A040932
Conductivity	umho/cm	670	2.0	A038936				270	2.0	A038936
Total Dissolved Solids	mg/L	380	10	A040148				205	10	A040148
Dissolved Organic Carbon	mg/L	6.5	0.4	A038631				1.1	0.4	A038631
pH	pH	7.38		A038937				7.30		A038937
Dissolved Sulphate (SO4)	mg/L	30	1.0	A038929				2.8	1.0	A038929
Alkalinity (Total as CaCO3)	mg/L	250	1.0	A038934				16	1.0	A038934
Dissolved Chloride (Cl-)	mg/L	45	1.0	A038927				53	1.0	A038927
Nitrate (N)	mg/L	ND	0.10	A038454				0.23	0.10	A038610

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas ID		AWMJ42			AWMJ43		AWMJ44		
Sampling Date		2025/10/20 13:38			2025/10/20 14:47		2025/10/20 15:08		
COC Number		1062808-01-01			1062808-01-01		1062808-01-01		
	UNITS	PL3-06 Lab-Dup	RDL	QC Batch	PL7-16	QC Batch	PL8-16	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L				ND	A038734	ND	0.050	A038742
Total Chemical Oxygen Demand (COD)	mg/L				ND	A040932	ND	4.0	A040932
Conductivity	umho/cm				330	A038936	52	2.0	A038936
Total Dissolved Solids	mg/L				180	A040148	40	10	A040149
Dissolved Organic Carbon	mg/L				3.2	A038631	1.7	0.4	A038631
pH	pH				7.23	A038937	7.06		A038937
Dissolved Sulphate (SO4)	mg/L	2.7	1.0	A038929	15	A038929	5.9	1.0	A038929
Alkalinity (Total as CaCO3)	mg/L				95	A038934	15	1.0	A038934
Dissolved Chloride (Cl-)	mg/L	53	1.0	A038927	32	A038927	ND	1.0	A038927
Nitrate (N)	mg/L				0.29	A038610	ND	0.10	A038610

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AWMJ44			AWMJ45		AWMJ46		
Sampling Date		2025/10/20 15:08			2025/10/20 13:58		2025/10/20 14:47		
COC Number		1062808-01-01			1062808-01-01		1062808-01-01		
	UNITS	PL8-16 Lab-Dup	RDL	QC Batch	PL9-16	QC Batch	PL-QAQC-GW1	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L				ND	A038742	ND	0.050	A038734
Total Chemical Oxygen Demand (COD)	mg/L				ND	A040932	ND	4.0	A040932
Conductivity	umho/cm	52	2.0	A038936	170	A038936	340	2.0	A038936
Total Dissolved Solids	mg/L				110	A040149	155	10	A040149
Dissolved Organic Carbon	mg/L				2.0	A038631	3.2	0.4	A038631
pH	pH	7.08		A038937	7.03	A038937	7.18		A038937
Dissolved Sulphate (SO4)	mg/L				9.6	A038929	15	1.0	A038929
Alkalinity (Total as CaCO3)	mg/L	15	1.0	A038934	34	A038934	96	1.0	A038934
Dissolved Chloride (Cl-)	mg/L				19	A038927	32	1.0	A038927
Nitrate (N)	mg/L				0.55	A038454	0.33	0.10	A038454

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AWMJ41	AWMJ42	AWMJ43	AWMJ44	AWMJ45	AWMJ46		
Sampling Date		2025/10/20 14:28	2025/10/20 13:38	2025/10/20 14:47	2025/10/20 15:08	2025/10/20 13:58	2025/10/20 14:47		
COC Number		1062808-01-01	1062808-01-01	1062808-01-01	1062808-01-01	1062808-01-01	1062808-01-01		
	UNITS	**PL1-06**	**PL3-06**	**PL7-16**	**PL8-16**	**PL9-16**	**PL-QAQC-GW1**	**RDL**	**QC Batch**
Metals									
Dissolved Barium (Ba)	ug/L	50	17	34	4.0	12	33	2.0	A038406
Dissolved Boron (B)	ug/L	380	12	120	ND	31	120	10	A038406
Dissolved Calcium (Ca)	ug/L	71000	21000	40000	4800	15000	41000	200	A038406
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	ND	ND	100	A038406
Dissolved Magnesium (Mg)	ug/L	17000	7000	9600	1300	4300	9300	50	A038406
Dissolved Manganese (Mn)	ug/L	2000	ND	560	ND	ND	550	2.0	A038406
Dissolved Sodium (Na)	ug/L	37000	7900	19000	1800	7700	19000	100	A038406

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AWMJ41
Sample ID: PL1-06
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	A038631	N/A	2025/10/23	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	A038406	N/A	2025/10/23	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	A038734	N/A	2025/10/24	Kruti Jitesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	A038454	N/A	2025/10/23	Helen He
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan
Total Dissolved Solids	BAL	A040148	2025/10/25	2025/10/28	Hiu Fung Yan (James)

Bureau Veritas ID: AWMJ41 Dup
Sample ID: PL1-06
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat

Bureau Veritas ID: AWMJ42
Sample ID: PL3-06
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	A038631	N/A	2025/10/23	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	A038406	N/A	2025/10/23	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	A038734	N/A	2025/10/24	Kruti Jitesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	A038610	N/A	2025/10/24	Chandra Nandlal
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan
Total Dissolved Solids	BAL	A040148	2025/10/25	2025/10/28	Hiu Fung Yan (James)

Bureau Veritas ID: AWMJ42 Dup
Sample ID: PL3-06
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AWMJ43
Sample ID: PL7-16
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	A038631	N/A	2025/10/23	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	A038406	N/A	2025/10/23	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	A038734	N/A	2025/10/24	Kruti Jitesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	A038610	N/A	2025/10/24	Chandra Nandlal
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan
Total Dissolved Solids	BAL	A040148	2025/10/25	2025/10/28	Hiu Fung Yan (James)

Bureau Veritas ID: AWMJ44
Sample ID: PL8-16
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	A038631	N/A	2025/10/23	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	A038406	N/A	2025/10/23	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	A038742	N/A	2025/10/27	Kruti Jitesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	A038610	N/A	2025/10/24	Chandra Nandlal
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan
Total Dissolved Solids	BAL	A040149	2025/10/25	2025/10/28	Manowalage shanika GUNASEKARA

Bureau Veritas ID: AWMJ44 Dup
Sample ID: PL8-16
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai

Bureau Veritas ID: AWMJ45
Sample ID: PL9-16
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai

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Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: AWMJ45
Sample ID: PL9-16
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	A038631	N/A	2025/10/23	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	A038406	N/A	2025/10/23	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	A038742	N/A	2025/10/27	Kruti Jitesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	A038454	N/A	2025/10/23	Helen He
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan
Total Dissolved Solids	BAL	A040149	2025/10/25	2025/10/28	Manowalage shanika GUNASEKARA

Bureau Veritas ID: AWMJ46
Sample ID: PL-QAQC-GW1
Matrix: Water

Collected: 2025/10/20
Shipped:
Received: 2025/10/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	A038934	N/A	2025/10/29	Surinder Rai
Chloride by Automated Colourimetry	SKAL	A038927	N/A	2025/10/29	Alina Dobreanu
Chemical Oxygen Demand	SPEC	A040932	N/A	2025/10/28	Arshdeep Jagayat
Conductivity	AT	A038936	N/A	2025/10/29	Surinder Rai
Dissolved Organic Carbon (DOC)	TOCV/NDIR	A038631	N/A	2025/10/23	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	A038406	N/A	2025/10/23	Indira HarryPaul
Total Ammonia-N	SKAL/NH4	A038734	N/A	2025/10/24	Kruti Jitesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	A038454	N/A	2025/10/23	Helen He
pH	AT	A038937	2025/10/23	2025/10/29	Surinder Rai
Sulphate by Automated Turbidimetry	SKAL	A038929	N/A	2025/10/28	Massarat Jan
Total Dissolved Solids	BAL	A040149	2025/10/25	2025/10/28	Manowalage shanika GUNASEKARA

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Chemistry testing is conducted at 6740 Campobello Rd.

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.3°C

Results relate only to the items tested.

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Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

QUALITY ASSURANCE REPORT

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A038406	Dissolved Barium (Ba)	2025/10/24	98	80 - 120	97	80 - 120	ND, RDL=2.0	ug/L	2.1	20
A038406	Dissolved Boron (B)	2025/10/24	NC	80 - 120	88	80 - 120	ND, RDL=10	ug/L	3.4	20
A038406	Dissolved Calcium (Ca)	2025/10/24	NC	80 - 120	95	80 - 120	ND, RDL=200	ug/L	0.29	20
A038406	Dissolved Iron (Fe)	2025/10/24	101	80 - 120	97	80 - 120	ND, RDL=100	ug/L	2.3	20
A038406	Dissolved Magnesium (Mg)	2025/10/24	NC	80 - 120	95	80 - 120	ND, RDL=50	ug/L	0.95	20
A038406	Dissolved Manganese (Mn)	2025/10/24	97	80 - 120	93	80 - 120	ND, RDL=2.0	ug/L	0.67	20
A038406	Dissolved Sodium (Na)	2025/10/24	NC	80 - 120	92	80 - 120	ND, RDL=100	ug/L	0.23	20
A038454	Nitrate (N)	2025/10/23	97	80 - 120	95	80 - 120	ND, RDL=0.10	mg/L	NC	20
A038610	Nitrate (N)	2025/10/24	115	80 - 120	107	80 - 120	ND, RDL=0.10	mg/L	4.0	20
A038631	Dissolved Organic Carbon	2025/10/23	91	80 - 120	97	80 - 120	ND, RDL=0.4	mg/L	0.64	20
A038734	Total Ammonia-N	2025/10/24	NC	75 - 125	97	80 - 120	ND, RDL=0.050	mg/L	1.9	20
A038742	Total Ammonia-N	2025/10/27	NC	75 - 125	98	80 - 120	ND, RDL=0.050	mg/L	1.7	20
A038927	Dissolved Chloride (Cl-)	2025/10/29	NC	80 - 120	94	80 - 120	ND, RDL=1.0	mg/L	1.0	20
A038929	Dissolved Sulphate (SO4)	2025/10/28	87	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	5.1	20
A038934	Alkalinity (Total as CaCO3)	2025/10/29			96	85 - 115	ND, RDL=1.0	mg/L	0.59	20
A038936	Conductivity	2025/10/29			102	85 - 115	ND, RDL=2.0	umho/cm	0.38	10
A038937	pH	2025/10/29			102	98 - 103			0.23	N/A
A040148	Total Dissolved Solids	2025/10/28			95	80 - 120	ND, RDL=10	mg/L	4.4	20
A040149	Total Dissolved Solids	2025/10/28			97	80 - 120	ND, RDL=10	mg/L	0.99	20
A040932	Total Chemical Oxygen Demand (COD)	2025/10/28	98	80 - 120	100	80 - 120	ND, RDL=4.0	mg/L	0	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C5D3279
Report Date: 2025/10/29

BluMetric Environmental Inc
Client Project #: 250253-03
Site Location: Papineau Lake
Sampler Initials: BM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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Chemistry testing is conducted at 6740 Campobello Rd.

C5D3279
2025/10/22 09:40

Bureau Veritas
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NONT-2025-10-4784

Invoice To:		Report To:		PROJECT INFORMATION:		
Company:	#1192 BluMetric Environmental Inc	Company:	#5638 BluMetric Environmental Inc	Quotation #:	C45781	Bottle Order #: 1062808
Attention:	Accounts Payable	Attention:	MHH Distribution	P.O. #:		
Address:	1682 Woodward Drive Ottawa ON K2C 3R8	Address:	The Tower - The Woolen Mill 4 Cataraqui St Kingston ON K7K 1Z7	Project:	250253-03	
Tel:	(613) 839-3053 Fax: (613) 839-5376	Tel:	(613) 531-2725 Fax:	Project Name:	Papineau Lake	COC #: C#1062808-01-01
Email:	ap@blumetric.ca	Email:	cbandler@blumetric.ca, cmiller@blumetric.ca, edms@bl	Site #:		Project Manager: Deepthi Shaji
				Sampled By:	BM/DK	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
☐ Table 1 ☐ Res/Park ☐ Medium/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ For RSC
☐ Table ___

Other Regulations
☐ CCME ☐ Sanitary Sewer Bylaw
☐ Reg 558. ☐ Storm Sewer Bylaw
☐ MISA Municipality _____
☐ PWQO ☐ Reg 406 Table _____
☐ Other _____

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? _____

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests..
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____ ☐
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): (Metals / Hg / Cr VI)	GW - FALL EVENT	# of Bottles	Comments
1		PL1-06	25/10/20	14:28	GW	Y	✓	6	
2		PL3-06	25/10/20	13:38	GW	Y	✓	6	
3		PL7-16	25/10/20	14:47	GW	Y	✓	6	
4		PL8-16	25/10/20	15:08	GW	Y	✓	6	
5		PL9-16	25/10/20	13:58	GW	Y	✓	6	
6		PL-QAQC-GW1	25/10/20	14:47	GW	Y	✓	6	
7									
8									
9									
10									

* Relinquished By (Print):	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Brad M'Callum	2025/10/21	8:00				

Laboratory Use Only
Time Sensitive
Temperature (°C) on Recei 4/1.4
Custody Seal: Present ✓ Intact ✓ — Yes ✓ No

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Appendix D

D-3 QAQC Comparisons

2025 Groundwater Sampling Quality Assurance and Quality Control
(Spring)

Parameter	Unit	RDL	PL7-16	PL-QAQC-GW1 (PL7-16)	Relative Percent Difference
			2025-May-6	2025-May-6	
Chloride	mg/L	1.00	28.00	27.00	4%
Nitrate as N	mg/L	0.1	0.46	0.48	NA
Nitrite as N	mg/L	0.01	<0.01	<0.01	NA
Sulphate	mg/L	1.00	19.00	18.00	5%
Calcium (diss)	mg/L	0.2	38	39	3%
Magnesium (diss)	mg/L	0.05	9	9.2	2%
Potassium (diss)	mg/L	0.20	4.90	5.10	4%
Sodium (diss)	mg/L	0.1	19	19	0%
Alkalinity (as CaCO3)	mg/L	1	100	110	10%
Ammonia as N	mg/L	0.05	<0.05	0.075	NA
Chemical Oxygen Demand	mg/L	4	6.3	4.3	NA
Dissolved Organic Carbon	mg/L	0.4	2.6	2.5	4%
Electrical Conductivity	uS/cm	2	360	350	3%
pH	pH units	-	6.76	7.19	NA
Phenols-4AAP	mg/L	0.0010	<0.001	<0.001	NA
Total Dissolved Solids	mg/L	10	220	200	10%
Total Kjeldahl Nitrogen	mg/L	0.10	<0.1	0.10	NA
Total Phosphorus	mg/L	0.02	<0.02	<0.02	NA
Arsenic (diss)	mg/L	0.001	<0.001	<0.001	NA
Barium (diss)	mg/L	0.002	0.032	0.034	6%
Boron (diss)	mg/L	0.010	0.120	0.120	0%
Cadmium (diss)	mg/L	0.00009	<0.00009	<0.00009	NA
Chromium (diss)	mg/L	0.005	<0.005	<0.005	NA
Copper (diss)	mg/L	0.0009	0.0035	0.0036	NA
Iron (diss)	mg/L	0.100	<0.1	<0.1	NA
Lead (diss)	mg/L	0.0005	<0.0005	<0.0005	NA
Manganese (diss)	mg/L	0.002	0.43	0.44	2%
Mercury (diss)	mg/L	0.0001	<0.0001	<0.0001	NA
Zinc (diss)	mg/L	0.005	<0.005	<0.005	NA

Yellow shading indicates RPD value is above the percentage for a high level of reproductibility:
10% for electrical conductivity
20% for metals and inorganics
30% for BTEX and PHC
NA: RPD is not calculated becaue the average of the measured parameter concentrations of the original (S) and duplicate (D) samples are not greater than 5X the laboratory readable detection limit (RDL)

2025 Groundwater Sampling Quality Assurance and Quality Control

(Fall)

Parameter	Unit	RDL	PL7-16	PL-QAQC-GW1 (PL7-16)	Relative Percent Difference
			2025-Oct-22	2025-Oct-22	
Chloride	mg/L	1.00	32.00	32.00	0%
Nitrate as N	mg/L	0.10	0.29	0.33	NA
Sulphate	mg/L	1.00	15.00	15.00	0%
Calcium (diss)	mg/L	0.2	40	41	2%
Magnesium (diss)	mg/L	0.05	9.6	9.3	3%
Sodium (diss)	mg/L	0.1	19	19	0%
Alkalinity (as CaCO3)	mg/L	1	95	96	1%
Ammonia as N	mg/L	0.05	<0.05	<0.05	NA
Chemical Oxygen Demand	mg/L	4	<4	<4	NA
Dissolved Organic Carbon	mg/L	0.4	3.2	3.2	0%
Electrical Conductivity	uS/cm	2	330	340	3%
pH	pH units	-	7.23	7.18	NA
Total Dissolved Solids	mg/L	10	180	155	15%
Barium (diss)	mg/L	0.002	0.034	0.033	3%
Boron (diss)	mg/L	0.010	0.120	0.120	0%
Iron (diss)	mg/L	0.10	<0.1	<0.1	NA
Manganese (diss)	mg/L	0.002	0.56	0.55	2%

Yellow shading indicates RPD value is above the percentage for a high level of reproductibility:

10% for electrical conductivity

20% for metals and inorganics

30% for BTEX and PHC

NA: RPD is not calculated becaue the average of the measured parameter concentrations of the original (S) and duplicate (D) samples are not greater than 5X the laboratory readable detection limit (RDL)

Appendix E

Historical Groundwater Chemistry (2006 to 2025)

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2006-May-09	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08	2008-Oct-08	2009-Jun-05	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-02	2012-Apr-17	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12	2014-Oct-15	2015-May-05
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	-	-	25	25	18	26	15	27	22	35	16	32	18	37	17	32.6	16.3	33	28.5
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.61	0.65	0.5	0.72	0.3	0.75	0.42	1.15	0.67	0.89	0.57	1.32	0.8	1.1	0.46	0.37	0.37	0.18	0.31
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	32	36	32	44	29	44	28	49	41	63	31	69	43	62	35.7	60.4	31.1	54.7	39.5
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	40	44	43	40	43	42	34	42	41	53	36	47	36.2	33.4	43.6	55.2	36.9	51.7	49.6
Magnesium (diss)	mg/L	-	-	-	-	0.05	12	12	12	11	11	12	9	12	12	13	10	12	10.7	13.9	11.9	14.7	10.1	13.3	12.7
Potassium (diss)	mg/L	-	-	-	-	0.05	5	5	5	5	5	5	5	6	5	6	4	6	4.2	7	4.87	-	4.85	-	5.81
Sodium (diss)	mg/L	100.98	200	-	-	0.05	16	19	17	21	17	19	14	20	17	24	15	26	22.5	30.8	17.2	26.9	16.4	24.2	21.6
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	135	141	128	133	140	132	118	138	132	142	118	149	135	144	123	161	127	169	149
Ammonia as N	mg/L	-	-	-	-	0.02	-	-	0.1	<0.02	<0.02	<0.02	0.03	0.04	<0.02	<0.02	0.02	0.06	0.03	<0.01	<0.02	<0.02	0.02	0.15	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	-	-	<5	<5	<5	13	10	18	8	10	10	12	12	<10	<5	13	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	-	-	3.9	4.4	2.9	3.9	2.9	4.4	3.6	4.4	3	4.2	3.8	4.5	2.8	4.4	3.8	4.9	3.7
Electrical Conductivity	uS/cm	-	-	-	-	1	394	424	394	432	391	446	336	462	416	504	346	522	439	516	357	512	360	519	455
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		149.3	159.3	156.8	145.2	152.7	154.3	122	154.3	151.8	185.9	131.1	166.8	134.5	140.6	157.9	198.4	133.7	183.9	176.1
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.09	6.72	6.68	6.82	7.26	7.45	6.82	6.66	7.05	6.82	7.35	6.62	6.9	6.5	7.3	7.22	7.15	8.01	6.87
Phenols	mg/L	-	-	0.001	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	-	-	256	281	254	290	218	300	270	328	225	339	276	310	194	278	204	314	252
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	0.31	-	0.32
Total Phosphorus	mg/L	-	-	0.03	-	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	**0.05**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	0.016	-	-	-	-	<0.004
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	-	<0.003	-	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.02	0.03	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.02	0.04	0.026	0.041	0.023	0.034	0.026	0.038	0.018
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.17	0.14	0.15	0.25	0.13	0.26	0.14	0.26	0.21	0.29	0.16	0.38	0.24	0.467	0.175	0.395	0.172	0.403	0.114
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	-	<0.002	-	<0.002
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.002	<0.001	<0.001	<0.0001	0.002	<0.001	0.002	<0.003	-	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	0.0066	0.0022	0.0019	0.0029	0.0024	0.0027	0.0019	0.003	0.0026	0.0028	0.0021	0.0034	0.002	0.0037	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	0.004	0.006	0.008	0.008	0.006	0.007	0.005	0.008	0.006	0.008	0.005	0.009	0.005	0.0096	0.005	-	0.005	-	0.004
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.002	-	<0.002	-	<0.002
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.83	0.89	0.73	0.92	0.81	0.89	0.62	0.87	0.73	0.85	0.61	0.97	0.629	0.642	0.678	-	1.1	-	0.426
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001	-	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	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	<0.0005	0.0013	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.003	0.006	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	7.7	7.9	7.3	7	7.5	8.7	7.3	8.3	7.1	7.3	7.4	6.8	6.5	7	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	0.233	0.168	0.198	0.17	0.229	0.155	0.21	0.248	0.233	0.285	0.195	0.263	0.183	0.274	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	<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	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	0.003	<0.001	0.002	0.004	0.003	<0.001	0.001	0.002	0.002	<0.001	0.001	0.002	0.0009	0.0019	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	-	<0.005	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06	PL1-06
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	35.4	20.8	40.3	29.5	45.8	40.3	43	56.1	53.8	42	55.1	50	59.7	49.3	65.3	50.2	56	52	65
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.18	0.4	0.09	0.46	<0.05	0.29	<0.05	0.47	<0.1	0.39	<0.05	0.22	<0.05	0.2	<0.05	0.37	<0.1	0.15	<0.1
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-
Sulphate	mg/L	251.697	500	-	-	0.1	49.3	29.8	50.7	26.4	44.4	30.9	39.4	23.8	36.2	22.2	30.8	24.2	31.2	24.3	32.9	20	29	23	34
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	58	38.2	61	37.1	60.7	44.2	58	46.8	65.3	39	56.8	48.3	60.8	49.5	69.6	47.2	77	54	71
Magnesium (diss)	mg/L	-	-	-	-	0.05	14.4	9.89	15.4	9.66	15.6	11.4	13.8	11.6	16.4	9.88	14.1	12.3	15.1	12.2	17.1	11	18	13	16
Potassium (diss)	mg/L	-	-	-	-	0.05	-	10.7	-	5.28	-	6	-	5.9	-	5.41	-	6.24	-	6.29	-	5.82	-	6.8	-
Sodium (diss)	mg/L	100.98	200	-	-	0.05	30	14.2	25.6	13.6	25.9	18.9	24.3	16.6	28	16	24.8	20	26.3	22.1	32	19	36	26	32
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	170	122	215	114	208	145	160	147	198	110	179	130	184	153	220	132	240	160	190
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	0.05	0.04	<0.02	0.06	0.38	0.08	0.09	0.18	0.17	0.09	0.09	0.08	0.05	0.13	0.13	0.25	0.18	0.28
Chemical Oxygen Demand	mg/L	-	-	-	-	4	13	2.8	<5	<5	15	<5	<5	<5	11	7	6	<5	<5	6	17	52	21	<4	4.5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	6.1	2.8	5	2.1	5.4	3	5.4	2.9	4.8	2.4	4.3	<0.5	69.9	3.7	6.2	2.5	7.4	3.6	5.1
Electrical Conductivity	uS/cm	-	-	-	-	1	550	337	575	375	529	413	590	468	576	488	511	465	584	492	694	447	710	520	660
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		204.1	136.1	215.7	132.4	215.8	157.3	201.7	164.6	230.6	138.1	199.9	171.3	214	173.8	244.2	-	-	-	-
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		6.66	7.37	7.34	8.03	7.25	7.02	7.5	6.97	7.45	6.64	6.95	7.03	7.24	7.02	7.16	6.82	6.85	8.25	7.37
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	**0.003**	-	**0.019**	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10	320	202	326	188	340	244	330	258	360	210	296	280	350	272	348	186	370	310	410
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	-	0.38	-	0.17	-	0.61	-	0.11	-	0.44	-	0.33	-	0.22	-	0.21	-	0.36	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02	-	<0.05	-	<0.05	-	0.03	-	<0.02	-	<0.02	-	0.02	-	<0.02	-	0.02	-	<0.02	-
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.001	-	<0.001	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.04	0.29	0.044	0.026	0.044	0.031	0.043	0.036	0.05	0.027	0.045	0.037	0.042	0.035	0.051	0.032	0.054	0.038	0.052
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	0.157	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.403	0.403	0.431	0.143	0.407	0.195	0.392	0.154	0.415	0.125	0.314	0.218	0.306	0.201	0.386	0.135	0.44	0.2	0.26
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.00009	-
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	-	<0.003	-	<0.003	-	<0.003	-	0.01	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.005	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	-	0.005	-	0.004	-	0.005	-	0.005	-	0.005	-	0.005	-	0.006	-	0.005	-	0.0091	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	-	<0.0005	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	1.1	0.718	1.15	0.713	1.16	0.861	1.16	0.943	1.25	0.771	1.2	1	1.26	1.06	1.71	0.915	1.8	1.2	1.7
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL1-06	PL1-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2025-May-06	2025-Oct-20	2006-May-09	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08	2008-Oct-08	2009-Jun-05	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-02	2012-Apr-17	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	46	45	-	-	11	6	4	7	5	6	6	6	9	7	6	7	13.7	13.4	25.1
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.18	<0.1	2.69	6.37	4.4	2.73	4.05	4.01	3.83	3.77	5.66	4.33	4.19	2.62	6.9	3.4	6.71	3.32	4.74
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	22	30	95	44	29	19	20	24	22	23	29	28	18	19	25	22	25.5	22.4	45.2
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	54	71	20	27	30	20	20	23	22	20	26	26	20	18	22.4	13.8	39	25.8	33.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	13	17	5	8	8	6	5	6	6	6	6	7	5	4	6.2	5.8	9.64	6.29	7.9
Potassium (diss)	mg/L	-	-	-	-	0.05	6	-	3	5	5	4	5	4	5	4	4	4	3	4	4.05	4.9	6.02	-	5.48
Sodium (diss)	mg/L	100.98	200	-	-	0.05	25	37	28	10	7	5	5	5	5	4	5	5	4	3	5.2	5.5	6.66	6.45	10.8
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	160	250	24	70	88	55	46	53	58	55	55	57	55	54	50	52	76	50	59
Ammonia as N	mg/L	-	-	-	-	0.02	0.18	0.31	-	-	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.07	0.01	<0.01	<0.02	<0.02	0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	5.9	9.5	-	-	<5	<5	<5	10	10	6	8	<5	13	8	12	<10	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	3.9	6.5	-	-	4.2	2.8	2.6	2.9	3.1	3.2	3.2	2.3	2.3	1.6	2.6	1.6	2.4	1.3	3.9
Electrical Conductivity	uS/cm	-	-	-	-	1	520	670	309	279	307	195	190	222	212	214	237	228	204	187	256	197	294	220	333
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	-	70.5	100.4	107.9	74.6	70.5	82.1	79.6	74.6	89.6	93.7	70.5	61.4	81.5	58.3	137.1	90.3	117.2
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		6.82	7.38	6.49	6.46	6.52	6.59	6.8	7.1	6.58	6.55	6.8	6.52	7	6.29	6.4	6.2	6.75	6.64	6.56
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	310	380	-	-	200	127	123	144	138	139	154	148	133	122	175	58	134	120	198
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18	-	0.52
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**0.073**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1.03**	-	**1.84**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	0.06	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	0.007	0.006	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.037	0.05	0.04	0.05	0.05	0.04	0.05	0.04	0.04	0.04	0.05	0.06	0.04	0.04	0.041	0.04	0.067	0.05	0.084
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.15	0.38	0.05	0.04	0.06	0.04	0.04	0.05	0.04	0.05	0.05	0.06	0.04	0.05	0.065	0.075	0.057	0.075	0.065
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.00009	-	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	-	<0.002
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.005	-	<0.001	0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	0.01	0.0008	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	0.0086	-	0.006	0.002	0.005	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	<0.001	0.001	0.0009	<0.003	-	<0.003
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.1	<0.1	0.73	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	0.1	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.0005	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	0.0006	<0.002	-	<0.002
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	1.3	2	0.3	0.1	0.05	0.02	0.02	0.04	0.02	0.01	0.01	0.01	<0.01	<0.01	0.006	<0.005	0.024	-	0.079
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	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	<0.0005	<0.0005	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	0.012	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002	<0.001	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	4.6	6.6	6.3	5.5	5.5	6.8	5.4	6.1	5.6	5.7	6	5.4	5.6	6.7	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	0.135	0.177	0.17	0.118	0.139	0.13	0.152	0.149	0.168	0.177	0.142	0.121	0.151	0.083	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	<0.001	<0.001	<0.001	0.002	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	0.0009	0.001	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	0.04	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	PL2-06	QAQC-GW1 (PL2
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2023-May-01
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	16.9	49.2	16.8	68.5	25.7	80.3	35.3	73.8	27.4	65.4	42.6	49.1	51.9	69.8	50.7	61	39.3	91.4	93.1
Nitrate as N	mg/L	2.7175	10	-	-	0.05	5.55	3.14	4.15	1.89	1.16	<0.1	<0.05	<0.1	<0.05	<0.1	<0.05	<0.1	<0.05	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	<0.05	-	<0.05	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	<0.05	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	23.3	33.1	21.2	107	31.6	47.4	22.6	38.5	19	29.4	17.1	21.9	18.4	22.9	20.8	25.2	18.2	31.4	32
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	31.4	48.8	32.7	78.1	39.9	86.9	44.1	71.7	39.2	69.8	46.8	49.5	44.2	60.6	44.2	51.9	35	82.7	89.8
Magnesium (diss)	mg/L	-	-	-	-	0.05	7.46	11.9	7.6	18.7	8.61	19.1	9.03	14.9	7.13	13.8	9.1	9.69	8.54	11.9	9.08	10	7.44	15.1	15.5
Potassium (diss)	mg/L	-	-	-	-	0.05	-	6.8	-	10.7	-	11.2	-	11.3	-	11.1	-	10	-	10.7	-	9.11	-	11.9	11.7
Sodium (diss)	mg/L	100.98	200	-	-	0.05	8.73	13.1	12.9	53.9	19.6	50.5	23.4	36.8	16.8	37.9	23	29.9	22.5	33.8	24.4	28.4	21.1	50.6	52.1
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	74	104	89	216	130	314	161	242	121	302	156	180	154	197	153	177	127	316	313
Ammonia as N	mg/L	-	-	-	-	0.02	0.14	<0.02	<0.02	0.58	0.35	1.8	1.56	1.52	1.32	1.94	1.58	2.06	1.34	1.67	1.28	0.96	1.03	1.98	1.96
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	5	9	33	<5	49	14	13	<5	44	8	23	<5	<5	<5	25	17	65	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	2	4.8	3.9	16.3	3.8	19	6.4	10.9	4.4	13.1	5.1	8.3	6.4	12.6	58.6	9.4	5.6	24.8	24.3
Electrical Conductivity	uS/cm	-	-	-	-	1	300	472	313	780	404	926	413	663	422	737	446	675	444	635	483	573	413	922	928
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		109.1	170.9	112.9	272	135.1	295.6	147.3	240.4	127.2	231.1	154.3	163.5	145.5	200.3	147.8	170.8	118	-	-
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.87	7.26	6.64	7.38	7.5	7.98	7.27	7.36	7.26	7.03	7.41	6.42	6.87	6.77	6.8	6.7	7.12	6.67	6.95
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	0.001	-	**0.005**	-	**0.002**	-	**0.013**	-	**0.047**	-	**0.0012**	**0.0011**
Total Dissolved Solids	mg/L	277	500	-	-	10	184	274	188	474	238	494	246	412	230	394	250	290	244	402	280	322	192	546	520
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	-	0.42	-	2.1	-	2.97	-	2.66	-	2.96	-	2.77	-	2.62	-	1.86	-	5.02	4.05
Total Phosphorus	mg/L	-	-	0.03	-	0.02	-	**0.79**	-	**0.92**	-	**0.75**	-	**0.12**	-	**0.6**	-	**0.56**	-	**0.36**	-	**3.31**	-	**1.66**	**1.2**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	0.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	-	-	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	0.001	0.001
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.062	0.134	0.072	0.153	0.083	0.155	0.074	0.132	0.089	0.129	0.081	0.101	0.097	0.148	0.097	0.113	0.082	0.157	0.159
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.306	0.371	0.223	0.656	0.22	0.792	0.347	0.528	0.185	0.491	0.264	0.351	0.273	0.463	0.297	0.355	0.169	0.709	0.709
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	-	<0.002	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	0.012	-	<0.003	-	<0.003	-	<0.003	-	<0.002	<0.002
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	-	0.005	-	0.02	-	0.012	-	0.004	-	0.006	-	0.004	-	0.004	-	0.004	-	0.007	0.007
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	0.114	0.039	0.189	0.657	1.92	0.412	5.21	0.465	0.998	0.98	2.24	0.97	0.762	0.995	0.623	0.616
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	<0.0005
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	-	1.58	0.889	4.55	3.6	8.03	4.69	6.35	4.75	6.01	4.41	4.27	4.2	5.33	4.06	3.98	3.63	4.21	4.45
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	<0.0001	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	-	<0.005	-	0.007	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL2-06	PL2-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2024-Apr-30	2025-May-06	2006-May-09	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08	2008-Oct-08	2009-Jun-05	2009-Oct-21	2010-May-18	2010-Oct-19	2011-May-19	2011-Nov-02	2012-Apr-17	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	53	49	-	-	3	3	<1	5	57	6	5	5	5	7	3	6	2.69	2.94	0.72
Nitrate as N	mg/L	2.7175	10	-	-	0.05	<0.1	1.43	0.3	0.47	0.61	0.45	1.55	3.46	0.4	0.41	0.31	0.33	0.31	0.37	0.4	0.3	0.46	0.28	0.36
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.01	0.014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	21	25	87	12	6	6	7	22	5	4	3	4	5	4	3	4	3.85	3.2	3.81
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	45	68	8	8	9	6	6	16	6	6	6	6	7	6	7.4	4.5	7.28	7.46	6
Magnesium (diss)	mg/L	-	-	-	-	0.05	8.8	13	2	3	3	3	2	5	2	2	2	2	2	2	2.03	<0.005	2.48	2.49	2.11
Potassium (diss)	mg/L	-	-	-	-	0.05	9.5	13	2	3	2	2	7	6	1	2	1	1	1	1	1.2	1.3	1.51	-	1.32
Sodium (diss)	mg/L	100.98	200	-	-	0.05	22	51	42	2	<2	<2	<2	4	3	2	3	<2	<2	2	1.8	1.9	1.97	1.95	1.42
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	130	270	12	37	37	26	27	40	30	24	23	23	32	33	21	20	22	24	28
Ammonia as N	mg/L	-	-	-	-	0.02	1.8	4.8	-	-	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.04	0.06	<0.01	<0.02	<0.02	0.08
Chemical Oxygen Demand	mg/L	-	-	-	-	4	13	48	-	-	<5	<5	<5	8	<5	<5	<5	<5	8	8	30	11	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	4.4	17	-	-	2.4	2.2	1.2	1.3	0.9	1.5	1.2	0.9	4.2	0.9	1.7	1	0.6	0.8	1.2
Electrical Conductivity	uS/cm	-	-	-	-	1	480	760	292	87	85	71	82	184	71	68	66	71	76	83	74	73	64	68	76
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	-	28.2	32.3	34.8	27.3	23.2	60.5	23.2	23.2	23.2	23.2	25.7	23.2	26.8	11.2	28.4	28.9	23.7
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.05	7.27	6.64	6.83	6.54	7.3	7.12	7.35	7.25	7.08	7.18	7.1	7.12	6.34	6.9	6.6	7.3	6.93	7.44
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	290	460	-	-	55	46	53	120	46	44	43	46	49	54	98	58	20	154	56
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	2.1	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	0.2
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**1.5**	**0.44**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**0.93**	-	**4.28**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	0.03	0.01	0.02	0.01	0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.001	0.002	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.1	0.16	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.005	0.006	0.005	0.006	0.005
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.22	0.65	0.01	<0.01	0.01	<0.01	0.01	0.05	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.011	0.012	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	0.00015	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.002	-	<0.002
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	0.0086	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	0.0018	0.022	0.004	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.003	-	<0.003
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	1.8	0.11	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.1	<0.1	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0001	<0.0001	<0.002	-	<0.002
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	3.5	3.4	0.17	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	-	<0.002
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	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	<0.0005	<0.0005	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	3.7	5.2	6.3	6	7.4	7.8	6.8	7.8	7	7.5	7.2	6.9	6.3	9.5	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	0.073	0.047	0.045	0.035	0.025	0.069	0.039	0.035	0.033	0.04	0.039	0.036	0.035	0.04	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	<0.005	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	1.42	2.12	2.49	0.77	2.97	0.5	5.51	1.87	5.54	3.31	8.65	1.79	14.1	17.1	35.2	48.4	49.2	36.1	52
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.17	0.19	0.29	0.5	0.25	0.28	0.18	0.19	0.19	0.35	0.22	0.16	0.21	0.2	0.28	0.24	0.29	0.27	0.26
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.697	500	-	-	0.1	3.77	4.19	3.49	3.07	3.24	2.51	3.28	3.7	3.52	2.65	3.03	3.12	2.44	2.38	2.5	7.32	2.63	3.28	2.4
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	6.57	5.94	5.96	5.63	6.29	5.7	6.68	5.21	6.15	6.57	7.99	5.14	8.36	9.01	14.3	17.6	16.7	12.9	22
Magnesium (diss)	mg/L	-	-	-	-	0.05	2.22	1.97	2.14	2.02	2.26	2.18	2.39	1.91	2.13	2.27	2.85	1.82	2.9	3.22	5.08	5.99	5.91	3.93	7.2
Potassium (diss)	mg/L	-	-	-	-	0.05	1.62	1.3	-	1.5	-	1.49	-	1.25	-	1.49	-	1.17	-	1.63	-	2.1	-	1.58	-
Sodium (diss)	mg/L	100.98	200	-	-	0.05	1.24	1.77	1.97	1.64	1.68	1.31	1.69	1.56	1.8	1.86	1.86	1.62	2.44	2.77	3.11	4.77	5.16	4.58	5.8
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	28	20	22	25	26	25	22	25	17	30	21	23	21	18	21	9	17	12	16
Ammonia as N	mg/L	-	-	-	-	0.02	0.16	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	0.07	<0.02	<0.02	0.04	0.05	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	12	<5	<4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	1	0.7	1.8	1.8	1.4	0.6	1.7	1	0.7	1.5	0.5	0.9	0.6	<0.5	4.1	0.9	0.5	0.7	1.2
Electrical Conductivity	uS/cm	-	-	-	-	1	68	61	63	57	68	61	63	56	72	69	77	71	90	104	162	203	214	176	250
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		25.5	22.9	23.7	22.4	25	23.2	26.5	20.9	24.1	25.8	31.7	20.3	32.8	35.8	56.6	68.6	66	-	-
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.57	7.17	6.42	7.06	7.12	7.19	6.86	6.58	6.91	6.6	6.86	6.79	6.57	6.93	6.82	6.52	6.91	6.64	6.93
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10	54	46	42	48	54	<20	50	58	50	66	52	44	46	78	148	164	136	152	140
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	-	<0.1	-	0.8	-	<0.1	-	0.22	-	<0.1	-	0.21	-	<0.1	-	<0.1	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02	-	**3**	-	**1.9**	-	**0.92**	-	**1.86**	-	**3.11**	-	**2.17**	-	**1.97**	-	**1.28**	-	**2.38**	-
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.001	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.005	0.005	0.005	0.005	0.006	0.004	0.005	0.005	0.006	0.006	0.006	0.004	0.007	0.008	0.011	0.014	0.014	0.01	0.018
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.012	0.01	<0.01	<0.01	<0.01	<0.01	0.012	0.016	0.011	<0.01	0.014	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	-	<0.002	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL3-06	PL3-06	PL3-06	PL3-06	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2024-Apr-30	2024-Oct-17	2025-May-06	2025-Oct-20	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	26	8.6	22	53	15	16.1	13.5	13.2	13.4	10.9	12.8	13.8	14.9	13.6	15.6	22.3	22.7	15	22.7
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.17	0.31	0.18	0.23	1.2	0.32	0.16	0.15	0.07	0.14	0.38	0.13	0.21	0.11	0.19	0.1	0.08	<0.05	<0.05
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.01	-	<0.01	-	-	<0.1	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.697	500	-	-	0.1	2.8	3.2	3.3	2.8	95	52.2	50.9	48.4	45.7	46.7	39.9	48.1	45.9	48.6	43.8	48.9	43.2	46.2	42
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	11	6.7	12	21	34.3	66	69.9	53.5	57.4	55.8	63.9	56.2	63.6	53.8	64.6	64.6	70.1	56.9	71.6
Magnesium (diss)	mg/L	-	-	-	-	0.05	3.6	2.4	4.2	7	9.1	17.8	17.4	13.2	13.6	13.1	15.8	12.7	15.7	12.7	16	16.3	17.1	12.6	18
Potassium (diss)	mg/L	-	-	-	-	0.05	1.7	-	1.8	-	6.2	5.87	-	5.3	-	5.04	-	4.8	-	4.27	-	4.7	-	4.01	-
Sodium (diss)	mg/L	100.98	200	-	-	0.05	5.3	3.6	4.7	7.9	88.8	19.3	13.5	12	8.09	7.99	8.26	7.4	6.86	6.71	7.01	7.51	8.2	6.6	9.13
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	23	25	23	16	175	184	182	157	164	149	180	158	179	148	193	195	181	190	203
Ammonia as N	mg/L	-	-	-	-	0.02	<0.05	<0.05	<0.05	<0.05	0.04	<0.02	<0.02	0.12	0.14	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	0.08	<0.02	<0.02	0.03
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<4	<4	<4	<4	88	<5	<5	11	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	0.8	0.7	1	1.1	5	2.6	1.3	1.8	1.3	1.3	2.2	2.2	1.6	1.3	1.7	1.9	3.2	3.9	1.6
Electrical Conductivity	uS/cm	-	-	-	-	1	140	89	140	270	577	501	453	439	454	421	476	397	477	464	441	466	562	438	500
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	-	-	-	123.1	238.1	246.2	187.9	199.3	193.3	224.6	192.6	223.5	186.6	227.2	228.4	245.5	194	252.9
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.31	7.28	7.23	7.3	7.4	7.78	7.84	7.72	8.08	7.88	7.25	8.08	8.14	8.25	7.7	7.72	7.9	7.48	7.93
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	<0.001	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10	125	80	150	205	346	262	370	240	254	236	260	232	274	224	266	312	316	238	294
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	<0.1	-	<0.1	-	-	<0.1	-	0.9	-	<0.1	-	0.14	-	<0.1	-	0.4	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**8.7**	-	**6.6**	-	-	**3.51**	-	**3.23**	-	**0.63**	-	**1.4**	-	**0.64**	-	**1.48**	-	**0.67**	-
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	0.065	-	-	-	-	0.02	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.001	-	<0.001	-	-	<0.003	-	<0.003	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.0091	0.0056	0.01	0.017	0.08	0.066	0.064	0.058	0.051	0.053	0.052	0.054	0.047	0.044	0.047	0.051	0.053	0.045	0.051
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	<0.01	<0.01	<0.01	0.012	0.077	0.064	0.065	0.059	0.068	0.041	0.069	0.068	0.056	0.058	0.065	0.084	0.138	0.069	0.103
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.00009	-	<0.00009	-	<0.0001	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.005	-	<0.005	-	<0.001	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	0.005	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	0.0035	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	<0.0009	-	<0.0009	-	0.0016	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.0005	-	<0.0005	-	<0.0001	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	<0.002	<0.002	<0.002	<0.002	0.199	0.582	-	0.288	-	0.147	0.162	0.23	0.139	0.177	0.125	0.195	0.148	0.164	0.125
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	-	<0.0001	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	0.163	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	<0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	0.0015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2024-Apr-30	2025-May-06	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	18.8	26.1	20.1	29	29.9	37.4	42.4	36	27	12	10	4.85	4.51	4.5	4.82	4.92	12.6	10.4	24.5
Nitrate as N	mg/L	2.7175	10	-	-	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	1.1	0.11	0.05	0.12	<0.05	0.08	<0.05	<0.05	0.06	0.24
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.01	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	46.5	42.9	43.8	44.5	43.8	42	37.2	41	37	67	34.5	10.8	15.6	12.2	12.8	12	11.8	9.7	13.5
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	58.4	58.9	62.5	74.5	66.3	76.8	74.3	82	69	11.1	30.8	26.1	24.9	23.2	24.3	23.1	24.6	20.1	26
Magnesium (diss)	mg/L	-	-	-	-	0.05	13.7	14.7	15.2	18.8	16.9	21.1	19.6	21	18	4.2	6.46	5.74	4.99	4.72	5.28	4.63	4.91	4.25	5.62
Potassium (diss)	mg/L	-	-	-	-	0.05	4.17	-	4.34	-	4.48	-	4.79	5.1	4.3	4.4	4.52	-	3.57	-	3.49	-	4	-	3.79
Sodium (diss)	mg/L	100.98	200	-	-	0.05	6.97	7.37	7.75	9.05	9.69	11.4	10.6	11	11	74	29.3	10.1	7.98	5.97	6.1	6.25	8	5.84	8.07
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	161	220	171	203	189	235	205	230	190	115	114	96	81	80	78	79	87	64	71
Ammonia as N	mg/L	-	-	-	-	0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.03	<0.02	<0.02	0.11	0.16	<0.02	<0.02	0.08	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	5	<5	<5	<5	8	<5	<4	<4	73	<5	5	20	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	1.5	1.9	<0.5	36.4	2.1	2.5	2.1	2.4	1.9	3.6	1.6	1.3	1.5	1.2	1.1	1.9	2.9	1.8	1.2
Electrical Conductivity	uS/cm	-	-	-	-	1	565	512	471	560	530	646	603	620	540	423	317	217	210	201	201	199	220	187	273
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		202.2	207.6	218.7	263.4	235.1	278.7	-	-	-	45	103.5	88.8	82.7	77.4	82.4	76.7	81.6	67.7	88.1
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.15	7.66	7.5	7.7	7.3	7.75	7.37	7.77	7.37	6.7	7.53	7.08	7.08	7.68	7.32	6.83	7.32	7.41	7.83
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	**0.003**	-	**0.006**	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	254	316	302	350	300	344	358	375	365	255	126	194	138	120	114	116	126	104	126
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.25	-	<0.1	-	<0.1	-	<0.1	0.11	<0.1	-	<0.1	-	0.5	-	<0.1	-	1	-	<0.1
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**0.97**	-	**1.3**	-	**0.59**	-	**0.64**	**0.29**	**0.34**	-	**5.02**	-	**2.31**	-	**1.6**	-	**1.1**	-	**0.65**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	0.037	-	-	-	-	0.009	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.003	-	<0.003	-	<0.003	-	<0.001	<0.001	<0.001	-	<0.003	-	<0.003	-	-	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.043	0.056	0.049	0.051	0.049	0.058	0.052	0.055	0.048	0.046	0.03	0.031	0.027	0.026	0.026	0.025	0.029	0.02	0.023
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.061	0.121	0.102	0.103	0.108	0.149	0.132	0.15	0.1	0.043	0.048	0.043	0.039	0.044	0.039	0.037	0.05	0.027	0.04
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.00009	<0.00009	<0.0001	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	-	-	<0.003	-	<0.003	-	<0.002	<0.005	<0.005	<0.001	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	0.017	-	-	-	-	-	-	<0.003	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	<0.002	-	<0.002	-	<0.002	-	<0.001	<0.0009	0.00092	0.0016	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	0.028	0.161	<0.01	0.048	0.039	0.011	<0.1	<0.1	<0.1	**2.23**	**7.62**	**1.95**	**4.23**	**3.09**	**4.95**	**4.63**	**2.13**	**1.25**
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.001	-	<0.001	-	<0.001	-	<0.0005	<0.0005	<0.0005	<0.0001	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.141	0.169	0.162	0.172	0.236	0.192	0.205	0.26	0.2	0.169	0.541	-	0.57	-	0.373	0.404	0.44	0.335	0.286
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	0.0027	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	7.1	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	0.095	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	0.0009	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	<0.005	0.011	0.007	-	<0.005	-	<0.005	-	<0.005	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	AQC GW-S21 (PL	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL6-12	PL6-12	PL6-12	PL6-12
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2024-Apr-30	2025-May-06	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	16.9	29.6	0.4	54.7	50.2	42.8	61.6	48.6	48	59	51.6	50.4	48	54	49	3	0.95	0.97	0.63
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.06	0.24	0.09	0.24	0.08	0.2	0.08	0.29	0.3	0.14	0.22	0.34	0.24	0.14	<0.1	0.1	<0.05	<0.05	<0.05
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	<0.05	-	<0.05	<0.01	<0.01	-	<0.05	-	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	12.5	14.4	10.2	12.4	11.6	10.7	11.6	11	11	13.4	11.8	14.3	12.3	13	12	12	14.9	11.6	14.1
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	27.3	26.6	9.84	31.8	35.4	27.5	30.1	32.7	32.4	37	32.2	29.1	29.9	42	40	6.6	14.7	11.8	10.3
Magnesium (diss)	mg/L	-	-	-	-	0.05	5.27	5.83	1.44	6.77	7.42	5.82	6.26	7.29	7.23	8.39	7.22	6.49	6.48	8	8.5	2.6	2.34	1.37	1.75
Potassium (diss)	mg/L	-	-	-	-	0.05	-	3.51	-	3.9	-	3.72	-	3.63	3.62	-	3.55	-	3.04	3.8	3.7	2.2	1.33	-	1.23
Sodium (diss)	mg/L	100.98	200	-	-	0.05	6.31	6.48	1.73	12	10.2	9.4	7.75	9.83	9.78	10.1	10.2	9.11	11.5	13	19	4.1	1.71	3.09	1.42
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	78	73	24	76	64	61	66	56	62	62	58	59	70	85	96	30	31	29	28
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	0.08	<0.02	0.06	0.03	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.05	<0.05	<0.001	<0.02	<0.02	0.07
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	<5	9	<5	<5	<5	<5	<5	<5	<5	9.9	6.3	80	<5	<5	20
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	1.2	1.1	4.9	2.3	1.2	1.3	1.1	<0.5	<0.5	33.1	1.3	1.3	1.3	1.8	2.1	3.3	2.2	1.4	1.7
Electrical Conductivity	uS/cm	-	-	-	-	1	207	235	83	340	306	346	322	290	286	344	301	313	323	370	410	100	99	91	74
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		89.9	90.4	30.5	107.3	118.9	92.6	100.9	111.7	110.7	126.9	110.1	99.4	-	-	-	27.2	46.3	35.1	32.9
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.14	6.89	7.06	6.57	7.04	6.44	6.71	6.77	6.83	6.71	6.6	6.93	6.69	7.1	6.7	6.2	7.12	6.92	7.05
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	**0.003**	**0.003**	-	**0.003**	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	136	152	50	188	210	162	202	222	210	258	178	168	210	255	275	60	26	290	50
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	-	0.25	-	<0.1	-	0.27	-	<0.1	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	-	<0.1	-	0.47
Total Phosphorus	mg/L	-	-	0.03	-	0.02	-	**0.92**	-	**0.31**	-	**0.14**	-	**0.09**	**0.08**	-	**0.19**	-	**0.23**	**0.75**	**0.47**	-	**0.45**	-	**1.02**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.021	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	-	<0.003	-	<0.003	-	<0.003	-	<0.003	<0.003	-	<0.003	-	<0.001	<0.001	<0.001	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.032	0.029	0.004	0.033	0.027	0.025	0.029	0.027	0.026	0.025	0.02	0.019	0.019	0.036	0.031	0.049	0.014	0.006	0.006
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.032	0.041	<0.01	0.037	0.039	0.018	0.034	0.045	0.036	0.034	0.024	0.025	0.021	0.031	0.041	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	-	<0.0001	-	<0.0001	<0.00009	<0.00009	<0.0001	<0.002	-	<0.002
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	-	<0.003	-	0.005	-	<0.003	-	<0.003	<0.003	-	<0.003	-	<0.002	<0.005	<0.005	<0.001	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0027	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	-	<0.003	-	<0.002	-	<0.002	-	<0.002	<0.002	-	<0.002	-	<0.001	<0.0009	<0.0009	0.0015	<0.003	-	<0.003
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	**0.74**	**2.74**	<0.01	**4.44**	**4.62**	**5.32**	**3.57**	**3.25**	**3.38**	**6.91**	**4.2**	**1.52**	**4.2**	**4.8**	**10**	<0.1	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.001	-	<0.0005	<0.0005	<0.0005	<0.0001	<0.002	-	<0.002
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.185	0.355	0.005	0.383	0.433	0.364	0.425	0.317	0.293	0.44	0.31	0.195	0.223	0.42	1.3	0.107	0.054	-	0.014
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.003	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.068	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0006	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	<0.005	<0.005	<0.005	0.006	<0.005	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12	PL6-12
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2014-Oct-15	2015-May-05	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2024-Apr-30
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	0.52	0.66	0.52	1.14	0.76	3.48	0.64	0.75	0.4	0.69	0.76	0.83	1.06	0.68	0.52	0.48	0.61	1.59	19
Nitrate as N	mg/L	2.7175	10	-	-	0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.16	0.16	<0.05	0.09	0.06	0.05	<0.05	0.08	<0.05	<0.05	<0.05	0.06	<0.05	<0.1
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.697	500	-	-	0.1	10.5	14.7	10.2	12	9.8	12.8	9.94	14.3	10.2	12.1	9.32	13.7	11.9	12	13.7	10.3	9.51	10.8	19
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	9.27	12.1	9.05	7.9	9.5	9.52	10.3	11.5	9.84	10.7	10.7	12.8	11.5	17.1	11.9	18.9	9.14	10.6	14
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.33	1.93	1.39	1.36	1.51	1.46	1.55	1.94	1.44	1.66	1.38	1.82	1.65	2.65	1.64	2.89	1.24	1.41	1.8
Potassium (diss)	mg/L	-	-	-	-	0.05	-	1.34	-	1.31	-	1.34	-	1.25	-	1.06	-	1.07	-	4.37	-	4.73	-	0.98	1.2
Sodium (diss)	mg/L	100.98	200	-	-	0.05	1.24	1.52	1.57	1.34	1.49	1.37	1.29	1.56	1.73	1.41	1.86	1.3	1.33	1.65	1.32	1.79	2.12	1.22	1.5
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	23	31	25	25	26	24	26	35	24	31	33	34	34	32	29	31	31	30	37
Ammonia as N	mg/L	-	-	-	-	0.02	0.19	<0.02	<0.02	0.07	<0.02	<0.02	<0.02	0.12	<0.02	<0.02	0.04	0.06	<0.02	<0.02	<0.02	<0.02	0.03	0.08	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	<5	<5	<5	<5	<5	33	<5	<5	<5	6	<5	<5	<5	<5	7	<5	8.1
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	1.5	3.1	1.8	3	2.8	1.6	2.8	2.5	4.9	3.1	2.3	1.4	1.6	1.7	11.5	4	1.9	1.5	1.7
Electrical Conductivity	uS/cm	-	-	-	-	1	75	106	74	74	79	90	70	90	83	84	77	119	80	94	92	83	80	80	97
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		28.6	38.2	28.3	25.3	29.9	29.8	32.1	36.7	30.5	33.6	32.4	39.5	35.5	53.6	36.5	59.1	27.9	-	-
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.21	6.85	6.43	7.12	7.02	7.45	6.84	6.7	7.06	6.51	7.02	6.54	6.6	6.79	6.77	6.54	6.86	6.89	7.32
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	0.001	-	0.001	-	<0.001	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	58	56	50	56	46	38	44	56	50	40	44	58	60	54	66	102	60	78	135
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	-	0.25	-	1	-	<0.1	-	0.15	-	<0.1	-	0.25	-	0.12	-	<0.1	-	<0.1	<0.2
Total Phosphorus	mg/L	-	-	0.03	-	0.02	-	**2.19**	-	**1.94**	-	**1.15**	-	**1.2**	-	**1.63**	-	**1.4**	-	**1.23**	-	**1.15**	-	**0.72**	**3.2**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.001	<0.001
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.003	0.005	0.004	0.004	0.004	0.003	0.003	0.005	0.004	0.004	0.004	0.003	0.003	0.07	0.003	0.092	0.003	0.003	0.0047
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	-	<0.002	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.00009
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.002	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	0.005	-	<0.002	-	0.008	-	0.011	-	<0.001	0.0033
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.26	<0.01	2.54	<0.01	<0.01	<0.1
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	0.005	-	0.009	-	<0.0005	<0.0005
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	-	0.005	0.008	<0.002	0.005	0.002	0.005	<0.002	0.005	<0.002	0.002	<0.002	<0.002	0.038	<0.002	0.031	<0.002	<0.002	0.0064
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	-	<0.005	-	<0.005	-	0.045	-	<0.005	-	0.006	-	<0.005	-	0.006	-	0.008	-	<0.005	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL6-12	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16	QC GW1-F22 (P	PL7-16	PL7-16	PL7-16
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2025-May-06	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30
Anions						Detection Limit																			
Chloride	mg/L	127.5	250	-	-	0.1	<1	12	11.5	16.3	23.1	37.9	20.4	23.1	24.4	42.7	28.4	34.4	34.5	38.9	29.7	29.3	36.7	22	40
Nitrate as N	mg/L	2.7175	10	-	-	0.05	<0.1	1.17	0.2	1.65	<0.05	0.13	0.37	1.09	0.1	0.4	0.27	0.45	0.22	0.31	0.38	0.4	0.49	0.44	0.25
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.01	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05	-	<0.01
Sulphate	mg/L	251.697	500	-	-	0.1	11	23.5	17.6	22.6	20.8	36.8	21.7	45.7	16.3	27.3	18.8	27.4	25	30.4	20.8	20.8	21.7	15	24
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	11	24.2	23.7	27	28.7	43	29.5	35.7	27.6	37.8	33.8	36.5	35.1	39	31.3	30.8	39.3	28	43
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.4	6.82	6.1	7.05	7.33	11.1	7.13	8.82	6.99	9.59	8.4	9.32	9.15	9.78	7.11	7.6	8.69	6.6	11
Potassium (diss)	mg/L	-	-	-	-	0.05	1	3.58	-	3.68	-	5.26	-	4.36	-	4.71	-	4.68	-	4.93	-	-	4.43	-	5.5
Sodium (diss)	mg/L	100.98	200	-	-	0.05	1.3	10.6	9.68	10.8	11.6	16.6	11.1	13.4	12.4	15.1	13.8	17.1	14	18.4	14.1	14.4	16.8	14	23
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	26	84	80	82	86	127	78	108	78	99	88	101	96	110	100	98	115	87	130
Ammonia as N	mg/L	-	-	-	-	0.02	<0.05	<0.02	0.14	<0.02	<0.02	0.04	<0.02	<0.02	0.04	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	4.6	<5	<5	<5	6	<5	<5	<5	<5	7	10	<5	<5	<5	7	7	<5	7.7	5.4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	2.4	1.8	2.5	1.9	2.9	3.3	5.5	2.6	1.9	2.2	2.1	2.6	41.8	2.9	1.8	1.8	2.4	1.9	2.9
Electrical Conductivity	uS/cm	-	-	-	-	1	76	266	237	302	257	382	305	356	253	478	274	361	337	406	344	340	392	290	430
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	88.5	84.3	96.5	101.8	153.1	103	125.5	97.7	133.9	119	129.5	125.3	137.7	107.4	108.2	-	-	-
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		6.93	7.03	7.77	7.87	6.96	7.28	7.51	6.89	7.43	6.7	6.78	6.83	7.02	6.77	7.17	7.39	7.18	6.81	7.4
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	**0.003**	-	**0.005**	-	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	90	146	132	140	164	248	174	186	140	214	164	206	204	218	156	164	230	130	260
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.14	0.1	-	<0.1	-	0.55	-	<0.1	-	0.29	-	0.17	-	<0.1	-	-	<0.1	-	0.13
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**1.9**	<0.05	-	<0.05	-	**0.04**	-	<0.02	-	0.02	-	<0.02	-	<0.02	-	-	<0.02	-	<0.02
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.001	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	-	<0.001	-	<0.001
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.0044	0.033	0.024	0.024	0.024	0.036	0.023	0.03	0.023	0.032	0.028	0.031	0.028	0.033	0.025	0.025	0.03	0.022	0.038
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	<0.01	0.102	0.126	0.164	0.141	0.234	0.113	0.129	0.106	0.147	0.131	0.178	0.125	0.157	0.106	0.105	0.142	0.081	0.24
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.00009	<0.001	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	0.0001	-	<0.0001	-	-	<0.0001	-	<0.00009
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.005	<0.003	-	<0.003	-	<0.003	-	0.005	-	<0.003	-	<0.003	-	<0.003	-	-	<0.002	-	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	<0.0009	<0.003	-	<0.003	-	0.004	-	0.003	-	0.004	-	<0.002	-	0.003	-	-	0.002	-	0.0044
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.011	<0.01	<0.01	0.012	<0.1	<0.1
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.0005	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	<0.0005	-	<0.0005
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.0069	0.052	0.081	0.092	0.004	0.037	0.018	0.051	0.036	0.187	0.268	0.185	0.103	0.143	0.062	0.066	0.126	0.01	0.068
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	<0.0001	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	-	<0.0001	-	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	-	<0.005	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	QAQC-GW1 (PL7	PL7-16	QAQC-GW1 (PL7	PL7-16	QAQC-GW1 (PL7	PL7-16	QAQC-GW1 (PL7	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2024-Apr-30	2024-Oct-17	2024-Oct-17	2025-May-06	2025-May-06	2025-Oct-20	2025-Oct-20	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-Oct-22	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14
Anions						**Detection Limit**																			
Chloride	mg/L	127.5	250	-	-	0.1	40	23	23	28	27	32	32	0.76	0.66	0.73	0.58	6.17	0.51	0.63	0.52	0.57	0.69	0.71	0.78
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.25	0.87	0.89	0.46	0.48	0.29	0.33	0.2	0.15	0.41	0.13	0.27	0.17	0.29	0.1	0.14	0.14	0.65	0.39
Nitrite as N	mg/L	0.26875	1	-	-	0.01	-	-	-	<0.01	<0.01	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.697	500	-	-	0.1	24	17	17	19	18	15	15	9.6	9	9.12	8.86	8.18	8.3	6.49	8.37	7.52	8.24	6.82	7.81
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	43	28	27	38	39	40	41	4.7	5.4	5.47	4.89	6.13	4.63	4.29	4.43	4.19	4.91	5.74	5.52
Magnesium (diss)	mg/L	-	-	-	-	0.05	10	6.4	6.3	9	9.2	9.6	9.3	1.58	1.71	1.76	1.47	1.91	1.34	1.25	1.3	1.28	1.46	1.81	1.64
Potassium (diss)	mg/L	-	-	-	-	0.05	5.5	-	-	4.9	5.1	-	-	1.17	-	1.12	-	1.19	-	0.97	-	0.86	-	1.09	-
Sodium (diss)	mg/L	100.98	200	-	-	0.05	23	16	16	19	19	19	19	2.33	2.07	1.97	2.14	2.02	1.83	1.47	2.35	1.58	2.16	1.89	2.11
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	130	95	96	100	110	95	96	18	18	18	15	15	12	15	13	12	17	18	23
Ammonia as N	mg/L	-	-	-	-	0.02	<0.05	<0.05	<0.05	<0.05	0.075	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	0.06	0.07	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<4	<4	<4	6.3	4.3	<4	<4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	3	1.8	1.8	2.6	2.5	3.2	3.2	1.1	1.4	0.9	1.5	1.1	1.2	0.9	0.9	1.1	1.5	<0.5	6.6
Electrical Conductivity	uS/cm	-	-	-	-	1	430	310	310	360	350	330	340	61	59	66	50	68	57	46	48	60	51	61	60
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	-	-	-	-	-	-	18.2	20.5	20.9	18.3	23.2	17.1	15.9	16.4	15.7	18.3	21.8	20.5
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		7.42	7.5	7.55	6.76	7.19	7.23	7.18	6.67	7.09	7.34	6.67	6.48	6.93	6.38	6.9	6.73	6.52	6.83	6.79
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	-	<0.001	<0.001	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10	270	190	200	220	200	180	155	40	52	24	40	50	40	28	32	32	38	40	54
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.19	-	-	<0.1	0.1	-	-	<0.1	-	<0.1	-	0.22	-	<0.1	-	0.24	-	0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02	<0.02	-	-	<0.02	<0.02	-	-	**0.77**	-	**0.94**	-	**0.63**	-	**0.12**	-	**1.77**	-	**0.1**	-
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.001	-	-	<0.001	<0.001	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.038	0.023	0.023	0.032	0.034	0.034	0.033	0.009	0.007	0.006	0.005	0.006	0.006	0.005	0.006	0.004	0.004	0.005	0.004
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.24	0.11	0.1	0.12	0.12	0.12	0.12	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.00009	-	-	<0.00009	<0.00009	-	-	<0.001	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.005	-	-	<0.005	<0.005	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	0.0044	-	-	0.0035	0.0036	-	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.002	-	<0.002	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.017	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.0005	-	-	<0.0005	<0.0005	-	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.068	0.038	0.035	0.43	0.44	0.56	0.55	0.006	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	-	-	-	<0.0001	<0.0001	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	-	<0.005	<0.005	-	-	<0.005	-	0.077	-	<0.005	-	0.005	-	<0.005	-	<0.005	-

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	QAQC GW-S19 (	PL9-16	QAQC GW-F19 (	PL9-16
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17	2025-May-06	2025-Oct-20	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08	2018-Oct-23	2019-May-08	2019-May-08	2019-Oct-22	2019-Oct-22	2020-May-07
Anions						Detection Limit																			
Chloride	mg/L	127.5	250	-	-	0.1	0.61	0.63	0.57	<1	<1	<1	<1	<1	20.6	14.9	16.3	12.5	18.3	13	17.4	17.4	17.5	17.5	27.8
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.51	0.22	0.53	0.1	0.16	0.1	0.23	<0.1	0.97	0.88	0.8	0.63	0.71	0.65	0.7	0.72	0.76	0.76	0.57
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.05	-	<0.05	-	-	-	<0.01	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	-	<0.05
Sulphate	mg/L	251.697	500	-	-	0.1	7.44	7.75	6.72	6.6	6.9	6.5	6.3	5.9	15.9	15.4	18.4	14.8	18.2	11.6	10.5	10.4	11.6	11.6	13.9
Cations																									
Calcium (diss)	mg/L	-	-	-	-	0.05	5.89	5.54	6.43	5.2	5.6	5.5	6.1	4.8	18.1	15.9	15.1	15.7	14.6	13.1	14.7	14.9	16.8	17.1	15.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.76	1.68	1.78	1.4	1.6	1.4	1.8	1.3	5.53	4.61	4.41	4.58	4.31	3.67	4.15	4.2	4.95	5.05	4.57
Potassium (diss)	mg/L	-	-	-	-	0.05	1.08	-	1.1	-	1.1	-	1.1	-	2.79	-	2.38	-	2.5	-	2.36	2.38	-	-	2.53
Sodium (diss)	mg/L	100.98	200	-	-	0.05	1.72	2.01	1.7	1.9	1.7	1.8	1.8	1.8	5.67	5.48	5.41	5.95	6.18	5.78	6.09	6.15	6.83	6.98	6.49
General Chemistry																									
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	17	23	23	16	21	23	24	15	53	41	35	42	36	36	49	44	42	42	29
Ammonia as N	mg/L	-	-	-	-	0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	0.04	0.05	0.03
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	6	<5	6.4	<4	<4	<4	<4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	1.4	1	0.9	1.5	1.1	1.2	1.2	1.7	1.6	1.5	0.8	1.8	1.3	2.2	0.9	1.6	1	1.1	1.1
Electrical Conductivity	uS/cm	-	-	-	-	1	64	63	63	55	55	61	62	52	215	175	187	150	158	158	166	166	165	166	233
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		22	20.8	-	-	-	-	-	-	68	58.7	55.9	58.1	54.2	47.8	53.8	54.5	62.3	63.5	58.5
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		6.65	6.98	6.83	6.85	7.23	7.31	7.15	7.06	7.11	7.36	7.66	6.95	6.74	7.32	6.64	6.73	7.24	7.18	6.35
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10	28	36	48	20	10	70	35	40	124	108	80	92	102	82	90	94	100	100	114
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	-	0.2	-	<0.1	-	0.22	-	<0.1	<0.1	-	-	0.22
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**0.65**	-	**0.05**	-	<0.02	-	**0.8**	-	**4.48**	-	**0.07**	-	**0.17**	-	**0.1**	**0.09**	-	-	**0.15**
Metals																									
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.003	-	<0.001	-	<0.001	-	<0.001	-	<0.003	-	<0.003	-	<0.003	-	<0.003	<0.003	-	-	<0.003
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.004	0.005	0.005	0.0041	0.0039	0.0049	0.0046	0.004	0.047	0.018	0.014	0.014	0.014	0.014	0.015	0.014	0.014	0.014	0.014
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.069	0.056	0.058	0.05	0.059	0.041	0.042	0.045	0.042	0.042	0.027
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.0001	-	<0.0001	-	<0.00009	-	<0.00009	-	<0.001	-	<0.001	-	<0.0001	-	<0.0001	<0.0001	-	-	<0.0001
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.003	-	<0.002	-	<0.005	-	<0.005	-	<0.003	-	<0.003	-	<0.003	-	0.004	0.004	-	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	<0.002	-	<0.001	-	<0.0009	-	<0.0009	-	<0.003	-	<0.003	-	<0.003	-	<0.002	<0.002	-	-	<0.002
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.001	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.002	-	<0.002	-	<0.001	-	<0.001	<0.001	-	-	<0.001
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.044	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	<0.0001	-	<0.0001	-	-	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	-	-	<0.0001
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	-	<0.005

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

Appendix E; Historical Groundwater Chemistry (2006 - 2025) - Papineau Lake WDS

MHH - Papineau Lake WDS Groundwater Chemistry						Sample ID	QAQC GW-S20 (	PL9-16	AQC GW-F20 (PL	PL9-16	PL9-16	AQC GW-F21 (PL	PL9-16	AQC GW-S22 (PL	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Sample Date	2020-May-07	2020-Oct-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2021-Oct-14	2022-Apr-20	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17	2025-May-06	2025-Oct-20
Anions						**Detection Limit**															
Chloride	mg/L	127.5	250	-	-	0.1	27.8	21.9	22	25.1	23.1	23.3	24.2	24.1	22.5	25.1	20	25	23	25	19
Nitrate as N	mg/L	2.7175	10	-	-	0.05	0.54	0.56	0.56	0.56	0.57	0.58	0.54	0.54	0.54	0.54	0.7	0.45	0.66	0.67	0.55
Nitrite as N	mg/L	0.26875	1	-	-	0.01	<0.05	-	-	<0.05	-	-	<0.05	<0.05	-	<0.05	-	-	-	<0.01	-
Sulphate	mg/L	251.697	500	-	-	0.1	13.8	11	11.1	12	11	10.8	11	11	11.2	8.99	9.3	13	8.9	9.9	9.6
Cations																					
Calcium (diss)	mg/L	-	-	-	-	0.05	16	16.1	16.4	14.9	14.5	14.6	13.7	14.1	14.6	14	16	16	15	17	15
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.62	4.7	4.76	4.46	4.43	4.43	3.96	4.06	4.05	3.75	4.4	4.4	4.1	4.9	4.3
Potassium (diss)	mg/L	-	-	-	-	0.05	2.55	-	-	2.49	-	-	2.33	2.37	-	2.26	-	2.6	-	2.5	-
Sodium (diss)	mg/L	100.98	200	-	-	0.05	6.5	6.29	6.39	6.97	6.63	6.55	7.05	7.21	7.55	6.78	7.7	7.9	7.7	8.7	7.7
General Chemistry																					
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	Calculated	-	1	29	37	38	29	34	34	27	26	35	29	38	48	32	34	34
Ammonia as N	mg/L	-	-	-	-	0.02	0.11	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<5	<5	7	<5	<5	<5	<5	<5	5	<5	<4	<4	<4	<4	<4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	1.2	1.2	1	<0.5	12.1	14.3	1.1	1.1	1.1	0.9	1.4	1.2	1.1	1.1	2
Electrical Conductivity	uS/cm	-	-	-	-	1	233	165	165	173	169	170	167	166	177	166	180	180	180	200	170
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		59	59.6	60.6	55.6	54.4	54.7	50.5	51.9	53.1	-	-	-	-	-	-
pH	pH units	6.715 - 7.715	6.5 - 8.5	6.5 - 8.5	-		6.52	6.62	6.62	6.75	6.82	6.93	6.63	6.66	7.06	6.75	6.93	7.11	7.21	7.05	7.03
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	-	**0.002**	-	-	0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10	112	100	102	96	124	112	98	94	84	118	80	115	125	165	110
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1	0.35	-	-	<0.1	-	-	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02	**0.2**	-	-	**0.05**	-	-	**0.04**	**0.04**	-	**0.15**	-	**0.041**	-	**0.65**	-
Metals																					
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.003625	0.01	-	0.005	0.001	<0.003	-	-	<0.003	-	-	<0.003	<0.003	-	<0.001	-	<0.001	-	<0.001	-
Barium (diss)	mg/L	0.25375	1	-	-	0.002	0.014	0.015	0.013	0.013	0.012	0.012	0.012	0.012	0.012	0.011	0.013	0.014	0.012	0.014	0.012
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.25375	5	-	0.2	0.01	0.026	0.034	0.034	0.031	0.027	0.027	0.031	0.031	0.027	0.028	0.03	0.039	0.025	0.033	0.031
Cadmium (diss)	mg/L	0.0012875	0.005	0.2	Calculated	0.00009	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	-	<0.0001	-	<0.00009	-	<0.00009	-
Chromium (diss)	mg/L	0.012875	0.05	-	-	0.002	<0.003	-	-	<0.003	-	-	<0.003	<0.003	-	<0.002	-	<0.005	-	<0.005	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.50025	1	-	Calculated	0.0009	<0.002	-	-	<0.002	-	-	<0.002	<0.002	-	<0.001	-	<0.0009	-	<0.0009	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.013	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (diss)	mg/L	0.002875	0.01	-	Calculated	0.0005	<0.001	-	-	<0.001	-	-	<0.001	<0.001	-	<0.0005	-	<0.0005	-	<0.0005	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0002875	0.001	0.0002	-	0.0001	<0.0001	-	-	<0.0001	-	-	<0.0001	<0.0001	-	<0.0001	-	-	-	<0.0001	-
Molybdenum (diss)	mg/L	-	-	-	0.04	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.50125	5	-	0.02	0.005	<0.005	-	-	<0.005	-	-	<0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-

-LEGEND-

Detection Limit	DL: May vary between sample locations and events
DL exceeds criteria	
Concentration exceeds RUV-PL	Reasonable Use Values Papineau Lake
Concentration exceeds ODWQS-ALL-MERGED	Ontario Drinking Water Quality Standards All Types Merged
Concentration exceeds PWQO-GENERAL	Provincial Water Quality Objectives General
Concentration exceeds PWQO-INTERIM	Provincial Water Quality Objectives Interim
Calculated	PWQO values are determined on a sample-specific basis, as the criterion depends on the concentration of another parameter. Calculation procedures follow PWQO guidance tables.

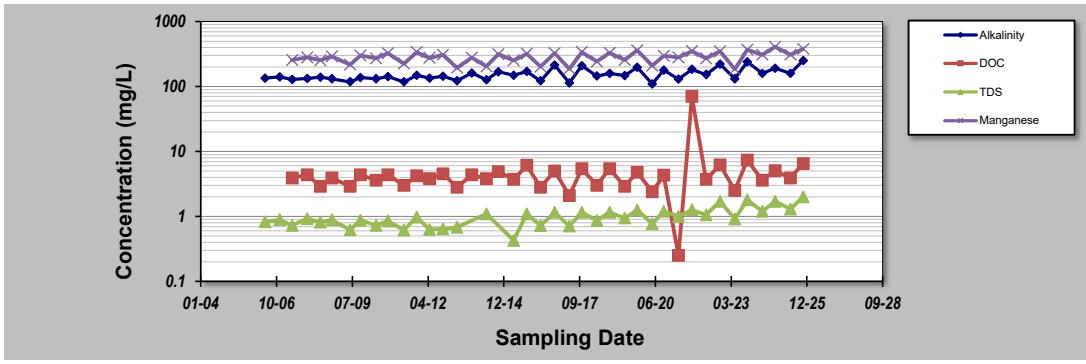
Appendix F

Mann-Kendall Trend Analysis

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL1-06
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL1-06 CONCENTRATION (mg/L)						
1	2006-May-09	135	-	0.83	-			
2	2006-Nov-21	141	-	0.89	-			
3	2007-May-02	128	3.9	0.73	256			
4	2007-Nov-21	133	4.4	0.92	281			
5	2008-May-08	140	2.9	0.81	254			
6	2008-Oct-08	132	3.9	0.89	290			
7	2009-Jun-05	118	2.9	0.62	218			
8	2009-Oct-21	138	4.4	0.87	300			
9	2010-May-18	132	3.6	0.73	270			
10	2010-Oct-19	142	4.4	0.85	328			
11	2011-May-19	118	3	0.61	225			
12	2011-Nov-02	149	4.2	0.97	339			
13	2012-Apr-17	135	3.8	0.629	276			
14	2012-Oct-17	144	4.5	0.642	310			
15	2013-Apr-17	123	2.8	0.678	194			
16	2013-Oct-29	161	4.4	-	278			
17	2014-May-12	127	3.8	1.1	204			
18	2014-Oct-15	169	4.9	-	314			
19	2015-May-05	149	3.7	0.426	252			
20	2015-Oct-27	170	6.1	1.1	320			
21	2016-Apr-27	122	2.8	0.718	202			
22	2016-Oct-27	215	5	1.15	326			
23	2017-May-11	114	2.1	0.713	188			
24	2017-Oct-24	208	5.4	1.16	340			
25	2018-May-08	145	3	0.861	244			
26	2018-Oct-23	160	5.4	1.16	330			
27	2019-May-08	147	2.9	0.943	258			
28	2019-Oct-22	198	4.8	1.25	360			
29	2020-May-07	110	2.4	0.771	210			
30	2020-Oct-07	179	4.3	1.2	296			
31	2021-Apr-21	130	0.25	1	280			
32	2021-Oct-14	184	69.9	1.26	350			
33	2022-Apr-20	153	3.7	1.06	272			
34	2022-Oct-19	220	6.2	1.71	348			
35	2023-May-01	132	2.5	0.915	186			
36	2023-Oct-16	240	7.4	1.8	370			
37	2024-Apr-30	160	3.6	1.2	310			
38	2024-Oct-17	190	5.1	1.7	410			
39	2025-May-06	160	3.9	1.3	310			
40	2025-Oct-20	250	6.5	2	380			
Coefficient of Variation:		0.22	1.87	0.35	0.20			
Mann-Kendall Statistic (S):		289	91	344	176			
Confidence Factor:		>99.9%	87.0%	>99.9%	98.7%			
Concentration Trend:		Increasing	No Trend	Increasing	Increasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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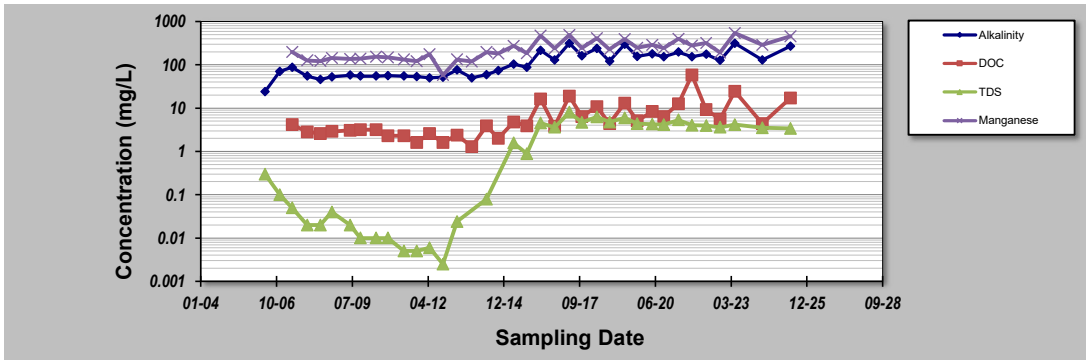
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL2-06
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			

Sampling Event	Sampling Date	PL2-06 CONCENTRATION (mg/L)						
1	2006-May-09	24	-	0.3	-			
2	2006-Nov-21	70	-	0.1	-			
3	2007-May-02	88	4.2	0.05	200			
4	2007-Nov-21	55	2.8	0.02	127			
5	2008-May-08	46	2.6	0.02	123			
6	2008-Oct-08	53	2.9	0.04	144			
7	2009-Jun-05	58	3.1	0.02	138			
8	2009-Oct-21	55	3.2	0.01	139			
9	2010-May-18	55	3.2	0.01	154			
10	2010-Oct-19	57	2.3	0.01	148			
11	2011-May-19	55	2.3	0.005	133			
12	2011-Nov-02	54	1.6	0.005	122			
13	2012-Apr-17	50	2.6	0.006	175			
14	2012-Oct-17	52	1.6	0.0025	58			
15	2013-Apr-17	76	2.4	0.024	134			
16	2013-Oct-29	50	1.3	-	120			
17	2014-May-12	59	3.9	0.079	198			
18	2014-Oct-15	74	2	-	184			
19	2015-May-05	104	4.8	1.58	274			
20	2015-Oct-27	89	3.9	0.889	188			
21	2016-Apr-27	216	16.3	4.55	474			
22	2016-Oct-27	130	3.8	3.6	238			
23	2017-May-11	314	19	8.03	494			
24	2017-Oct-24	161	6.4	4.69	246			
25	2018-May-08	242	10.9	6.35	412			
26	2018-Oct-23	121	4.4	4.75	230			
27	2019-May-08	302	13.1	6.01	394			
28	2019-Oct-22	156	5.1	4.41	250			
29	2020-May-07	180	8.3	4.27	290			
30	2020-Oct-07	154	6.4	4.2	244			
31	2021-Apr-21	197	12.6	5.33	402			
32	2021-Oct-14	153	58.6	4.06	280			
33	2022-Apr-20	177	9.4	3.98	322			
34	2022-Oct-19	127	5.6	3.63	192			
35	2023-May-01	316	24.8	4.21	546			
36	2024-Apr-30	130	4.4	3.5	290			
37	2025-May-06	270	17	3.4	460			
38								
39								
40								
Coefficient of Variation:		0.67	1.32	1.03	0.51			
Mann-Kendall Statistic (S):		374	290	206	322			
Confidence Factor:		>99.9%	>99.9%	99.9%	>99.9%			
Concentration Trend:		Increasing	Increasing	Increasing	Increasing			



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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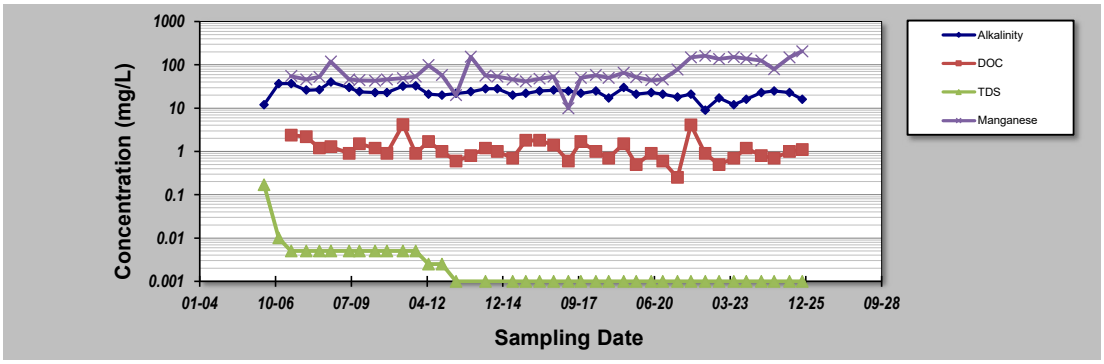
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL3-06
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL3-06 CONCENTRATION (mg/L)						
1	2006-May-09	12	-	0.17	-			
2	2006-Nov-21	37	-	0.01	-			
3	2007-May-02	37	2.4	0.005	55			
4	2007-Nov-21	26	2.2	0.005	46			
5	2008-May-08	27	1.2	0.005	53			
6	2008-Oct-08	40	1.3	0.005	120			
7	2009-Jun-05	30	0.9	0.005	46			
8	2009-Oct-21	24	1.5	0.005	44			
9	2010-May-18	23	1.2	0.005	43			
10	2010-Oct-19	23	0.9	0.005	46			
11	2011-May-19	32	4.2	0.005	49			
12	2011-Nov-02	33	0.9	0.005	54			
13	2012-Apr-17	21	1.7	0.0025	98			
14	2012-Oct-17	20	1	0.0025	58			
15	2013-Apr-17	22	0.6	0.001	20			
16	2013-Oct-29	24	0.8	-	154			
17	2014-May-12	28	1.2	0.001	56			
18	2014-Oct-15	28	1	-	54			
19	2015-May-05	20	0.7	0.001	46			
20	2015-Oct-27	22	1.8	0.001	42			
21	2016-Apr-27	25	1.8	0.001	48			
22	2016-Oct-27	26	1.4	0.001	54			
23	2017-May-11	25	0.6	0.001	10			
24	2017-Oct-24	22	1.7	0.001	50			
25	2018-May-08	25	1	0.001	58			
26	2018-Oct-23	17	0.7	0.001	50			
27	2019-May-08	30	1.5	0.001	66			
28	2019-Oct-22	21	0.5	0.001	52			
29	2020-May-07	23	0.9	0.001	44			
30	2020-Oct-07	21	0.6	0.001	46			
31	2021-Apr-21	18	0.25	0.001	78			
32	2021-Oct-14	21	4.1	0.001	148			
33	2022-Apr-20	9	0.9	0.001	164			
34	2022-Oct-19	17	0.5	0.001	136			
35	2023-May-01	12	0.7	0.001	152			
36	2023-Oct-16	16	1.2	0.001	140			
37	2024-Apr-30	23	0.8	0.001	125			
38	2024-Oct-17	25	0.7	0.001	80			
39	2025-May-06	23	1	0.001	150			
40	2025-Oct-20	16	1.1	0.001	205			
Coefficient of Variation:		0.28	0.67	4.00	0.61			
Mann-Kendall Statistic (S):		-304	-193	-381	249			
Confidence Factor:		>99.9%	99.2%	>99.9%	99.9%			
Concentration Trend:		Decreasing	Decreasing	Decreasing	Increasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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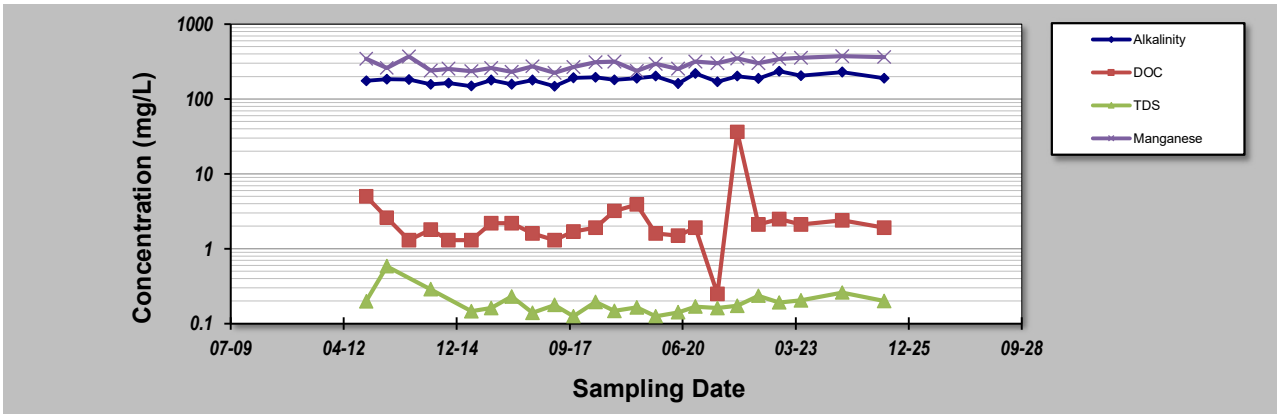
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL4-12
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL4-12 CONCENTRATION (mg/L)						
1	2012-Oct-17	175	5	0.199	346			
2	2013-Apr-17	184	2.6	0.582	262			
3	2013-Oct-29	182	1.3	-	370			
4	2014-May-12	157	1.8	0.288	240			
5	2014-Oct-15	164	1.3	-	254			
6	2015-May-05	149	1.3	0.147	236			
7	2015-Oct-27	180	2.2	0.162	260			
8	2016-Apr-27	158	2.2	0.23	232			
9	2016-Oct-27	179	1.6	0.139	274			
10	2017-May-11	148	1.3	0.177	224			
11	2017-Oct-24	193	1.7	0.125	266			
12	2018-May-08	195	1.9	0.195	312			
13	2018-Oct-23	181	3.2	0.148	316			
14	2019-May-08	190	3.9	0.164	238			
15	2019-Oct-22	203	1.6	0.125	294			
16	2020-May-07	161	1.5	0.141	254			
17	2020-Oct-07	220	1.9	0.169	316			
18	2021-Apr-21	171	0.25	0.162	302			
19	2021-Oct-14	203	36.4	0.172	350			
20	2022-Apr-20	189	2.1	0.236	300			
21	2022-Oct-19	235	2.5	0.192	344			
22	2023-May-01	205	2.1	0.205	358			
23	2024-Apr-30	230	2.4	0.26	375			
24	2025-May-06	190	1.9	0.2	365			
25								
Coefficient of Variation:		0.13	2.02	0.47	0.17			
Mann-Kendall Statistic (S):		120	30	19	106			
Confidence Factor:		99.9%	76.2%	69.2%	99.6%			
Concentration Trend:		Increasing	No Trend	No Trend	Increasing			



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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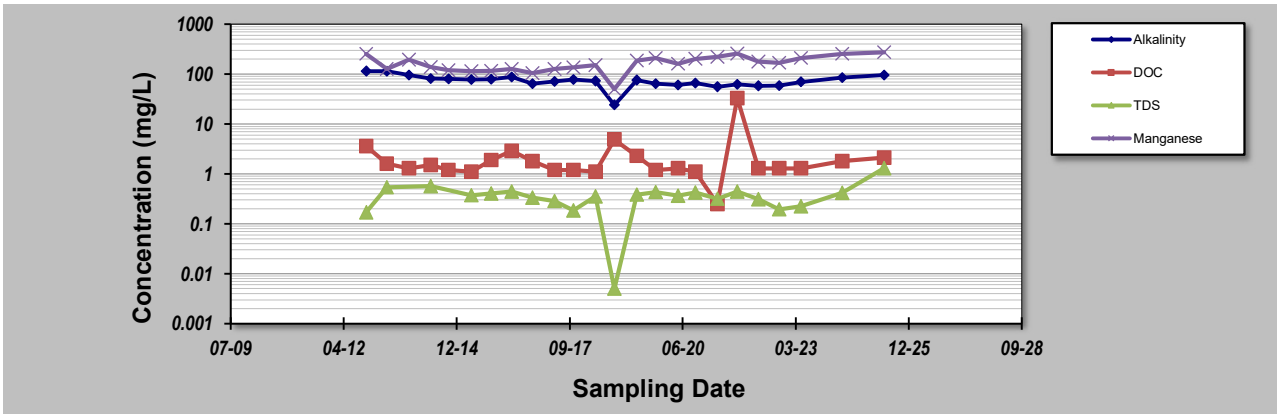
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL5-12
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL5-12 CONCENTRATION (mg/L)						
1	2012-Oct-17	115	3.6	0.169	255			
2	2013-Apr-17	114	1.6	0.541	126			
3	2013-Oct-29	96	1.3	-	194			
4	2014-May-12	81	1.5	0.57	138			
5	2014-Oct-15	80	1.2	-	120			
6	2015-May-05	78	1.1	0.373	114			
7	2015-Oct-27	79	1.9	0.404	116			
8	2016-Apr-27	87	2.9	0.44	126			
9	2016-Oct-27	64	1.8	0.335	104			
10	2017-May-11	71	1.2	0.286	126			
11	2017-Oct-24	78	1.2	0.185	136			
12	2018-May-08	73	1.1	0.355	152			
13	2018-Oct-23	24	4.9	0.005	50			
14	2019-May-08	76	2.3	0.383	188			
15	2019-Oct-22	64	1.2	0.433	210			
16	2020-May-07	61	1.3	0.364	162			
17	2020-Oct-07	66	1.1	0.425	202			
18	2021-Apr-21	56	0.25	0.317	222			
19	2021-Oct-14	62	33.1	0.44	258			
20	2022-Apr-20	58	1.3	0.31	178			
21	2022-Oct-19	59	1.3	0.195	168			
22	2023-May-01	70	1.3	0.223	210			
23	2024-Apr-30	85	1.8	0.42	255			
24	2025-May-06	96	2.1	1.3	275			
25								
Coefficient of Variation:		0.26	2.15	0.63	0.34			
Mann-Kendall Statistic (S):		-121	-8	-8	115			
Confidence Factor:		99.9%	56.8%	57.7%	99.8%			
Concentration Trend:		Decreasing	No Trend	Stable	Increasing			



Notes:

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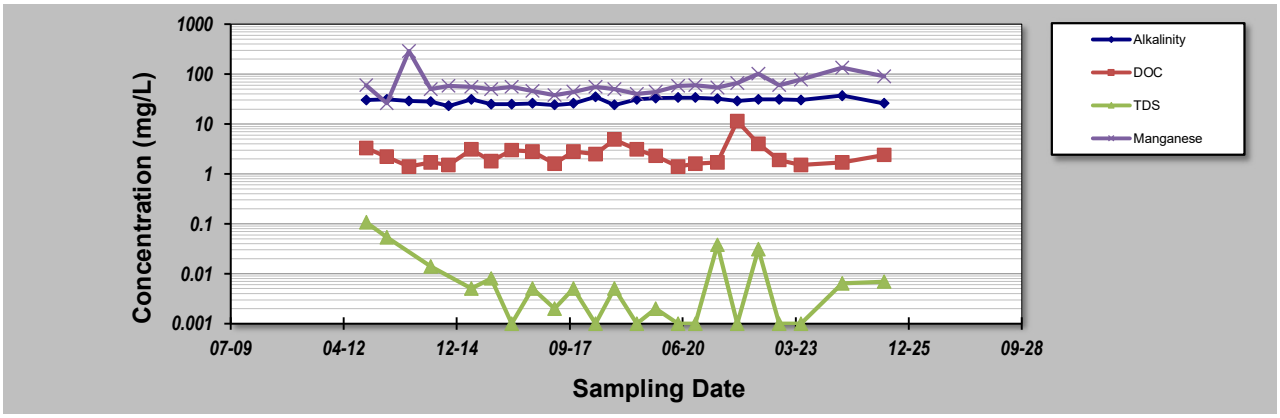
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL6-12
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL6-12 CONCENTRATION (mg/L)						
1	2012-Oct-17	30	3.3	0.107	60			
2	2013-Apr-17	31	2.2	0.054	26			
3	2013-Oct-29	29	1.4	-	290			
4	2014-May-12	28	1.7	0.014	50			
5	2014-Oct-15	23	1.5	-	58			
6	2015-May-05	31	3.1	0.005	56			
7	2015-Oct-27	25	1.8	0.008	50			
8	2016-Apr-27	25	3	0.001	56			
9	2016-Oct-27	26	2.8	0.005	46			
10	2017-May-11	24	1.6	0.002	38			
11	2017-Oct-24	26	2.8	0.005	44			
12	2018-May-08	35	2.5	0.001	56			
13	2018-Oct-23	24	4.9	0.005	50			
14	2019-May-08	31	3.1	0.001	40			
15	2019-Oct-22	33	2.3	0.002	44			
16	2020-May-07	34	1.4	0.001	58			
17	2020-Oct-07	34	1.6	0.001	60			
18	2021-Apr-21	32	1.7	0.038	54			
19	2021-Oct-14	29	11.5	0.001	66			
20	2022-Apr-20	31	4	0.031	102			
21	2022-Oct-19	31	1.9	0.001	60			
22	2023-May-01	30	1.5	0.001	78			
23	2024-Apr-30	37	1.7	0.0064	135			
24	2025-May-06	26	2.4	0.0069	90			
25								
Coefficient of Variation:		0.13	0.76	1.86	0.75			
Mann-Kendall Statistic (S):		58	-2	-62	85			
Confidence Factor:		92.1%	51.0%	95.8%	98.2%			
Concentration Trend:		Prob. Increasing	Stable	Decreasing	Increasing			



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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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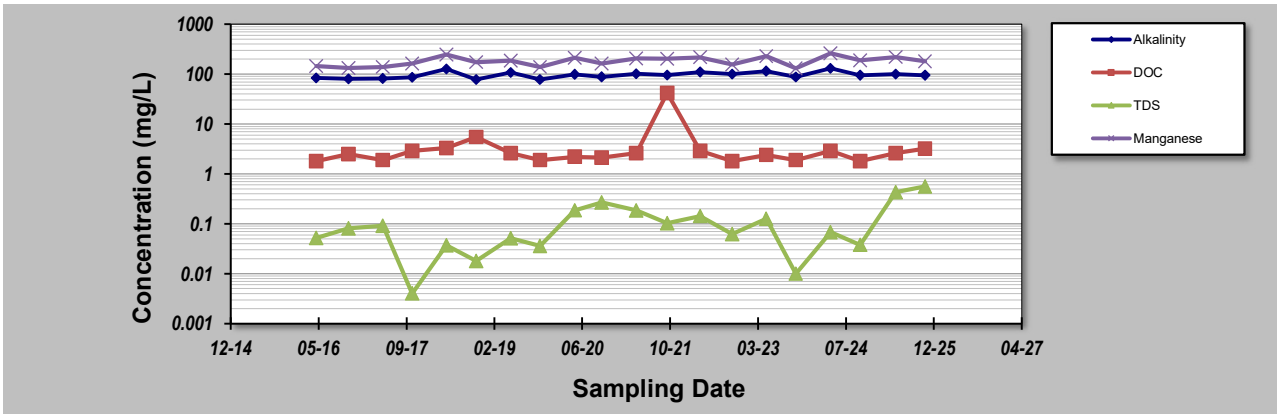
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL7-16
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL7-16 CONCENTRATION (mg/L)						
1	2016-Apr-27	84	1.8	0.052	146			
2	2016-Oct-27	80	2.5	0.081	132			
3	2017-May-11	82	1.9	0.092	140			
4	2017-Oct-24	86	2.9	0.004	164			
5	2018-May-08	127	3.3	0.037	248			
6	2018-Oct-23	78	5.5	0.018	174			
7	2019-May-08	108	2.6	0.051	186			
8	2019-Oct-22	78	1.9	0.036	140			
9	2020-May-07	99	2.2	0.187	214			
10	2020-Oct-07	88	2.1	0.268	164			
11	2021-Apr-21	101	2.6	0.185	206			
12	2021-Oct-14	96	41.8	0.103	204			
13	2022-Apr-20	110	2.9	0.143	218			
14	2022-Oct-19	100	1.8	0.062	156			
15	2023-May-01	115	2.4	0.126	230			
16	2023-Oct-16	87	1.9	0.01	130			
17	2024-Apr-30	130	2.9	0.068	260			
18	2024-Oct-17	95	1.8	0.038	190			
19	2025-May-06	100	2.6	0.43	220			
20	2025-Oct-20	95	3.2	0.56	180			
21								
22								
23								
24								
25								
Coefficient of Variation:		0.16	1.95	1.13	0.21			
Mann-Kendall Statistic (S):		57	10	48	58			
Confidence Factor:		96.6%	61.3%	93.6%	96.8%			
Concentration Trend:		Increasing	No Trend	Prob. Increasing	Increasing			



Notes:

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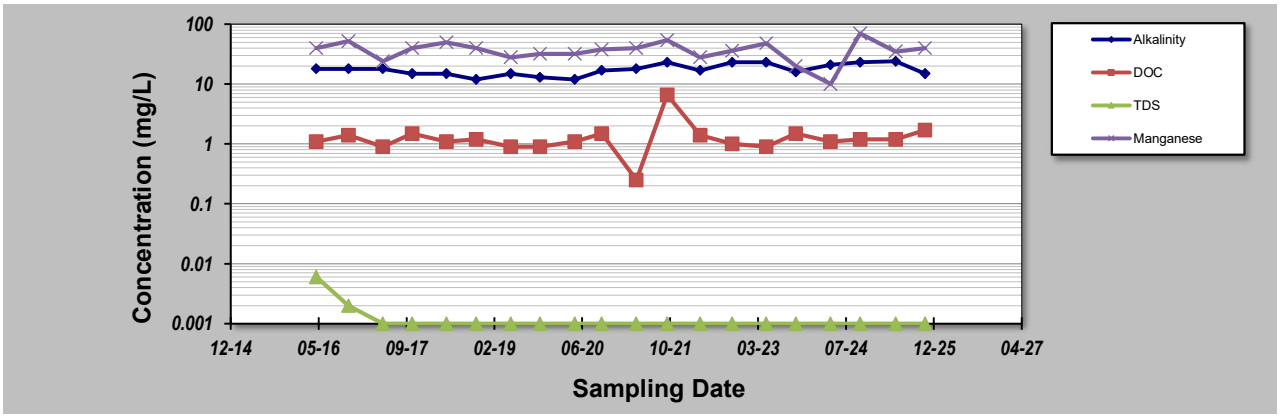
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL8-16
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL8-16 CONCENTRATION (mg/L)						
1	2016-Apr-27	18	1.1	0.006	40			
2	2016-Oct-27	18	1.4	0.002	52			
3	2017-May-11	18	0.9	0.001	24			
4	2017-Oct-24	15	1.5	0.001	40			
5	2018-May-08	15	1.1	0.001	50			
6	2018-Oct-23	12	1.2	0.001	40			
7	2019-May-08	15	0.9	0.001	28			
8	2019-Oct-22	13	0.9	0.001	32			
9	2020-May-07	12	1.1	0.001	32			
10	2020-Oct-07	17	1.5	0.001	38			
11	2021-Apr-21	18	0.25	0.001	40			
12	2021-Oct-14	23	6.6	0.001	54			
13	2022-Apr-20	17	1.4	0.001	28			
14	2022-Oct-19	23	1	0.001	36			
15	2023-May-01	23	0.9	0.001	48			
16	2023-Oct-16	16	1.5	0.001	20			
17	2024-Apr-30	21	1.1	0.001	10			
18	2024-Oct-17	23	1.2	0.001	70			
19	2025-May-06	24	1.2	0.001	35			
20	2025-Oct-20	15	1.7	0.001	40			
21								
22								
23								
24								
25								
Coefficient of Variation:		0.22	0.89	0.87	0.35			
Mann-Kendall Statistic (S):		50	27	-37	-14			
Confidence Factor:		94.4%	79.8%	87.7%	66.1%			
Concentration Trend:		Prob. Increasing	No Trend	Stable	Stable			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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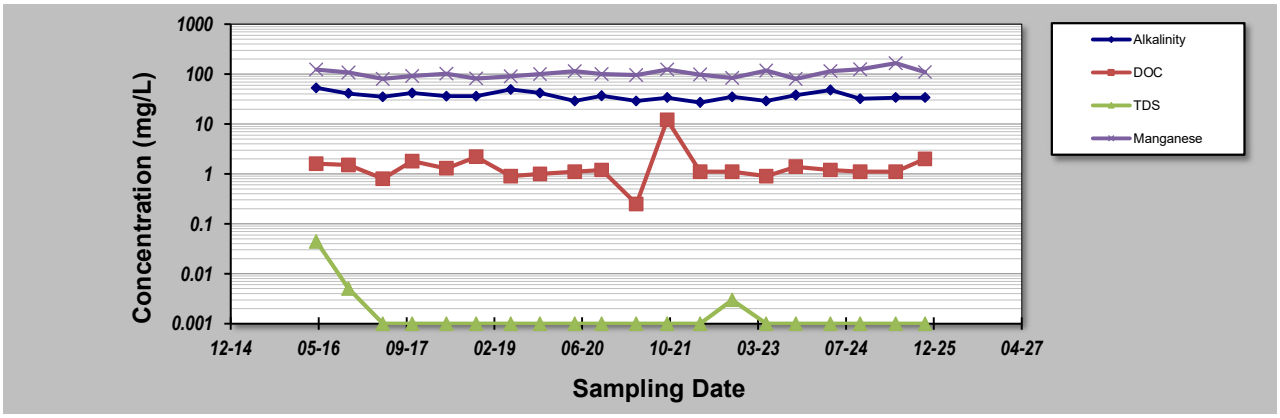
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Mar-25	Job ID:	250253-03
Facility Name:	Papineau Lake WDS	Constituent:	PL9-16
Conducted By:	Lhamilton	Concentration Units:	mg/L

Sampling Point ID:	Alkalinity	DOC	TDS	Manganese			
Sampling Event	Sampling Date	PL9-16 CONCENTRATION (mg/L)						
1	2016-Apr-27	53	1.6	0.044	124			
2	2016-Oct-27	41	1.5	0.005	108			
3	2017-May-11	35	0.8	0.001	80			
4	2017-Oct-24	42	1.8	0.001	92			
5	2018-May-08	36	1.3	0.001	102			
6	2018-Oct-23	36	2.2	0.001	82			
7	2019-May-08	49	0.9	0.001	90			
8	2019-Oct-22	42	1	0.001	100			
9	2020-May-07	29	1.1	0.001	114			
10	2020-Oct-07	37	1.2	0.001	100			
11	2021-Apr-21	29	0.25	0.001	96			
12	2021-Oct-14	34	12.1	0.001	124			
13	2022-Apr-20	27	1.1	0.001	98			
14	2022-Oct-19	35	1.1	0.003	84			
15	2023-May-01	29	0.9	0.001	118			
16	2023-Oct-16	38	1.4	0.001	80			
17	2024-Apr-30	48	1.2	0.001	115			
18	2024-Oct-17	32	1.1	0.001	125			
19	2025-May-06	34	1.1	0.001	165			
20	2025-Oct-20	34	2	0.001	110			
21								
22								
23								
24								
25								
Coefficient of Variation:		0.19	1.38	2.78	0.19			
Mann-Kendall Statistic (S):		-57	-8	-32	41			
Confidence Factor:		96.6%	58.9%	84.1%	90.2%			
Concentration Trend:		Decreasing	No Trend	No Trend	Prob. Increasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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Appendix G

Trigger Mechanisms and Contingency Plan

Papineau Lake Waste Disposal Site
Trigger Mechanisms
Approved December 2017, Revised November 2022

Objective and Background

The objective of the trigger mechanisms and contingency plan for the Papineau Lake Waste Disposal Site (WDS) is to identify the off-site migration of leachate impacted groundwater and ensure timely action to prevent and mitigate any adverse impacts to the environment.

Objective 1: Surface Water Impacts (Approved in November 2022)

To identify migration of leachate impacted groundwater discharging to adjacent surface water bodies and ensures timely action to prevent and mitigate any adverse impacts to the environment.

South, East and West Property Boundaries-Surface Water

- Assessment Points - PL7-16, PL8-16, PL9-16
- Trigger Parameters - Alkalinity, Boron, Chloride, Iron, Manganese, Sulphate, and Un-ionized Ammonia
- Frequency-Sampling twice per year (Spring and Fall)
- Contingency Plan is activated if: two (2) or more of the trigger parameters are above criteria for two (2) consecutive sampling events.

Table 1: SW Trigger Values for Select Parameters

Chemical Parameter	Trigger Description	Concentration mg/L
Alkalinity	1.5 x Maximum Concentration at PL7-16	190.5
Boron	1.5 x Maximum Concentration at PL7-16	0.351
Chloride	1.5 x Maximum Concentration at PL7-16	64.05
Iron	1.5 x PWQO	0.45
Manganese	1.5 x Maximum Concentration at PL7-16	0.402
Sulphate	1.5 x Maximum Concentration at PL7-16	68.55
Unionized Ammonia	1.5 x PWQO	0.03

Objective 2: Groundwater Impacts (Approved in December 2017)

South, East and West Property Boundaries-Groundwater

- Assessment Points - PL7-16, PL8-16, PL9-16
- Trigger Parameters - Alkalinity (Upper Limit), DOC, Iron, Manganese, and TDS
- Frequency-Sampling twice per year (Spring and Fall)
- Contingency Plan is activated if: 75% of RUV's are exceeded for three (3) parameters at two assessment points for two (2) consecutive sampling events.

Table 2: GW Trigger Values for Select Parameters

Parameter	RUV mg/L	Trigger Value 75% of RUV mg/L
Alkalinity(Upper Limit)	263	197
DOC	3.1	2.3
Iron	0.165	0.124
Manganese	0.030	0.023
TDS	274.25	206

The RUVs are calculated using the median background concentration locations (PL3-06) chemical parameters based on the sampling results from May 2006 to Fall 2017(26 results)

Papineau Lake Waste Disposal Site – Contingency Plan

Tier 1: If the triggers are exceeded, a repeat sampling will be conducted within one (1) month to confirm or refute the results at the assessment points which have been triggered.

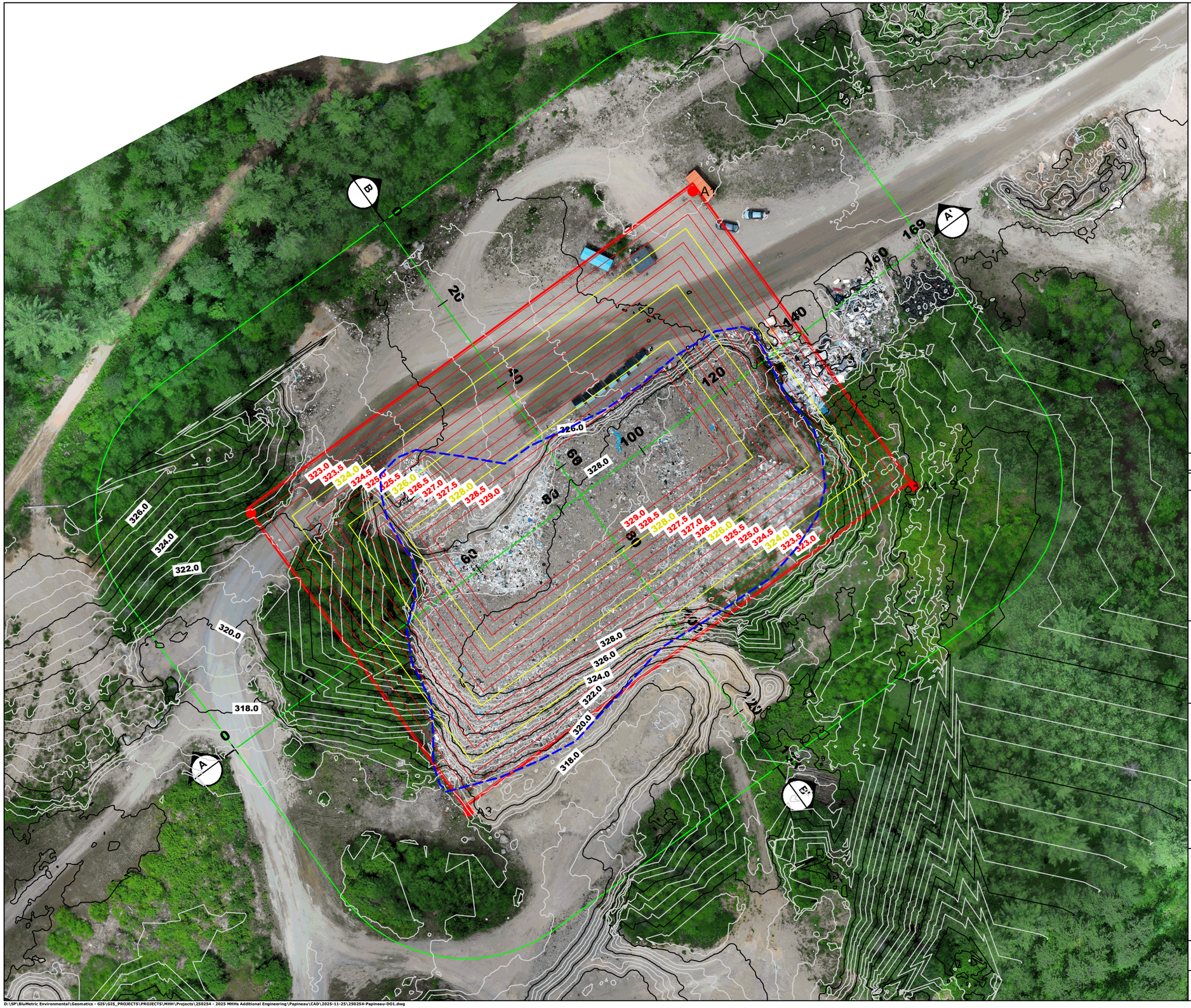
Tier 2: If the exceedance is confirmed through Tier 1, additional sampling then one or more of the following measures may be implemented depending on the nature of the trigger activation:

- Increase monitoring frequency to twice monthly, for four months (at the assessment points which have been triggered), if exceedances continue. Revert back to semi-annual sampling if there are two consecutive sampling results that do not show exceedances.
- Identification of other potential causes for elevated concentrations through additional studies.

Tier 3: If the increased sampling indicates a continuing issue resulting in impacts or potential significant impacts to the environment, then mitigation/remediation measures will be implemented to prevent further impact. These measures would be aimed at intercepting or diverting the impacted groundwater before it reaches a receptor. The specifics of the plan will be dependent on the nature of the impact. Additional monitoring wells will be installed approximately 100 m downgradient of the assessment points that show exceedances of the Tier 2 Contingency Plan measures.

Appendix H

Capacity Calculations and 2010 Design & Operations Figures



LEGEND

- Approved Landfill Area
- 30 m Fire Break Buffer
- Current Extent of Waste Material
- Elevation Contour - 0.5 masl (June 2024)
- Elevation Contour 2.0 masl (June 2024)
- Design Elevation Contour - 0.5 masl (Top of Waste)
- Design Elevation Contour 2.0 masl (Top of Waste)

Inside Waste Outline
Cut: 5,268 m³
Fill: 3,992 m³
NetFill: -1,267 m³

Outside Waste Outline
Cut: 4,250 m³
Fill: 2,114 m³

Notes:
2024 elevation contours and ortohimagery were collected by an RPAS Survey - 2024-05-03

2008 elevation surface have been shifted down by 0.25 m to match the 2024 elevation surface along the access road, where the elevation should not have changed.

Design elevation surface has been shifted down by 0.6 m because the original surface is assumed to be the defined top of intermediate cover.

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

PROPRIETARY INFORMATION MAY NOT BE REPRODUCED OR DIVULGED WITHOUT PRIOR WRITTEN CONSENT OF BLUMETRIC ENVIRONMENTAL INC. DO NOT SCALE DRAWING. THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

0 15 30 Metres
1:750

N W E S

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS - Capacity Review

TITLE

Design Capacity based on Scenario 1 (2010 D&O Fig 4)

BluMetric Environmental
1682 Woodward Drive
Ottawa, Ontario, K2C 3R8
TEL: (613) 839-3053
FAX: (613) 839-5376
Email: info@blumetric.ca
Web: http://www.blumetric.ca

DRAWN	CHECKED
GM	LH

PROJECT #	DATE	DWG NO.	REV
250254	October 2, 2025	A	0

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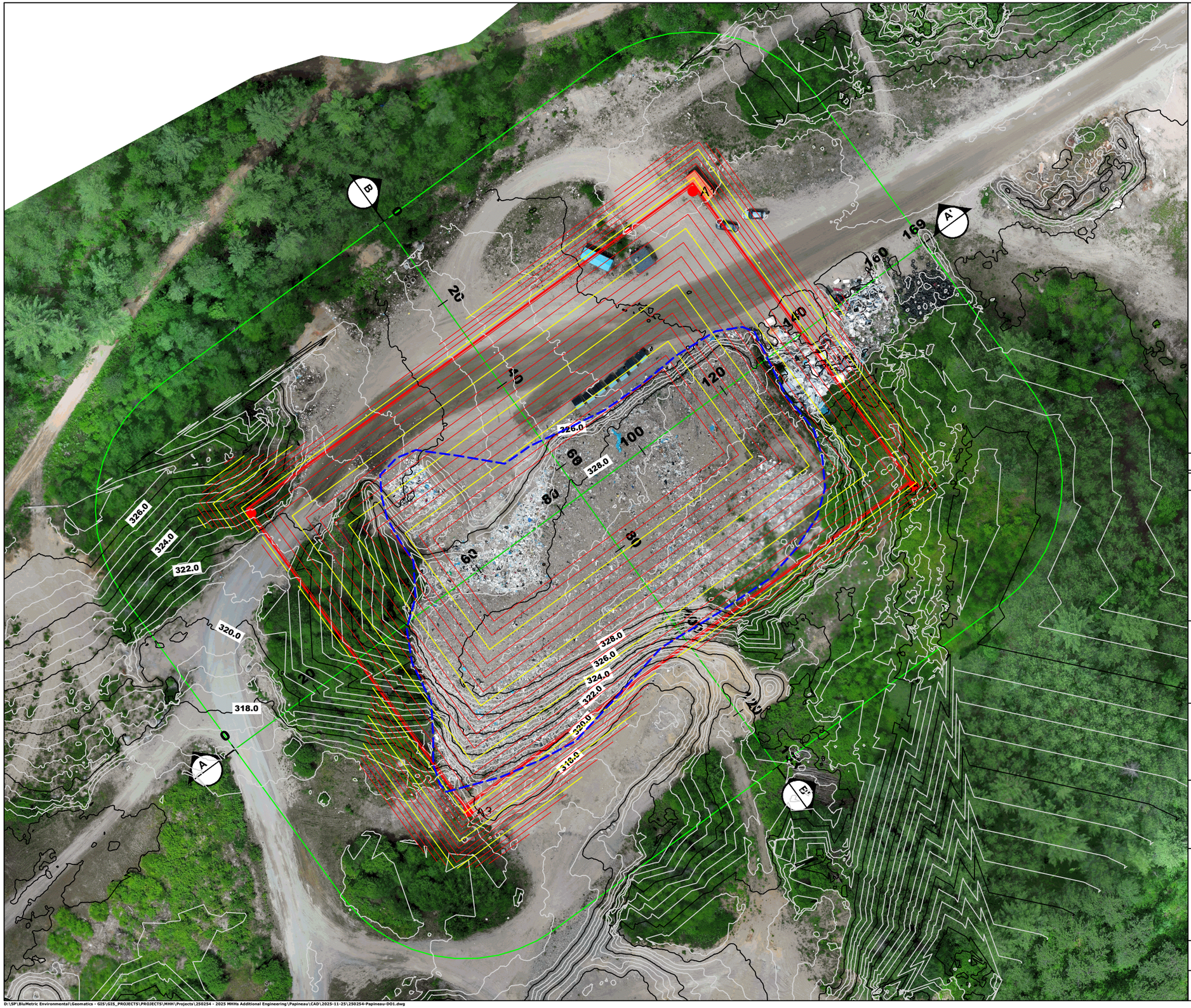

LEGEND

- Approved Landfill Area
- 30 m Fire Break Buffer
- Current Extent of Waste Material
- Elevation Contour - 0.5 masl (June 2024)
- Elevation Contour 2.0 masl (June 2024)
- Design Elevation Contour - 0.5 masl (Top of Waste)
- Design Elevation Contour 2.0 masl (Top of Waste)

Inside Waste Outline
Cut: 5,268 m³
Fill: 4,093 m³
NetFill: -1,175 m³

Outside Waste Outline
Cut: 12,013 m³
Fill: 3,675 m³

Notes:
2024 elevation contours and ortohimagery were collected by an RPAS Survey - 2024-05-03

2008 elevation surface have been shifted down by 0.25 m to match the 2024 elevation surface along the access road, where the elevation should not have changed.

Design elevation surface has been shifted down by 0.6 m because the original surface is assumed to be the defined top of intermediate cover.

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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0 15 30 Metres
1:750

N W E S

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS - Capacity Review

TITLE

Design Capacity based on Scenario 2 (2010 D&O Fig 5)

1682 Woodward Drive
Ottawa, Ontario, K2C 3R8
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FAX: (613) 839-5376
Email: info@blumetric.ca
Web: http://www.blumetric.ca

DRAWN	CHECKED
GM	LH

PROJECT #	DATE	DWG NO.	REV
250254	October 2, 2025	B	0

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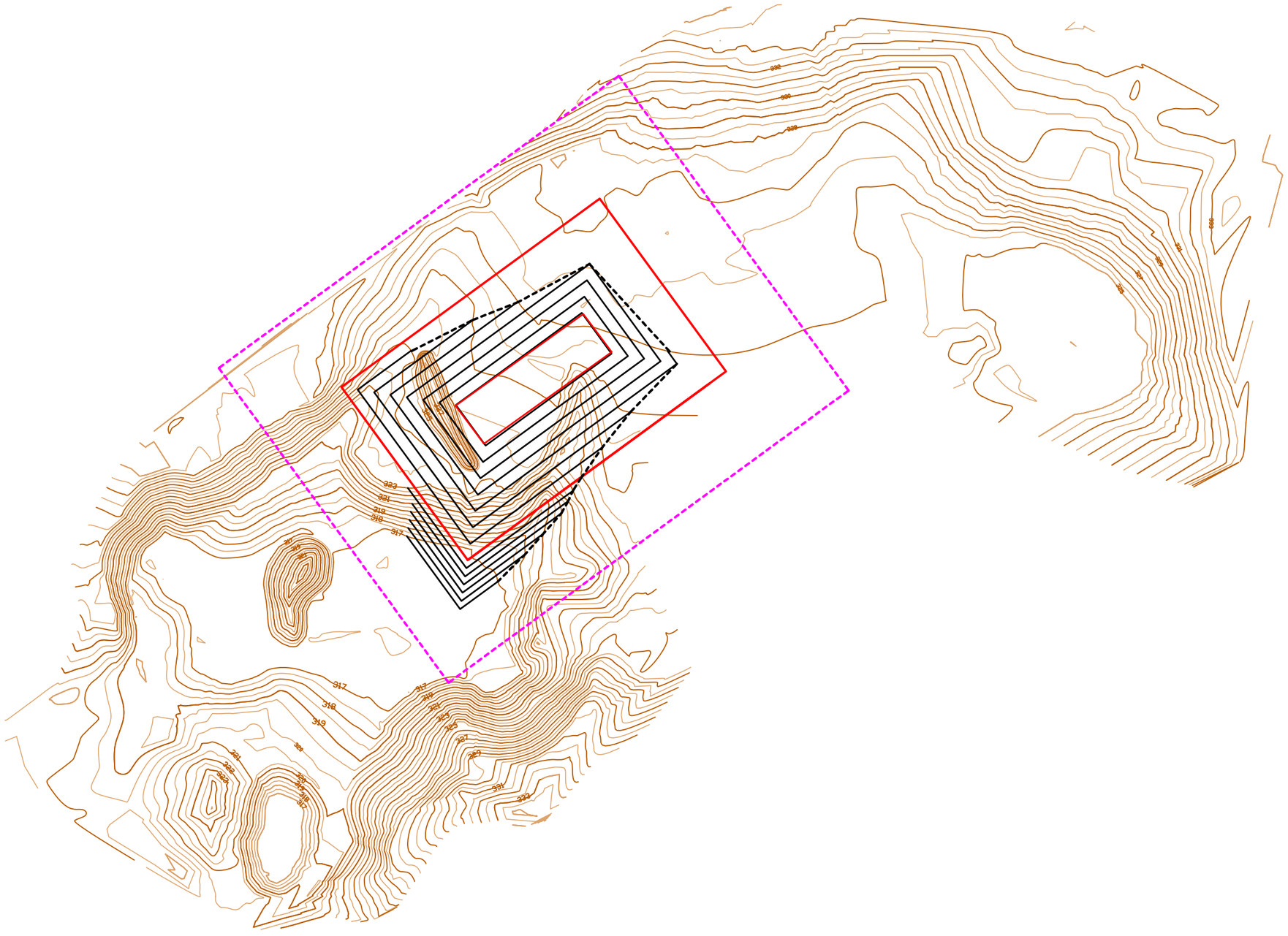

LEGEND

TREE LINE

ROADWAY

289 CONTOUR (masl)

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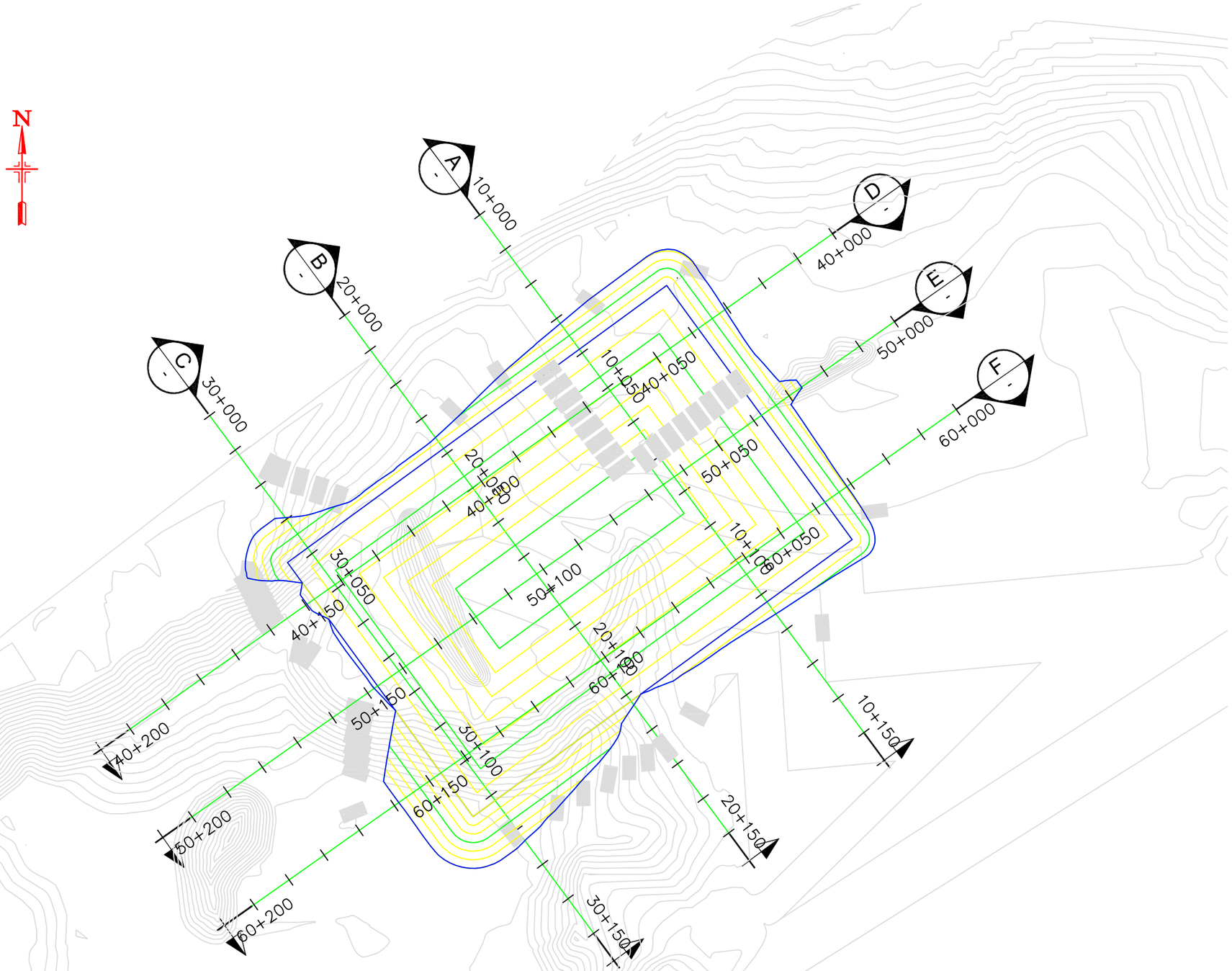
DATE: 11 OCT. 2007	CHECKED BY: A.A.	
SCALE: 1 / 1500	CAD FILE NO.: B5082-PAP-SP-AUGO	

FIGURE: 4

FINAL CONTOURS

PAPINEAU WASTE DISPOSAL SITE
TOWNSHIP OF HASTINGS HIGHLANDS

WESA
A Better Environment For Business



PLAN

1:1000

LEGEND

Volume Analysis

Volumes between 323 plan and EG
Scenario 1
– vertical from 323 to existing ground (see elevation table on plan view)
cut: 15920 m3
fill: 1631 m3

Scenario 2
– from 323 to existing ground with 2:1 slope
cut: 18156 m3
fill: 3447 m3

New mound volume, from 323 to 330
27568 m3

PROJECT NUMBER: B5082	DRAWN BY: S.G.	DESIGNED BY: A.A.
DATE: 11 SEPTEMBER 2007	CHECKED BY: A.A.	
SCALE: AS SHOWN	CAD FILE NO.: B5082–12 VA.dwg	

FIGURE 5:

Volume Calculation Section Lines

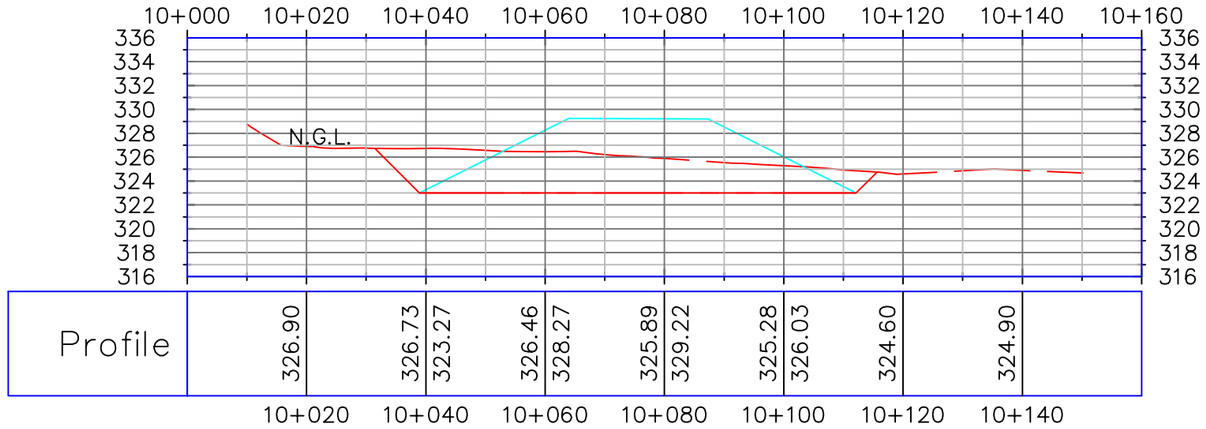
PAPINEAU WASTE DISPOSAL SITE
TOWNSHIP OF HASTINGS HIGHLANDS

WESA
A Better Environment For Business

A

Section

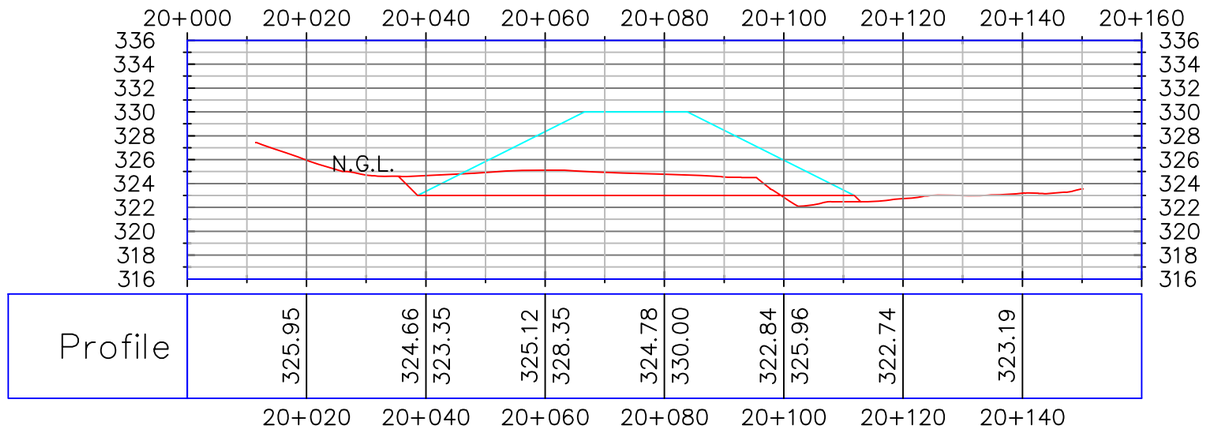
1:1000H / 1:500V



B

Section

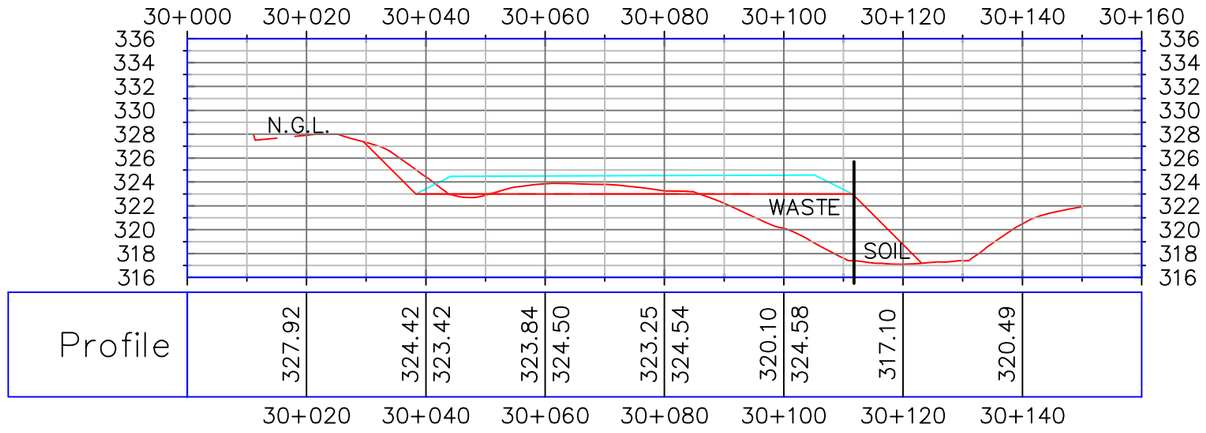
1:1000H / 1:500V



C

Section

1:1000H / 1:500V



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DATE: 16 OCTOBER 2007	CHECKED BY: A.A.	
SCALE: AS SHOWN	CAD FILE NO.: B5082-12 VA.dwg	

FIGURE: 6

Sections A, B, and C

PAPINEAU WASTE DISPOSAL SITE
TOWNSHIP OF HASTINGS HIGHLANDS

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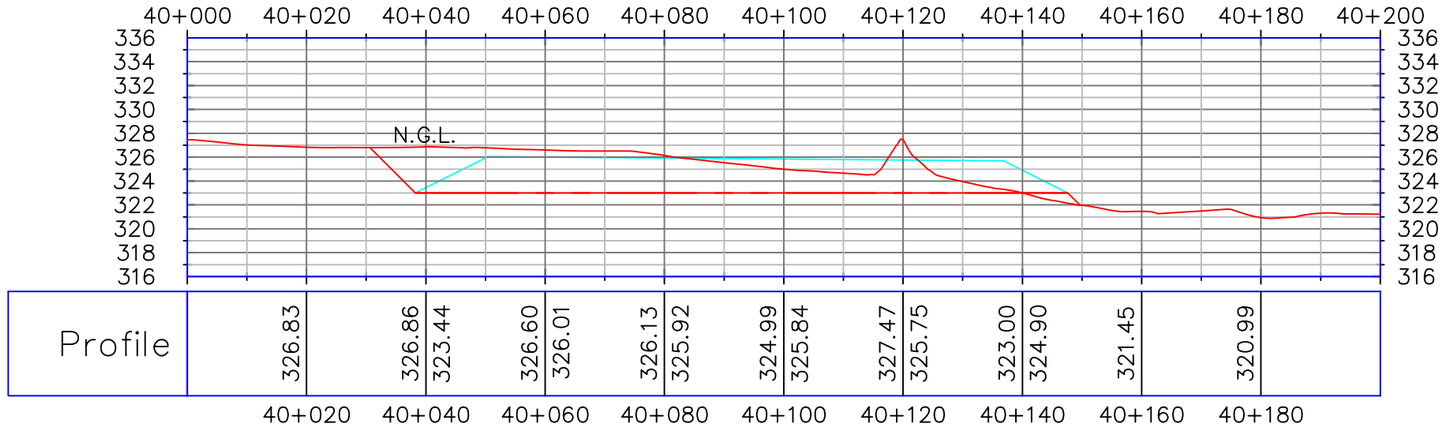
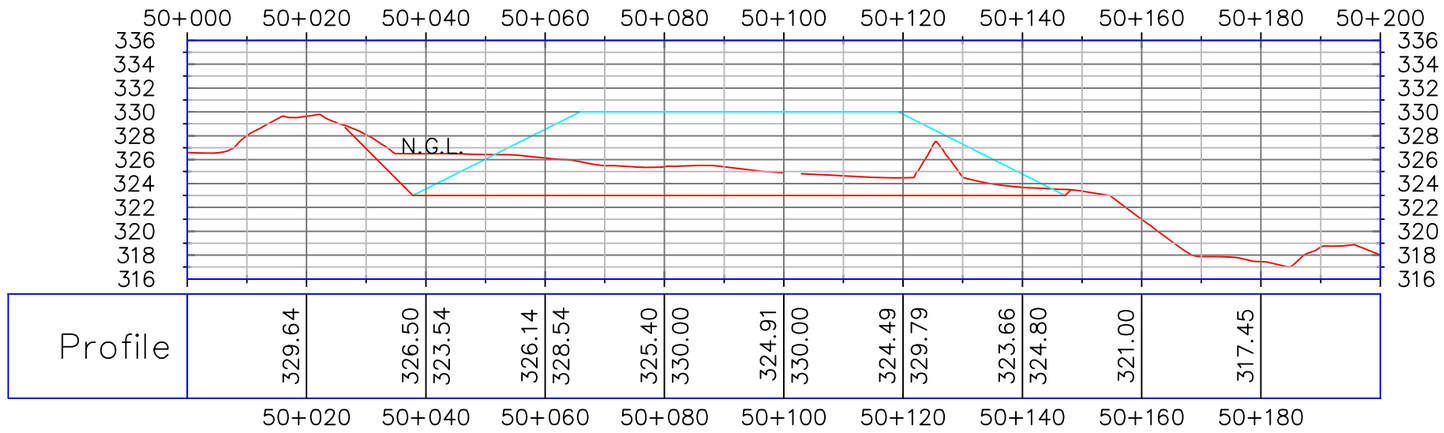
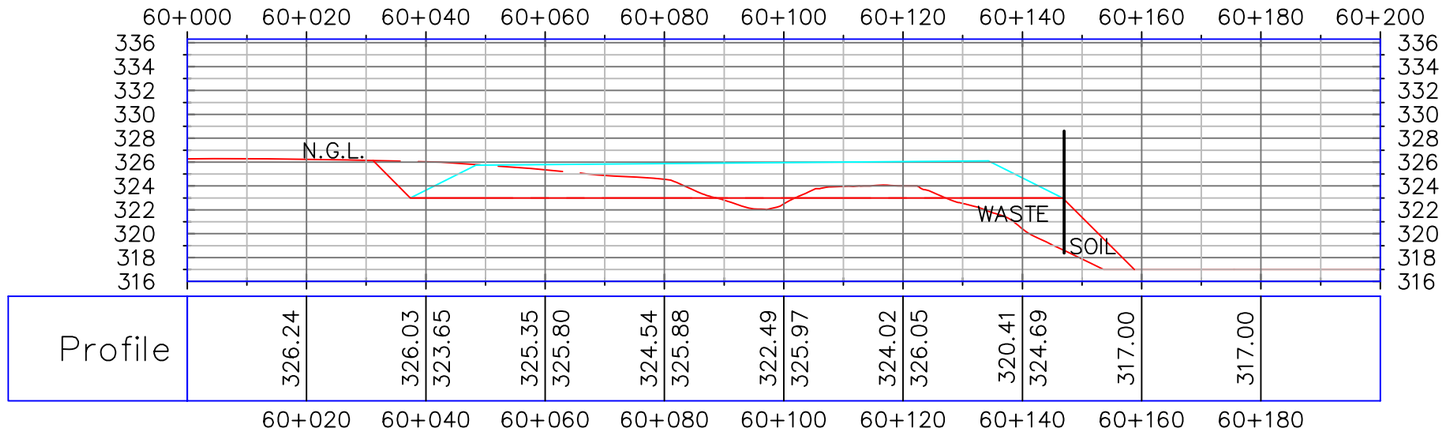
Section D
1:1000H / 1:500V



Section E
1:1000H / 1:500V



Section F
1:1000H / 1:500V



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DATE: 11 SEPTEMBER 2007	CHECKED BY: A.A.	
SCALE: AS SHOWN	CAD FILE NO.: B5082-12 VA.dwg	

FIGURE: 7

Sections D, E, and F

PAPINEAU WASTE DISPOSAL SITE
TOWNSHIP OF HASTINGS HIGHLANDS

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