2024 Annual Monitoring Report
Papineau Lake Waste Disposal Site
Environmental Compliance Approval
No. A361105

Prepared for:

The Corporation of the Municipality of Hastings Highlands
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BluMetric.ca

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(Provided on USB Drive for Hard Copy)

1 Introduction

BluMetric Environmental Inc. (BluMetric®) was retained by The Municipality of Hastings Highlands (MHHs or Municipality) to conduct the 2024 environmental monitoring and sampling program and prepare the 2024 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, 2024. 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 2024.

In November 2022, the MECP approved the revised trigger mechanism and contingency plan presented in the previous annual monitoring report. This is discussed in Section 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 2024.

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 (2023), 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)**.

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 ext. 233	dstewart@hastingshighlands.ca
CEP	Senior Environmental Engineer, BluMetric – S'rana Scholes, P.Eng.	209 Frederick Street, Kitchener, ON N2H 2M7	(877) 487-8436 ext. 218	sscholes@blumetric.ca

1.3 Description and Development of the WDS

The Site has a total area of approximately 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 Site includes the 0.8 ha waste footprint within a total site area of 7.3 ha. This amendment updated the site operating hours, identified a restriction on the volume of industrial, commercial, and institutional waste per day, accepted the trigger mechanisms and contingency plan, which was further revised by email correspondence in 2022, and had given the Municipality until January 5, 2021, to obtain the easement rights for the CAZ for the Site.

The Municipality has contacted the Ministry of Natural Resources (MNR) regarding obtaining the easement rights. It is our understanding the Municipality needs to amend the adjacent Aggregate Resources Permit to proceed with obtaining the CAZ areas. The Municipality moved forward with work to amend the Aggregate Resource Permit in 2019 and 2020. We understand the Aggregate Resource Permit is currently under review by MNR.

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 waste disposal site. The monitoring and reporting program has been developed with these objectives in mind. In addition, the monitoring and reporting program are designed to adhere to the MECP's WDS-Technical Guidance and the ECA for the Site.

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 April 30, and October 17, 2024. In general, the site was in good condition. The detailed site checklists are provided in **Appendix D (D1)**.

In the spring, it was noted that the designated waste area was not covered. It was also noted that interim cover should be placed on top of areas where excavated fill beyond approved limits (FBAL) waste was placed during 2023.

In the fall, it was noted that blown plastics were present over most of the site.

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

Groundwater monitoring wells PL1-06, PL2-06, and PL3-06 were drilled and installed in 2006. Monitors were installed to depths of 5.18 m below ground surface (mbgs), 9.91 mbgs and 12.95 mbgs, respectively, with each well screening a water-bearing medium grained sand and gravel unit. Three additional groundwater monitoring wells were drilled and installed in October 2012 to fulfill a MECP request (MOE, 2011). Monitoring wells PL4-12, PL5-12, 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.

The MECP requested that additional monitoring wells be installed to better characterize groundwater flow direction, downgradient groundwater quality and to determine leachate quality. 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, in 2016. The wells were drilled to meet the above objectives, as well as to determine the requirements for a 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 description 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, *Coordinates for wells PL3 through PL6 were not updated during the 2016 Survey.

Groundwater samples were collected on April 30 and October 17, 2024. 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, 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

Note: * Mercury analysis was missed during the 2024 monitoring period.

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

During the 2024 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 TOC (masl)	Elevation TPVC (masl)	Depth 30-Apr-24 (mbtoc)	Depth 17-Oct-24 (mbtoc)	Groundwater Elevation 30-Apr-24	Groundwater Elevation 17-Oct-24
PL1-06	318.32	317.78	1.435	1.21	316.885	316.57
PL2-06	325.56	324.81	8.485	8.24	317.075	316.57
PL3-06	326.27	325.75	8.83	8.65	317.44	317.10
PL4-12	318.18	317.68	1.38	1.23	316.80	316.45
PL5-12	325.77	325.23	10.71	11.775	315.06	313.455
PL6-12	327.05	326.65	6.33	6.655	320.72	319.995
PL7-16	324.16	323.62	7.46	7.39	316.70	316.23
PL8-16	320.35	319.64	3.26	3.22	317.09	316.42
PL9-16	326.60	326.04	9.65	9.54	316.95	316.50

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

Depths measured in metres (m) below top of casing (TOC).

3.2.1.2 Groundwater Gradients and Flow Direction

The horizontal hydraulic gradient was calculated to be in the range of 0.0026 to 0.0077 m/m based on the April 30, 2024, groundwater elevation data. The horizontal hydraulic gradient was calculated to be 0.0013 to 0.0031 m/m using the October 17, 2024, groundwater elevation data. Based on the 2024 data, groundwater is inferred to flow in a southern direction from PL5-12, in a southwesterly direction from PL3-06 and from the west in a southeasterly direction from PL8-16, converging towards PL7-16 at the south of the Site. This is consistent with historic data.

The 2024 groundwater elevations data and contours are provided on Figure 04 for the spring data and Figure 05 for the fall data. Vertical hydraulic gradients cannot currently be determined as there are no “nested” monitoring wells on Site and there are no monitoring wells adjacent to a surface water body.

3.2.2 Surface Water Monitoring

Surface water monitoring is not specifically required at the Papineau Lake WDS. The MECP recommended that ponding water no longer be sampled (as it is not flowing away from the Site). No surface water samples were collected during either of the 2024 sampling events. For information purposes only, 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 F**.

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 indicated there was no evidence of surface water flowing off site in 2024, 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 2024. 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 April 30, 2024, and October 17, 2024, 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 field pH values of 5.69 to 6.47 were recorded in the spring and of 6.16 to 7.84 were recorded during the fall sampling event, which are generally below the acceptable range of ODWSOG criteria. Conductivity values from 15 to 620 µS/cm were recorded during the spring event and from 58 to 658 µS/cm during the fall event.

The summary of the 2024 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	Iron, manganese
PL3-06 (background)	Alkalinity (below lower criterion)
*PL4-12	Manganese
*PL5-12	Iron, manganese
*PL6-12	N/A
PL7-16	Manganese (spring)
PL8-16	Alkalinity (below lower criterion)
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 2023 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	30	0.5	26.5
Alkalinity as $CaCO_3$ - Upper	23	500	0.5	261.5
Chloride	5	250	0.5	127.5
Dissolved Organic Carbon	1.0	5	0.5	3.0
N-NO_3 (Nitrate)	0.295	10	0.25	2.7
pH - Lower	6.93	6.5	0.5	6.7
pH - Upper	6.93	8.5	0.5	7.7
Sulphate	3.61	500	0.5	251.8
TDS (COND - CALC)	54	500	0.5	277.0
Sodium	1.97	20	0.5	101.0
Aluminum	0.01	0.1	0.5	0.1
Barium	0.006	1	0.25	0.3
Boron	0.0115	5	0.25	1.3
Copper	0.001	1	0.5	0.5
Iron	0.06	0.3	0.5	0.1525
Lead	0.06	0.01	0.25	0.0029
Manganese	0.09	0.05	0.5	0.0255
Zinc	0.01	5	0.5	2.5

Note: RUVs for arsenic, nitrite, cadmium, and chromium were not calculated as all groundwater results have been reported below the laboratory detection limit

Parameters from the 2024 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, pH (spring), TDS, manganese
*PL2-06	DOC, TDS, iron, manganese
PL3-06 (background)	Alkalinity (below lower criterion)
*PL4-12	pH, TDS, manganese
*PL5-12	iron, manganese
*PL6-12	N/A
PL7-16	Manganese
PL8-16	Alkalinity (below lower criterion)
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 2024 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, boron (fall)
*PL2-06	Total phosphorus, iron, boron
PL3-06 (background)	Total phosphorus
*PL4-12	Total phosphorus
*PL5-12	Total phosphorus, iron
*PL6-12	Total phosphorus
PL7-16	Boron (spring)
PL8-16	N/A
PL9-16	Total phosphorus

Notes:
PWQOs available for pH, phenols, copper, boron, total phosphorus, iron, arsenic, lead, cadmium, and alkalinity only.
- 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.

4.2 Landfill Gas Concentrations

Table 9 presents the 2024 gas monitoring results which ranged from 0 to 55 ppm for the spring event and from 0 to 70 ppm in the fall event.

Table 9: Combustible Gas Monitoring Results

Monitoring Location	RKI Reading (ppm) 30-Apr-2024	RKI Reading (ppm) 17-Oct-2024
Attendant's Building	0	0
PL1-06	0	0
PL2-06	0	0
PL3-06 (background)	0	0
PL4-12	5	10
PL5-12	55	70
PL6-12	0	5
PL7-16	0	0
PL8-16	0	0
PL9-16	0	0

4.3 QA/QC Results

One groundwater duplicate sample was collected during each sampling event in 2024. 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. Water quality results fell below the lower limit of the RUV criterion alkalinity in both the spring and fall sampling events. Low alkalinity values are typical in the region.

Monitoring well PL6-12 is not representative of background groundwater quality but is located upgradient of the landfill.

Leachate Monitoring Wells

Monitoring wells PL2-06, PL4-12, and PL5-12 are considered representative of leachate water quality. Each of these sites were sampled during the spring sampling event but not the fall sampling event. Groundwater quality at PL2-06 exceeded the ODWSOG and RUV criteria iron and manganese, as well as DOC and TDS exceedances of RUV. Monitoring well PL4-12 exceeded ODWSOG and RUV criteria for manganese, as well as the RUV criteria for TDS and the upper criterion limit of the RUV criterion for pH. Groundwater quality at PL5-12 exceeded the ODWSOG and RUV criteria for iron and manganese.

Concentrations of alkalinity, boron, barium, chloride, conductivity, TDS, sulphate, calcium, potassium, and magnesium are also elevated when compared to the background and non-impacted wells.

Downgradient Monitoring Wells

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

Downgradient monitoring wells PL1-06 and PL7-16 are considered impacted by leachate. PL8-16 exceeded RUV for alkalinity, as did the upgradient water quality, and PL9-16 yielded no RUV exceedances during the 2024 sampling. PL8-18 and PL9-16 are therefore not interpretated to be impacted by the WDS.

Based on the 2024 groundwater results, the Site does not comply with Guideline B-7-1 along the downgradient property line. As mentioned previously, the Municipality is in the process of obtaining the easement rights for the CAZ from the Crown to bring the Site into 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 (total phosphorus, copper, boron, and iron) exceeded the PWQO criteria during 2024. 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. No upwards trends were observed for those parameters at any sampling location.

Boron exceeded the PWQO criteria at PL1-06, PL2-06, and PL7-16, but concentrations remain stable. While boron did not exceed the PWQO criteria at PL4-12, a slight upwards trend is apparent from 2017 to 2024. 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. A downwards trend in boron concentrations is observed at location PL9-16.

Historical Groundwater Data

Historical groundwater quality results from 2006 through 2024 are presented in **Appendix E**. Select trend graphs are presented following the photographs at the end of the text. The following trends are illustrated by the graphs:

- Alkalinity concentrations have been showing an upward trend at PL1-06 and PL2-06 since 2010, with a notable increase since 2015 at PL2-06. Both locations have generally remained within the RUV upper and lower limits, however PL2-06 exceeded the upper limit during the spring 2017, spring 2019 and spring 2023 sampling events. An upward trend has also been observed at PL4-12 since 2017.
- DOC concentrations have also been showing an upward trend at PL2-06, with a notable increase since 2015. DOC concentrations were above the ODWSOG/RUV criteria at PL2-06 for sampling events in 2019 to 2023 (and exceeded the RUV but not the ODWSOG in 2024). BluMetric and the MECP consider the elevated fall 2021 DOC concentrations at all locations to be anomalous.
- Manganese concentrations at PL1-06 appear to be trending upwards. Manganese concentrations at PL2-06 demonstrate a large increase from 2015 to 2017. A downwards trend is observed since 2017, but results remain very elevated compared to those reported prior to 2015.
- TDS concentrations at PL1-06, PL2-06 (spring) and PL4-12 (spring) were above the RUV limit in 2024. Historic concentrations of TDS are showing an upward trend at PL1-06, PL2-06 and PL4-12.

- Alkalinity, DOC, manganese, and TDS concentrations are elevated in CAZ boundary wells PL7-16, and PL9-16, while PL8-16 is quite often at or below the background concentrations. PL7-16 directly south of the waste mound and is showing the most noticeable elevation in concentrations.

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. Groundwater elevation data should continue to be collected from all wells during both semi-annual sampling events.

5.2 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 2024 did not trigger the Tier 1 Contingency Plan response for surface water and groundwater.

5.3 Landfill Gas Assessment

The gas readings collected in the Attendant's building and monitoring wells ranged from 0 to 70 ppm in 2024. 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 2023 and 2024, 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 2024, it is estimated that 18.9% of waste, excluding the segregated materials discussed in Section 6.2.1, was diverted from the landfill by recycling.

The 2024 residential/commercial waste calculations are based on bag counts at the waste site. There were 12,341 bags deposited at the Papineau Lake WDS in 2024. 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
2023									
6.8	26.7	10.8	39.5	17.0	65.4	9.2	36.9	43.8	168.6
2024									
7.3	29.8	11.2	47.6	16.7	69.9	7.8	37.8	43.1	185.1

Based on these reported quantities, the mass of recyclables collected in 2024 is approximately 0.7% less than collected in 2023. The amount of waste received has increased by 16.5% since 2023.

6.1.1 Annual Segregated Materials Removed Summary

Segregated materials are collected at each of the nine waste disposal sites in Hastings Highlands. In 2024, a total of 21.01 tonnes of scrap metal, 52.04 tonnes of bulky waste, 2.99 tonnes of electrical and electronic waste, and 52 tires was collected from the site.

Household hazardous wastes are not collected at the Papineau Lake WDS. The Municipality however does ensure batteries left at the WDS are disposed of properly.

Battery quantities were not tracked by site, but a total of 975 kg was received at all nine sites.

6.2 Annual Complaints & Emergency Situations Summary

There were no documented complaints for rejected waste at the Papineau Lake WDS and there were no emergency situations in 2024.

6.3 Capacity

As of January 2010, the reported remaining volumetric capacity for the Papineau Lake WDS was 13,600 m^3 (Section 7(4) of the ECA-**Appendix A (A1)**). The final volume included waste, daily cover, and intermediate cover, but excluded final cover. Volumetric surveys providing an updated estimate of the remaining capacity of the Site were conducted in the fall of 2015, and summer of 2020, 2023, and 2024. Cambium Inc. had identified in 2013 that Papineau Lake WDS was in a Fill Beyond Approved Limit (FBAL) status. Although the WDS was within the volumetric approved capacity, some waste was noted to be placed outside the existing WDS landfilling limits. An excavation was conducted in fall 2023 to remove FBAL and place all fill within the approved boundaries. The site was resurveyed on June 3, 2024, to provide an updated capacity reflective of the FBAL.

Based on the January 2010 remaining capacity and June 3, 2024, survey, it was noted that the Site was over capacity limits by 3,411 m^3 for waste, daily cover, and intermediate cover, as shown on Figure 06. The volume of waste received from June 3 to December 31 was approximately 124.67 tonnes. Based on a compaction density assumption of 500 kg/m3, this would mean the Site is over capacity by 3,660 m^3 as of December 31, 2024.

However, a review of historical data including the Development and Operations (D&O) Plan (WESA, 2010) identify a number of discrepancies in the design and remaining capacity identified in 2010. These include the following key preliminary findings:

1. Discrepancies in the design footprint and contours are noted within the different figures presented in the D&O Plan (WESA, 2010);
2. The net fill presented in the figures and the text of the D&O Plan (WESA, 2010) are different from each other; and
3. The design footprint extends into the access road and top of waste contours are at times below the ground surface.

The Municipality is currently verifying these findings and the impact on the remaining capacity at the Site. Once verified, the intention is to propose a re-design that may include the following:

1. Waste fill area will be located within the approved 0.8 ha footprint;
2. Access road will be relocated;

3. A maximum waste slope of 4H:1V and a minimum slope of 20H:1V;
4. Top of waste shall not exceed 330 masl; and,
5. Outer limit of waste contours will meet existing ground surface as of 2024.

As such, despite the current data suggesting the site is at capacity, the above noted items suggested that there is remaining capacity at the landfill and further communication with the MECP is pending.

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 2024 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 and continues. The surrendering of the aggregate permit rights for the CAZ lands must be completed first before the CAZ easement can be granted. The MNR is currently reviewing the aggregate permit surrender application.
- Based on the 2010 D&O Plan (WESA, 2010) and the 2024 survey, the landfill is currently beyond capacity. However as noted in Section 6.3, the Municipality is reviewing some key preliminary findings that suggest the remaining capacity in 2010 was not correct and the Site can continue to accept waste. It is recommended that a re-design is considered with approval from the MECP.
- Survey stakes should continue to be utilized to ensure that waste is placed within the proper footprint;
- 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.
- Monitoring wells PL1-06, PL8-16, PL9-16, and PL7-16 are located downgradient of the WDS and are adjacent to or outside of the 7.3 ha total site area.
- Based on the 2024 groundwater results, the Site does not comply with Guideline B-7-1 along the downgradient property line. As mentioned previously, the Municipality is in the process of obtaining the easement rights for the CAZ from the Crown to bring the Site into compliance.
- Four parameters (total phosphorus, copper, boron, and iron) exceeded the PWQO criteria during 2024. Exceedances associated with total phosphorus, copper, and iron are attributed to natural variation in water quality.
- A slight upwards trend in boron concentrations is apparent from 2017 to 2024 at PL4-12. Continued monitoring is required to assess this trend. A downwards trend in boron concentrations is observed at location PL9-16.

7.3 Surface Water

- As of 2022, surface water monitoring is not specifically required at the Papineau Lake WDS.
- The MECP surface water review of the 2015 Annual Monitoring Report indicated that groundwater data is to be compared to surface water criteria to screen for potential impacts to Kitts Creek located downgradient from the WDS, if surface water is flowing off-site.

7.4 Trigger Mechanisms and Contingency Plan

- The groundwater chemical results in 2024 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 2024 (0 to 70 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

- Based on the 2024 topographic survey and the ECA volumetric capacity (13,600 m^3), it is estimated that the Site has exceeded the capacity for waste, daily cover, and intermediate cover by 3,660 m^3.
- The Municipality is currently reviewing discrepancies related to the 2010 remaining capacity and it is anticipated that the Site is not beyond capacity. The Municipality is in the process of assessing the historical data for provision to the Ministry and it is anticipated that a re-design will be proposed to reflect the actual remaining capacity and to amend the ECA.

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,
BluMetric Environmental Inc.

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Senior Environmental Engineer

9 References

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Table

Hastings Highlands
Analytical Chemistry Results:
Anions, Cations, GenChem, Met in Well Screen

Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	PL1-06	PL1-06	PL2-06	PL3-06	PL3-06	PL4-12	PL5-12	PL6-12	PL7-16	PL7-16	PL7-16	PL7-16	PL8-16	PL8-16	PL9-16	PL9-16
						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
						Sample Date	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Apr-30	2024-Apr-30	2024-Apr-30	2024-Apr-30	2024-Oct-17	2024-Oct-17	2024-Apr-30	2024-Oct-17	2024-Apr-30	2024-Oct-17
						Lab Job Number	C4D1257	C4W8619	C4D1257	C4D1257	C4W8619	C4D1257	C4D1257	C4D1257	C4D1257	C4D1257	C4W8619	C4W8619	C4D1257	C4W8619	C4D1257	C4W8619
						Lab Sample ID	ZBG813		ZBG814	ZBG815		ZBG816	ZBG817	ZBG818	ZBG819	ZBG822			ZBG820		ZBG821	
Anions						Detection Limit																
Chloride	mg/L	127.5	250	-	-	1, 2	52	65	53	26	8.6	36	54	19	40	40	23	23	<1	<1	25	23
Nitrate as N	mg/L	2.7	10	-	-	0.1	0.15	<0.1	<0.1	0.17	0.31	<0.1	0.14	<0.1	0.25	0.25	0.87	0.89	0.16	0.1	0.45	0.66
Nitrite as N	mg/L	0.3	1	-	-	0.01	-	-	<0.01	<0.01	-	-	<0.01	-	<0.01	-	-	-	-	-	-	-
Sulphate	mg/L	251.8	500	-	-	1	23	34	21	2.8	3.2	41	13	19	24	24	17	17	6.9	6.5	13	8.9
Cations																						
Calcium (diss)	mg/L	-	-	-	-	0.2	54	71	45	11	6.7	82	42	14	43	43	28	27	5.6	5.5	16	15
Magnesium (diss)	mg/L	-	-	-	-	0.05	13	16	8.8	3.6	2.4	21	8	1.8	11	10	6.4	6.3	1.6	1.4	4.4	4.1
Potassium (diss)	mg/L	-	-	-	-	0.2	6.8	-	9.5	1.7	-	5.1	3.8	1.2	5.5	5.5	-	-	1.1	-	2.6	-
Sodium (diss)	mg/L	101	200	-	-	0.1	26	32	22	5.3	3.6	11	13	1.5	23	23	16	16	1.7	1.8	7.9	7.7
General Chemistry																						
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1	160	190	130	23	25	230	85	37	130	130	95	96	21	23	48	32
Ammonia as N	mg/L	-	-	-	-	0.05	0.18	0.28	1.8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4	<4	4.5	13	<4	<4	<4	9.9	8.1	5.4	<4	<4	<4	<4	<4	<4	<4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4	3.6	5.1	4.4	0.8	0.7	2.4	1.8	1.7	2.9	3	1.8	1.8	1.1	1.2	1.2	1.1
Electrical Conductivity	uS/cm	-	-	-	-	1	520	660	480	140	89	620	370	97	430	430	310	310	55	61	180	180
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		8.25	7.37	7.05	7.31	7.28	7.77	7.1	7.32	7.4	7.42	7.5	7.55	7.23	7.31	7.11	7.21
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	410	290	125	80	375	255	135	260	270	190	200	10	70	115	125
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	0.36	-	2.1	<0.1	-	0.11	<0.1	<0.2	0.13	0.19	-	-	<0.1	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	<0.02	-	**1.5**	**8.7**	-	**0.29**	**0.75**	**3.2**	<0.02	<0.02	-	-	<0.02	-	**0.041**	-
Metals																						
Arsenic (diss)	mg/L	0.0036	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	0.3	1	-	-	0.002	0.038	0.052	0.1	0.0091	0.0056	0.055	0.036	0.0047	0.038	0.038	0.023	0.023	0.0039	0.0049	0.014	0.012
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.2	0.26	0.22	<0.01	<0.01	0.15	0.031	<0.01	0.24	0.24	0.11	0.1	<0.01	<0.01	0.039	0.025
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009	<0.00009	-	0.00015	<0.00009	-	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	-	-	<0.00009	-	<0.00009	-
Chromium (diss)	mg/L	0.0129	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	0.5004	1	-	Calculated	0.0009	0.0091	-	0.0018	<0.0009	-	<0.0009	<0.0009	0.0033	0.0044	0.0044	-	-	<0.0009	-	<0.0009	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.1	<0.1	<0.1	1.8	<0.1	<0.1	<0.1	4.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead (diss)	mg/L	0.0029	0.01	-	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	1.2	1.7	3.5	<0.002	<0.002	0.26	0.42	0.0064	0.068	0.068	0.038	0.035	<0.002	<0.002	<0.002	<0.002
Zinc (diss)	mg/L	2.5	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

Figures

LEGEND

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

0 500 1,000 1,500 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Site Location Map

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
240205-03	February 14, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	MW	01	0

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LEGEND

- Former Surface Water Location (Not Sampled in 2024)
- Monitoring Well Locations
- Property Boundary
- Buffer
- Limit of Aggregate Permit Area (Crown).

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

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
240205-03	February 25, 2025

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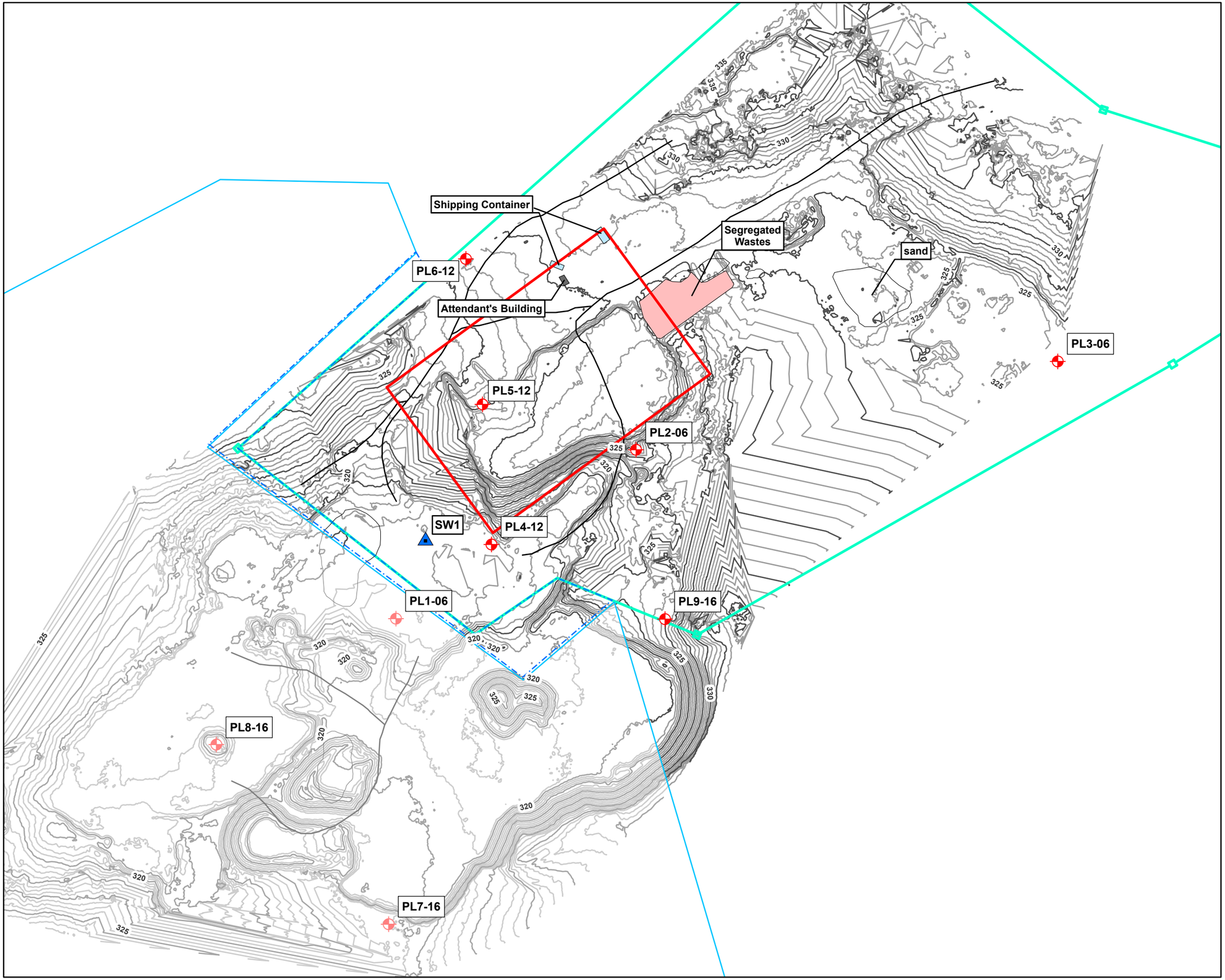

LEGEND

- Surface Water Location (Not Sampled in 2023)
- Monitoring Well Locations
- Development and Operations Plan Approved Landfilling Area (0.8ha)
- Shipping Container
- Segregated Wastes
- Attendant's Building
- Site Features
- Limit of Aggregate Permit Area (Crown).
- Buffer
- Road
- Property Boundary

2024 Elevation Contours

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

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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
240205-03	February 14, 2025

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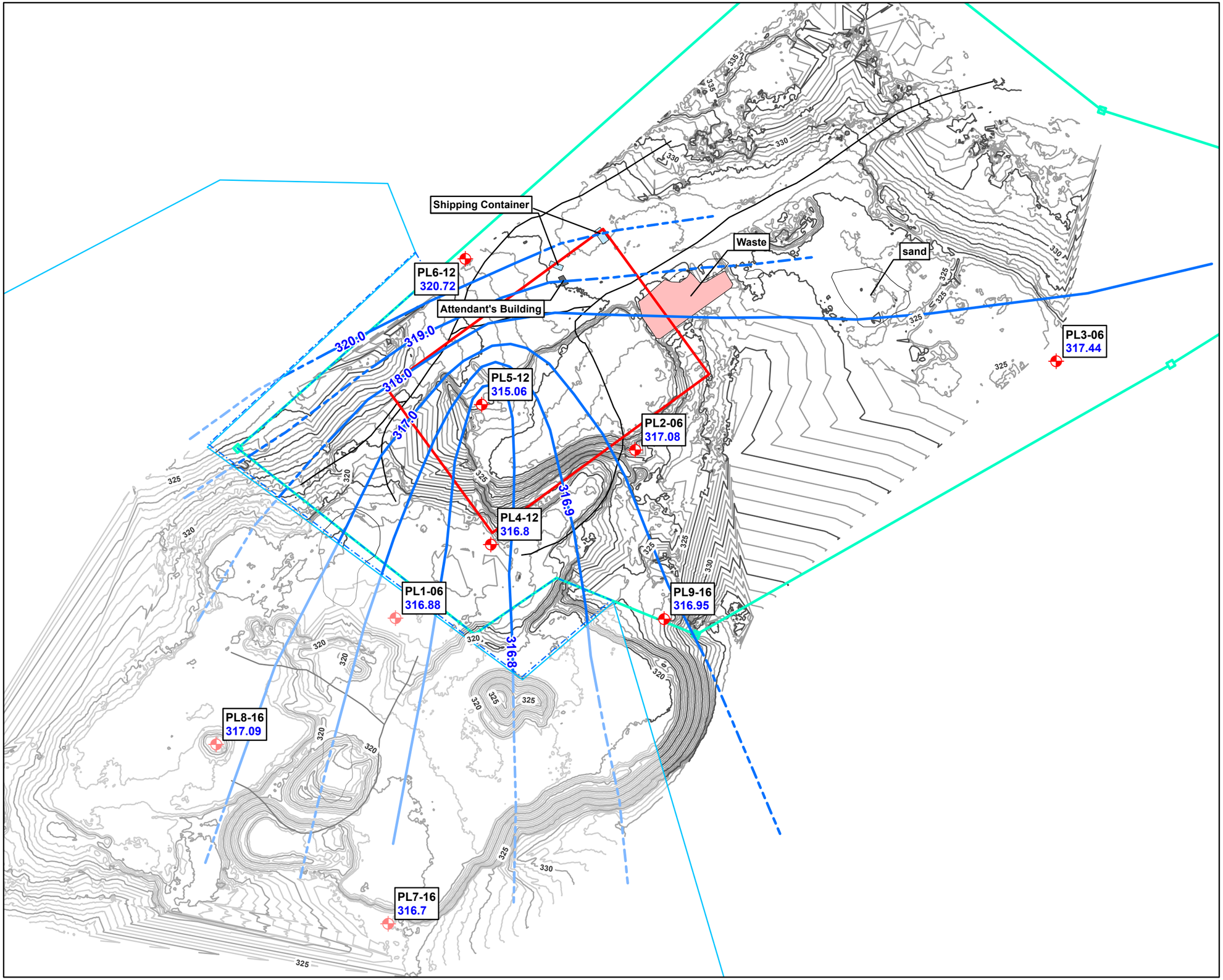


LEGEND

- Monitoring Well Locations
- Development and Operations Plan Approved Landfilling Area (0.8ha)
- Buffer
- Limit of Aggregate Permit Area (Crown).
- Road
- Property Boundary
- Groundwater Contour (0.2 m)
- Inferred Groundwater Contour

2024 Elevation Contours

- Elevation Contour (0.5 m)
- Elevation Contour (1.0 m)
- 317.14 Groundwater Elevation (masl) (Spring 2024)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

0 25 50 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Groundwater Flow Direction – Spring 2024

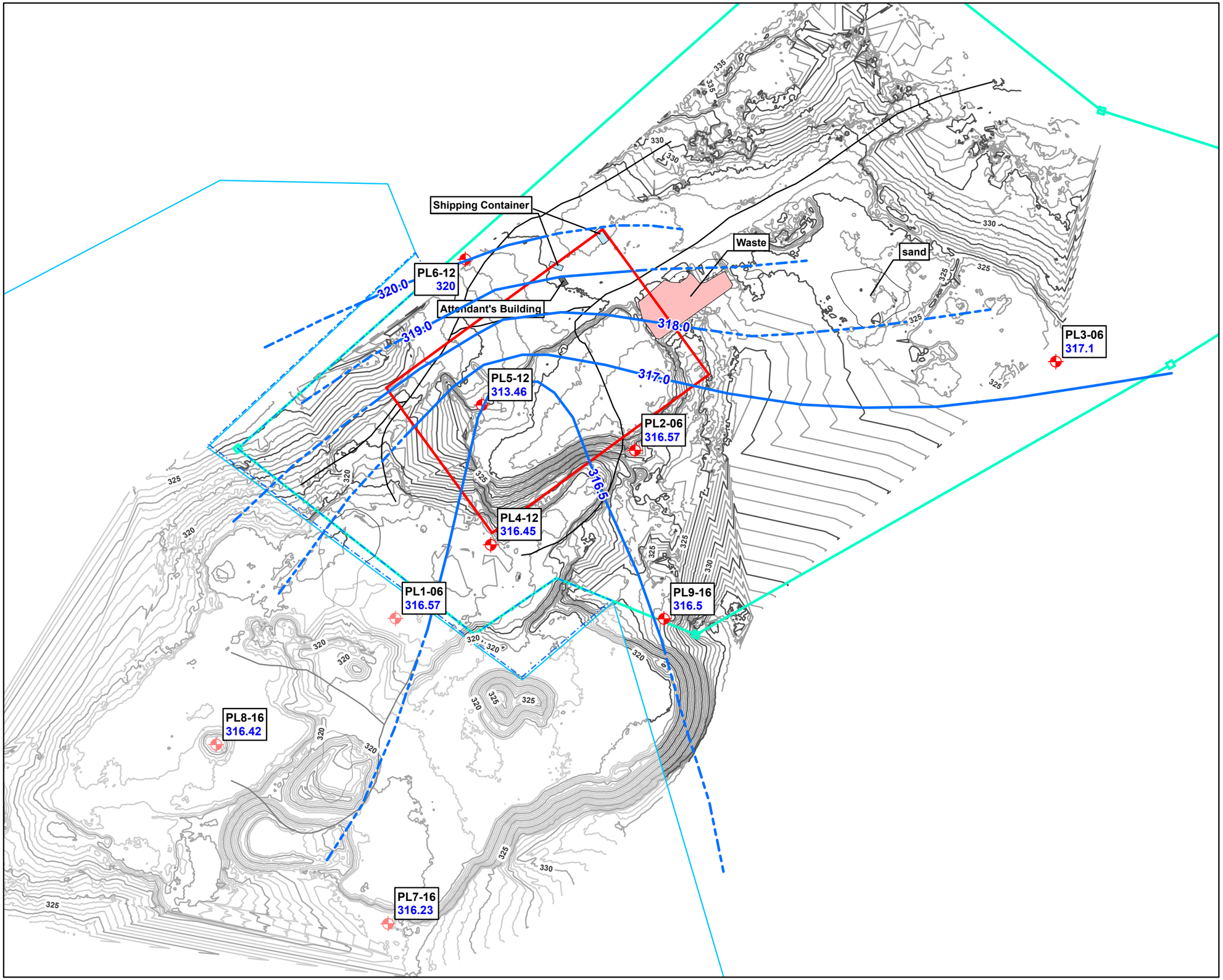
BluMetric Environmental

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
240205-03	February 14, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	MW	04	0

Document Path: C:\SP\BluMetric Environmental\Geomatics - GIS (1)\GIS_PROJECTS\PROJECTS\MHH\Projects\240205 - MHH 2024 AMR WDS-WTSs\03-Papineau Lake\APRX\2025-02-14\230225-Papineau2023.aprx



LEGEND

- Monitoring Well Locations
- Development and Operations Plan Approved Landfilling Area (0.8ha)
- Buffer
- Limit of Aggregate Permit Area (Crown).
- Road
- Property Boundary
- Groundwater Contour (0.5 m)
- Inferred Groundwater Contour

2024 Elevation Contours

- Elevation Contour (0.5 m)
- Elevation Contour (1.0 m)
- 317.14 Groundwater Elevation (masl) (Fall 2024)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

0 25 50 Meters

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Groundwater Flow Direction – Fall 2024

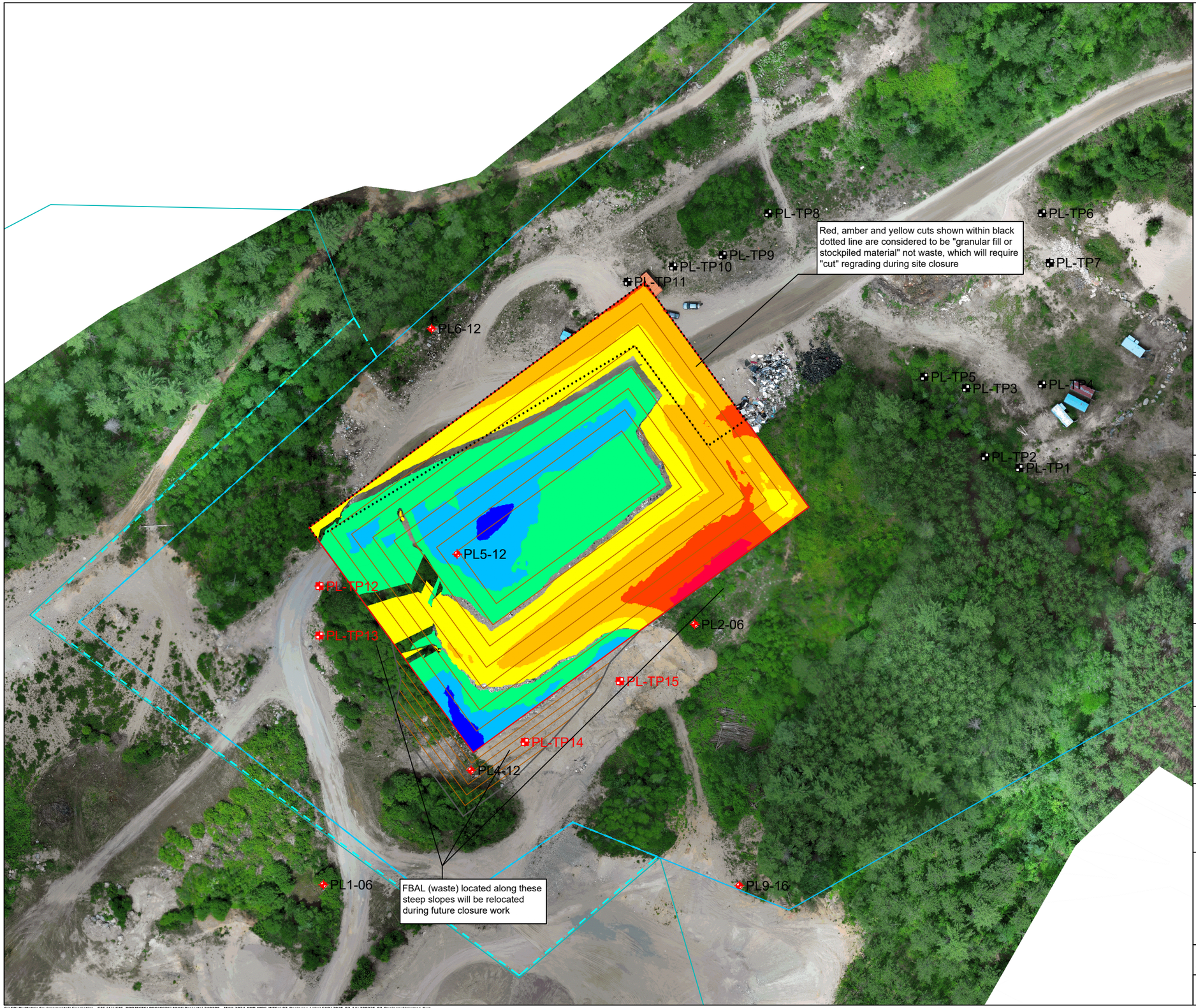
BluMetric Environmental

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
240205-03	February 14, 2025

DRAWN	CHECKED	FIG NO.	REV
EB	MW	05	0

Document Path: C:\SP\BluMetric Environmental\Geomatics - GIS (1)\GIS_PROJECTS\PROJECTS\MHH\Projects\240205 - MHH 2024 AMR WDS-WTSs\03-Papineau Lake\APRX\2025-02-14\230225-Papineau2023.aprx



LEGEND

- Monitoring Well Location
- Test Pit Location Without Waste
- Test Pit Location with Waste
- Development and Operations Plan Footprint
- Property Boundary
- Buffer
- Limit of Aggregate Permit Area (Crown)

Cut: 9,518 m³
Fill: 6,106 m³
NetFill: -3,411 m³

Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	−8.00	−6.00	
2	−6.00	−4.00	
3	−4.00	−2.00	
4	−2.00	−0.25	
5	0.25	2.00	
6	2.00	4.00	
7	4.00	6.00	
8	6.00	8.00	

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

0 20 40 Metres
1:1000

CLIENT

Municipality of Hastings Highlands

PROJECT

Papineau Lake WDS

TITLE

Remaining Fill Capacity as of June 3, 2024

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

PROJECT #	DATE
240205-03	February 14, 2025

DRAWN	CHECKED	DWG NO.	REV
EB	MW	06	0

C:\SP\BluMetric Environmental\Geomatics - GIS (1)\GIS_PROJECTS\PROJECTS\MHH\Projects\240205 - MHH 2024 AMR WDS-WTSs\03-Papineau Lake\CAD\2025-02-14\230225-03-PapineauVolumes.dwg

Site Photographs

Photo 1: Site entrance – October 17, 2024.

Photo 2: Site hours and signage – October 17, 2024.

Photo 3: General site – October 17, 2023.

Photo 4: Active landfill site – October 17, 2024.

Photo 5: Metal/steel pile – April 30, 2024.

Photo 6: Tires pile – April 30, 2024.

Photo 7: Bulk Waste – April 30, 2024.

Photo 8: Active landfill area – April 30, 2024.

Photo 9: Metal/steel pile – October 17, 2024.

Photo 10: Tires pile – October 17, 2024.

Photo 11: Bulk Waste - October 17, 2024.

Photo 12: Active landfill area - October 17, 2024.

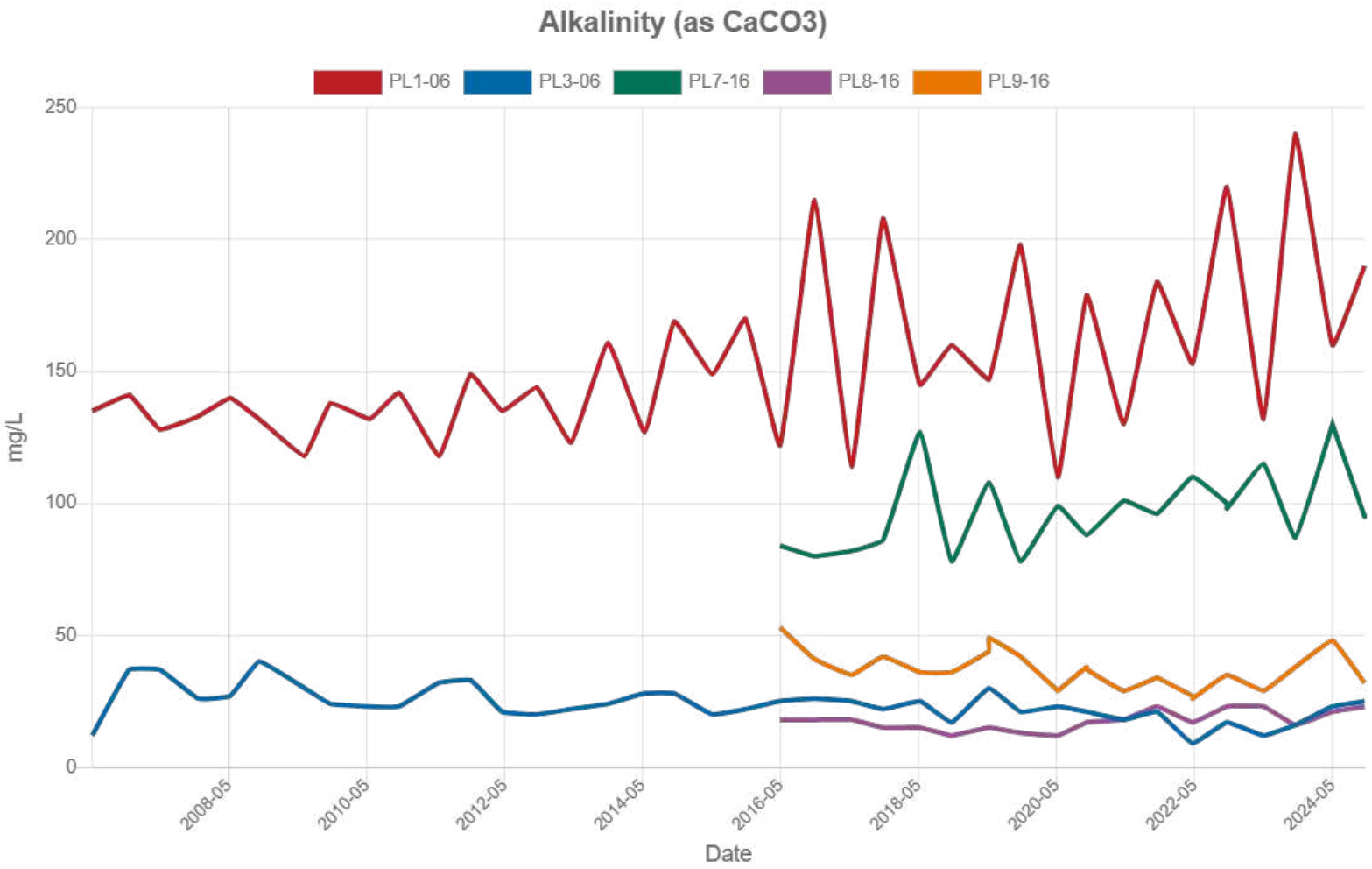
Photo 13: Attendant's building – October 17, 2024.

Photo 14: Waste bins – April 30, 2024.

Photo 15: Household batteries – April 30, 2024.

Photo 16: Landfill site of 2023 FBAL excavation – April 30, 2024.

Chemistry Trend Graphs

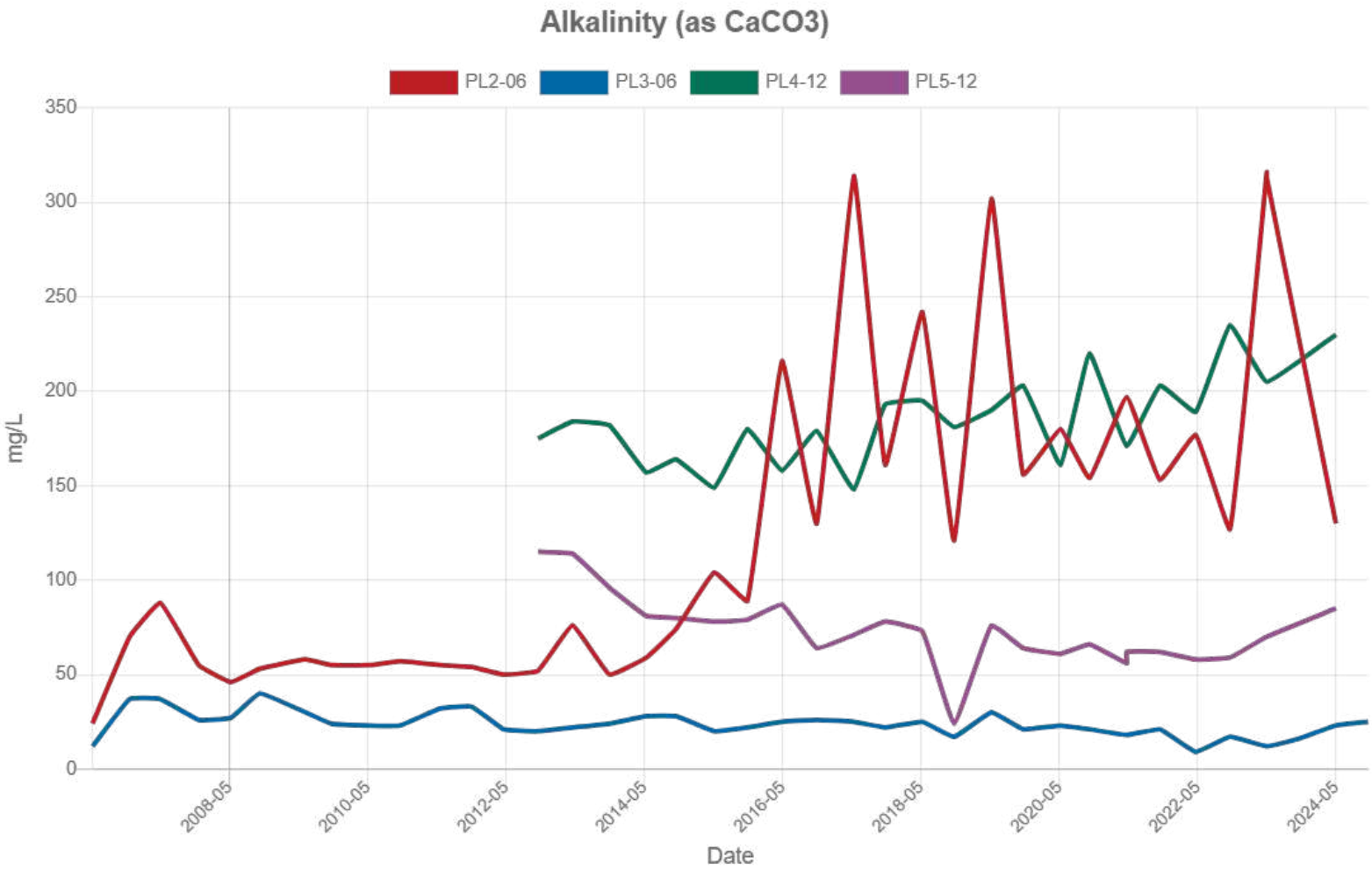


Papineau Lake WDS
Municipality of Hasting's Highlands

BluMetric Proj No: 240205
Date: February 12, 2025

Graph 1
Alkalinity in Groundwater – Downgradient Wells

Created by: Megan Williamson



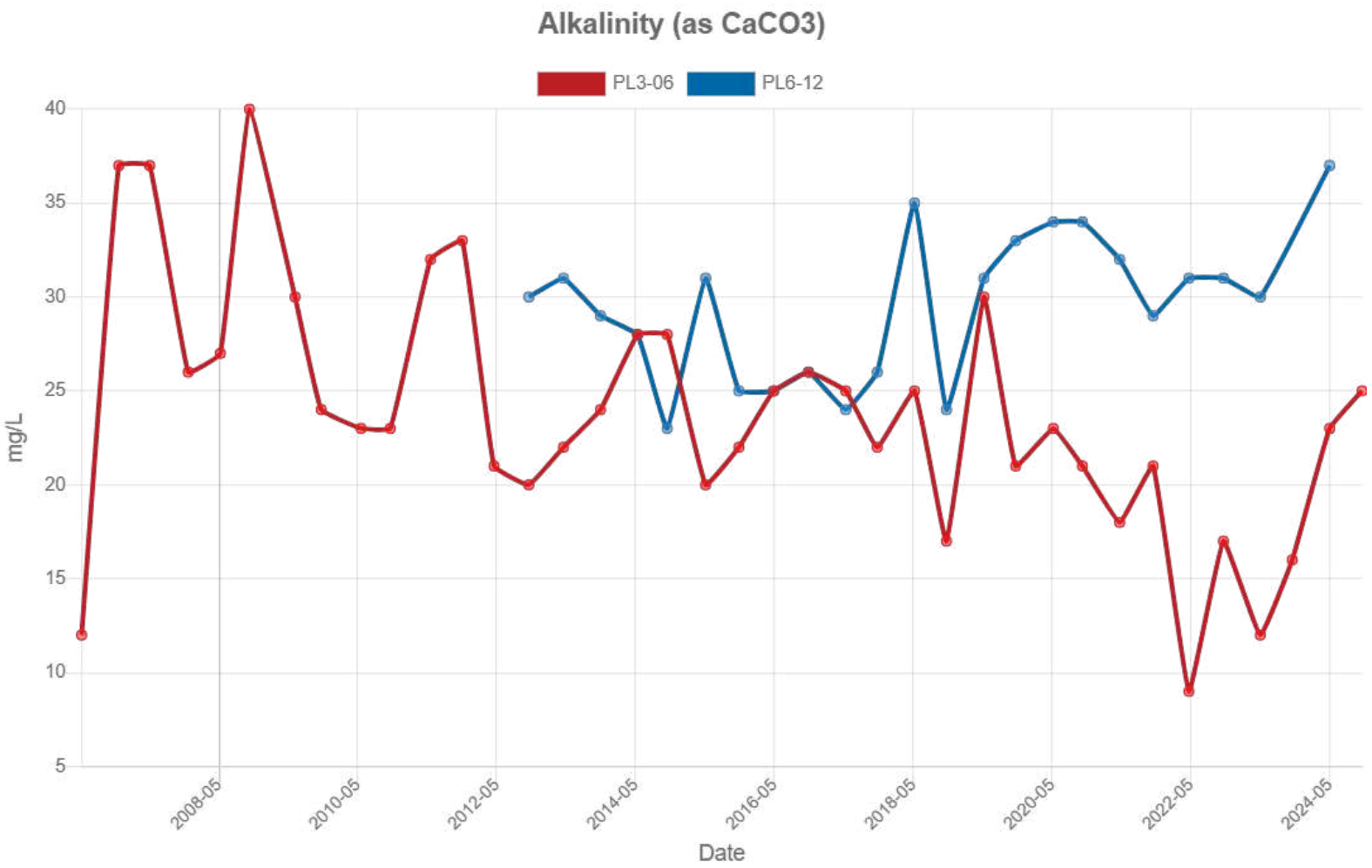
Papineau Lake WDS
Municipality of Hasting's Highlands

BluMetric Proj No: 240205
Date: February 12, 2025

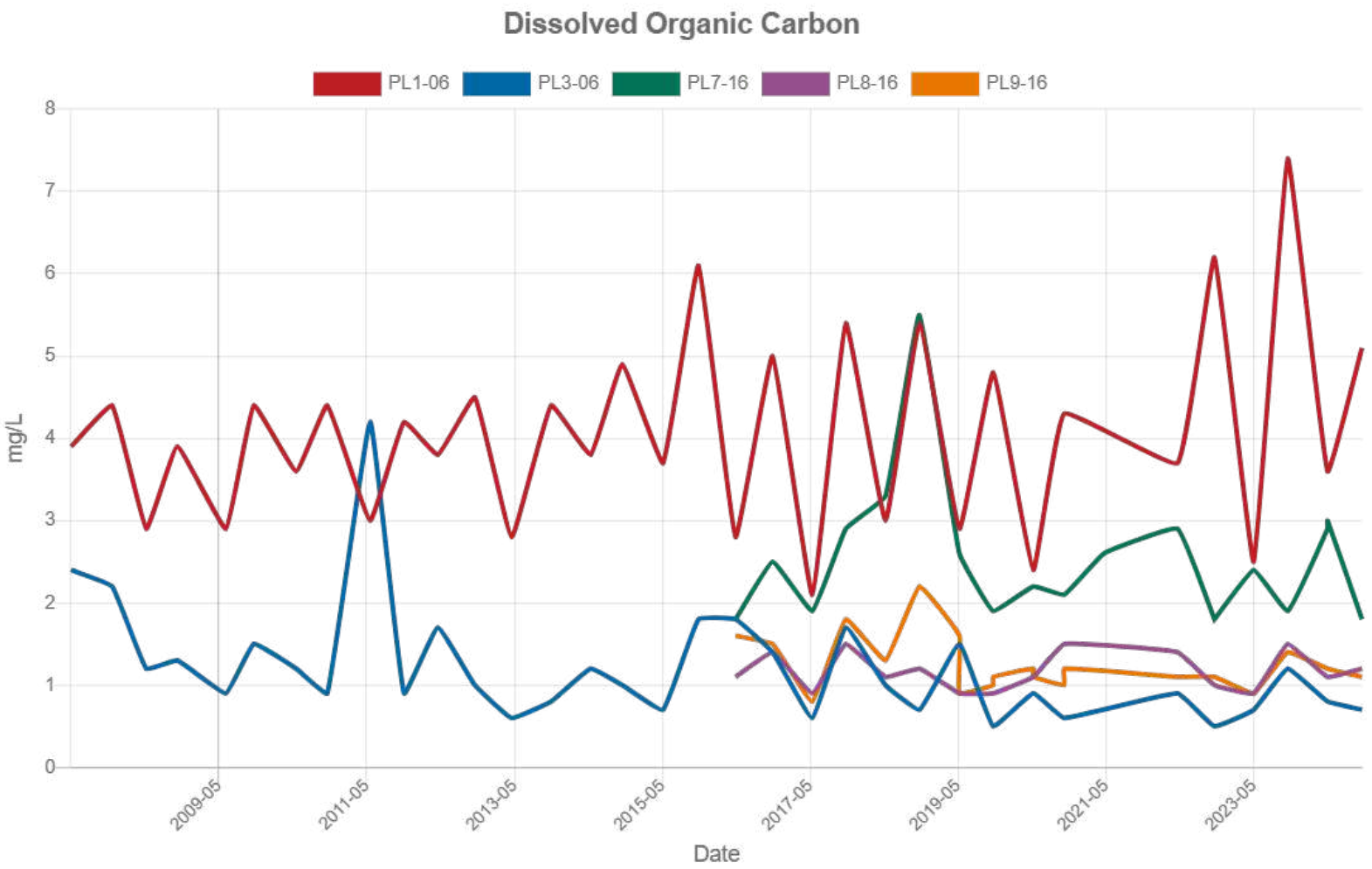
Graph 2
Alkalinity in Groundwater – Leachate Wells

Created by: Megan Williamson

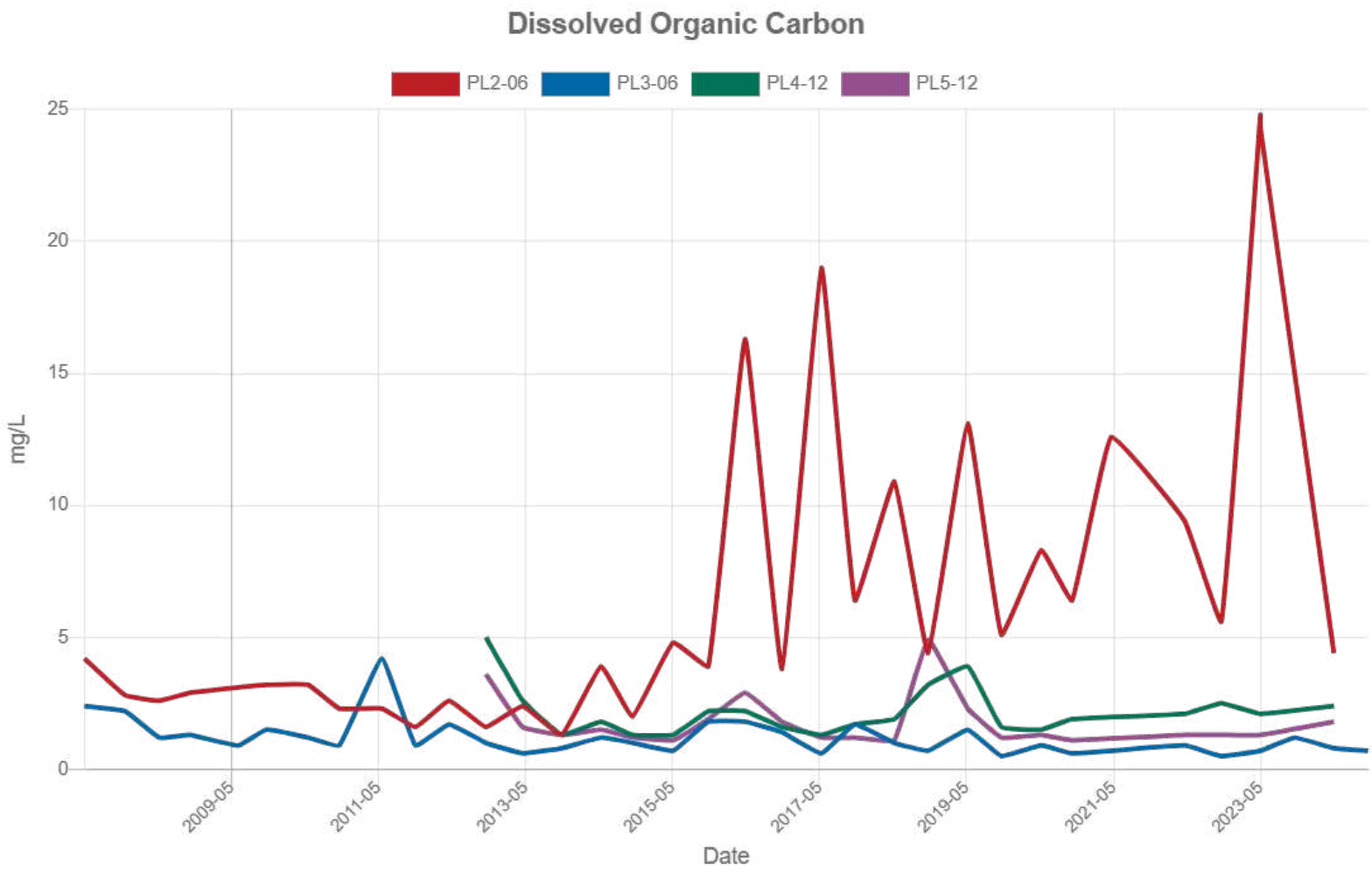
BluMetric Environmental



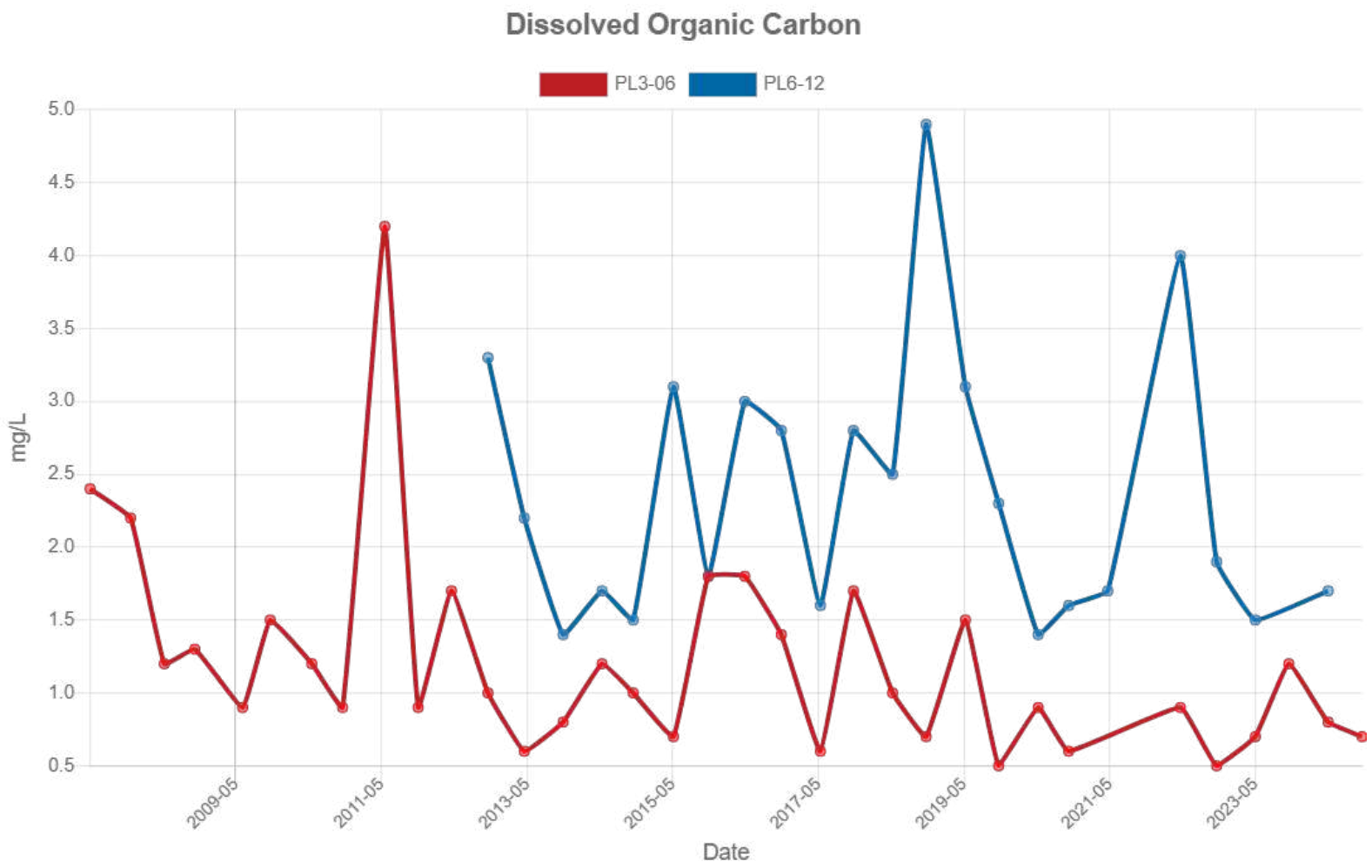
Papineau Lake WDS **Municipality of Hasting's Highlands**	**Graph 3** **Alkalinity in Groundwater – Upgradient Wells**
BluMetric Proj No: 240205 **Date: February 12, 2025**	**Created by: Megan Williamson**



Papineau Lake WDS **Municipality of Hasting's Highlands**	**Graph 4** **DOC in Groundwater – Downgradient Wells**
BluMetric Proj No: 240205 **Date: February 12, 2025**	**Created by: Megan Williamson**



Papineau Lake WDS **Municipality of Hasting's Highlands**	**Graph 5** **DOC in Groundwater – Leachate Wells**
BluMetric Proj No: 240205 **Date: February 12, 2025**	**Created by: Megan Williamson**



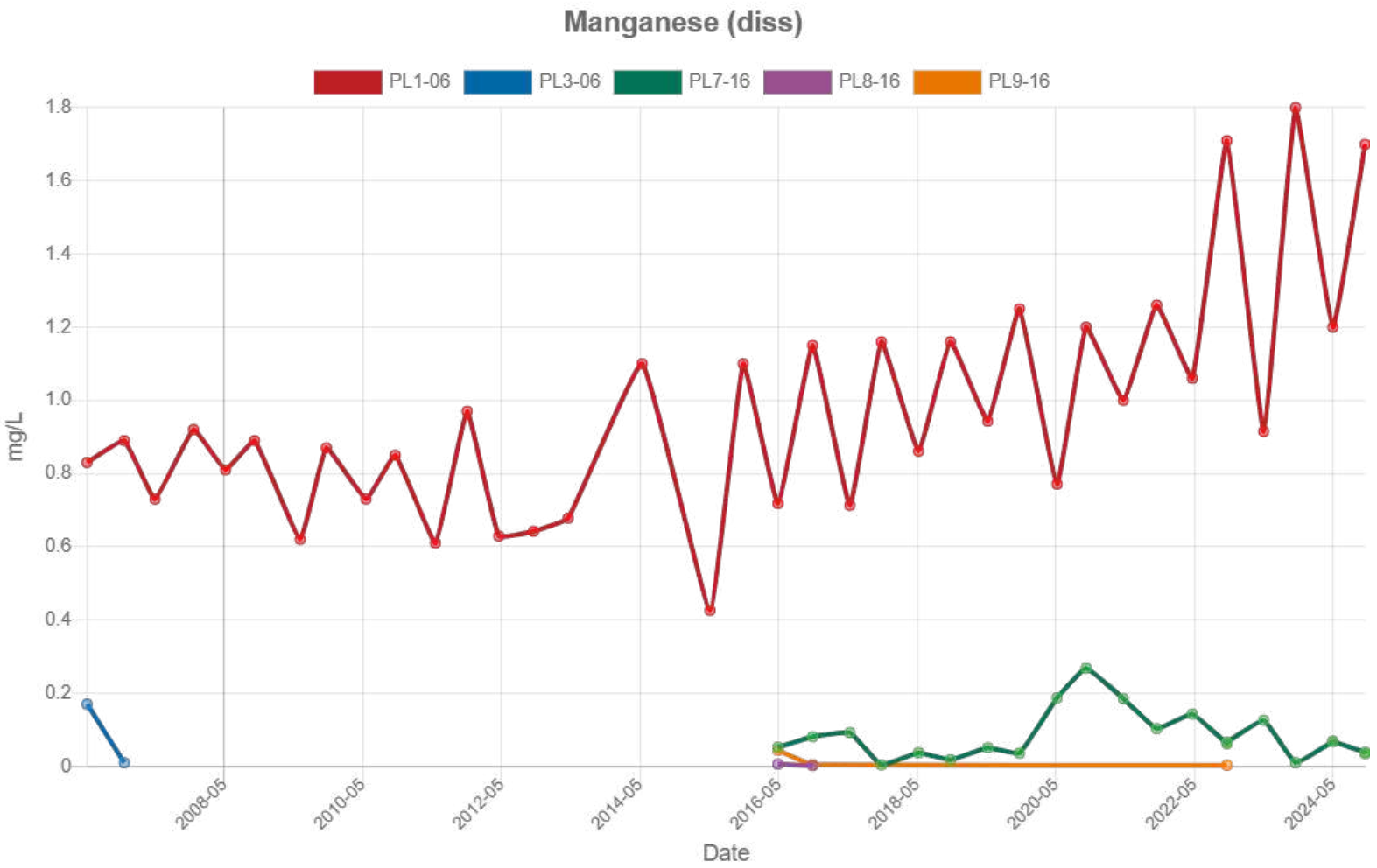
Papineau Lake WDS
Municipality of Hasting's Highlands

BluMetric Proj No: 240205
Date: February 12, 2025

Graph 6
DOC in Groundwater – Upgradient Wells

Created by: Megan Williamson

BluMetric Environmental

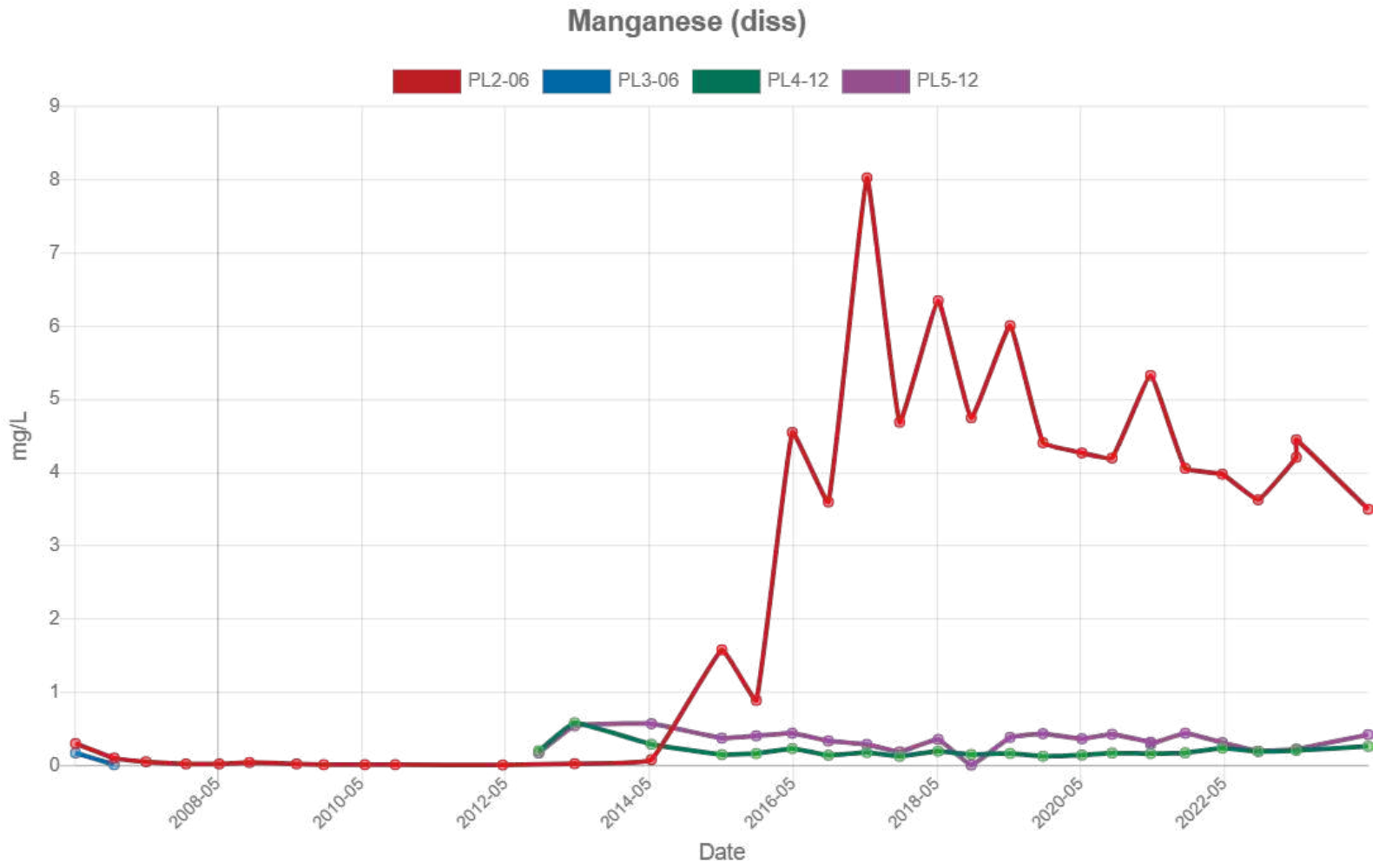


Papineau Lake WDS
Municipality of Hasting's Highlands

BluMetric Proj No: 240205
Date: February 12, 2025

Graph 7
Manganese in Groundwater – Downgradient Wells

Created by: Megan Williamson

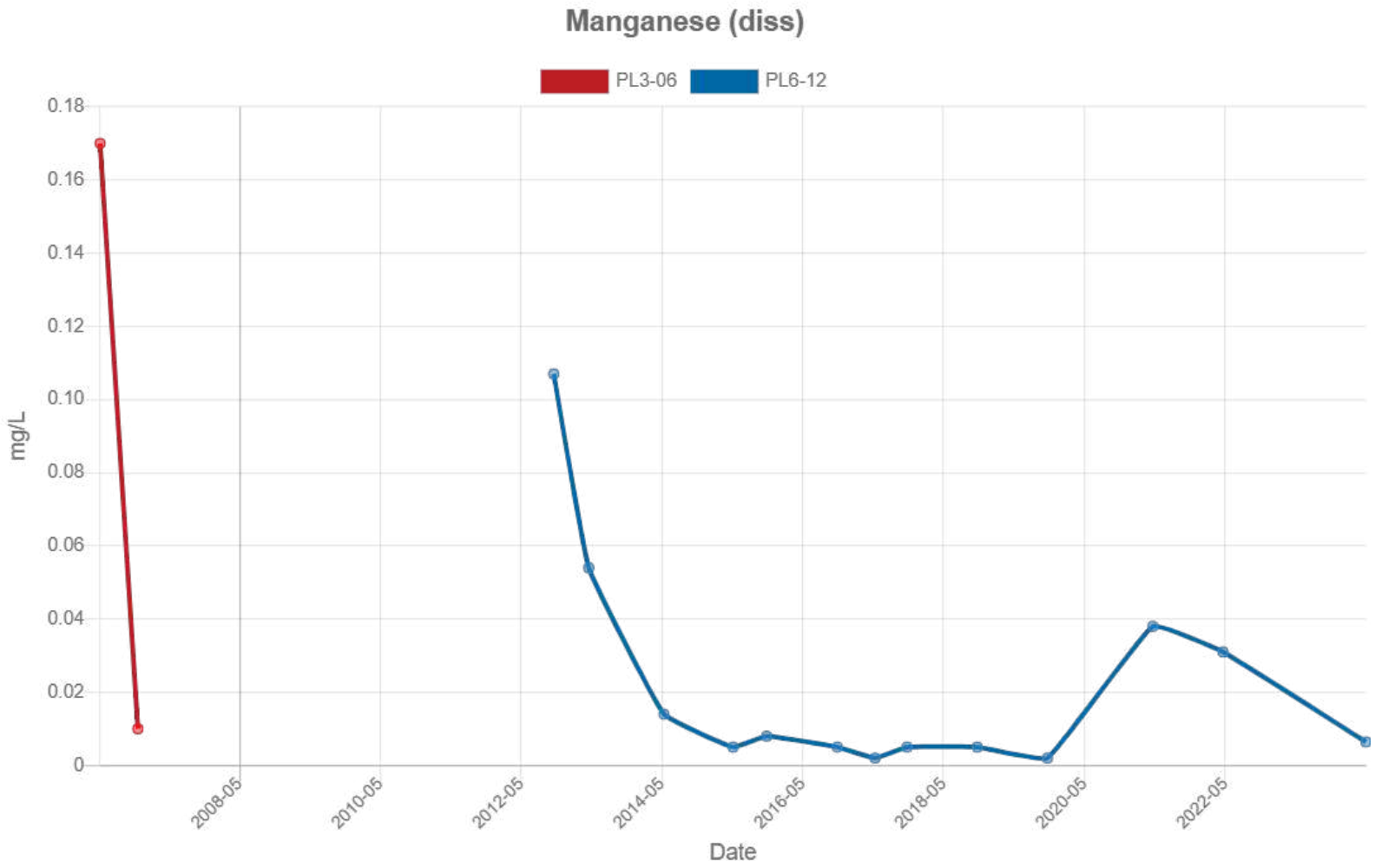


Papineau Lake WDS
Municipality of Hasting's Highlands

BluMetric Proj No: 240205
Date: February 12, 2025

Graph 8
Manganese in Groundwater – Leachate Wells

Created by: Megan Williamson

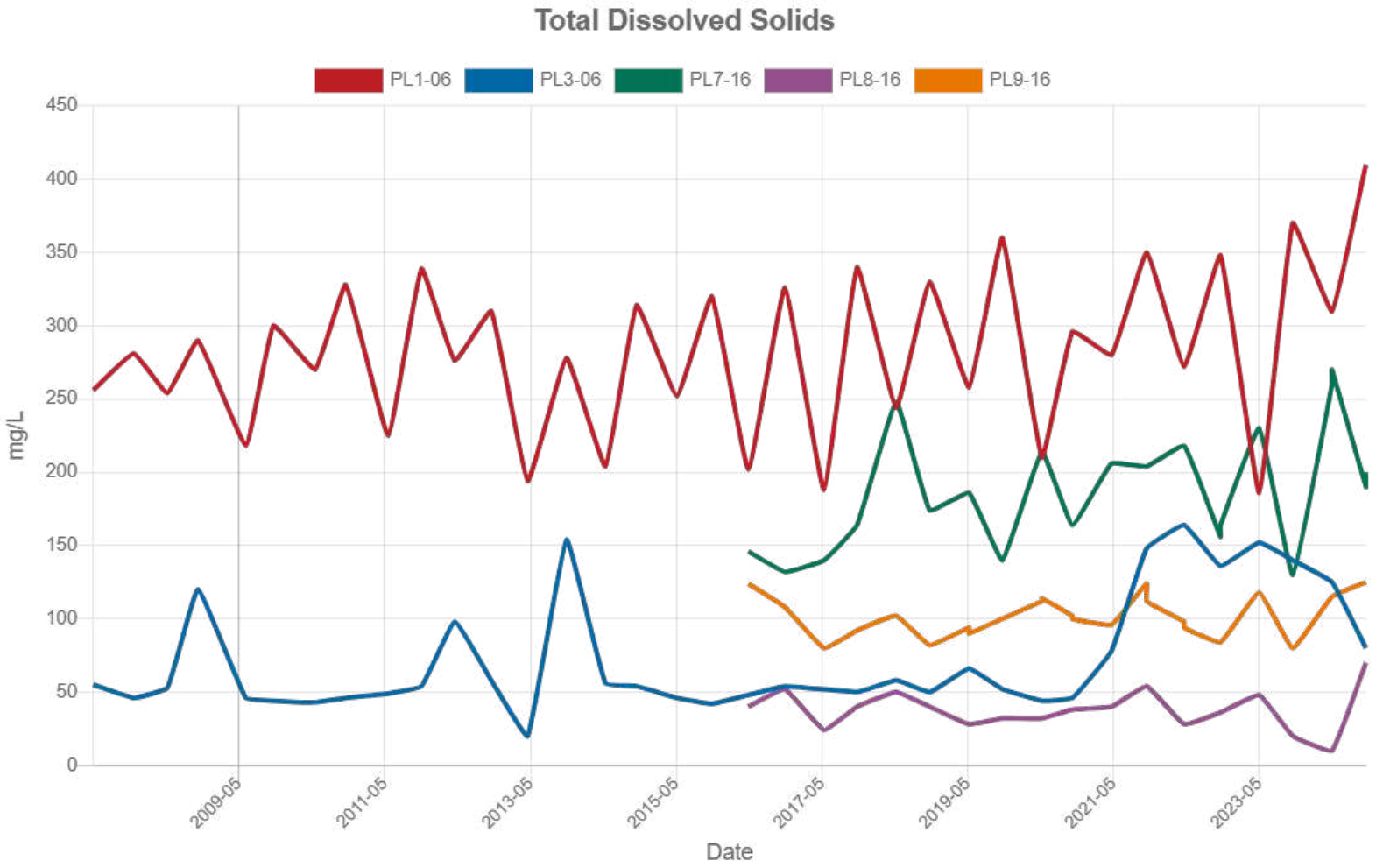


Papineau Lake WDS
Municipality of Hasting's Highlands

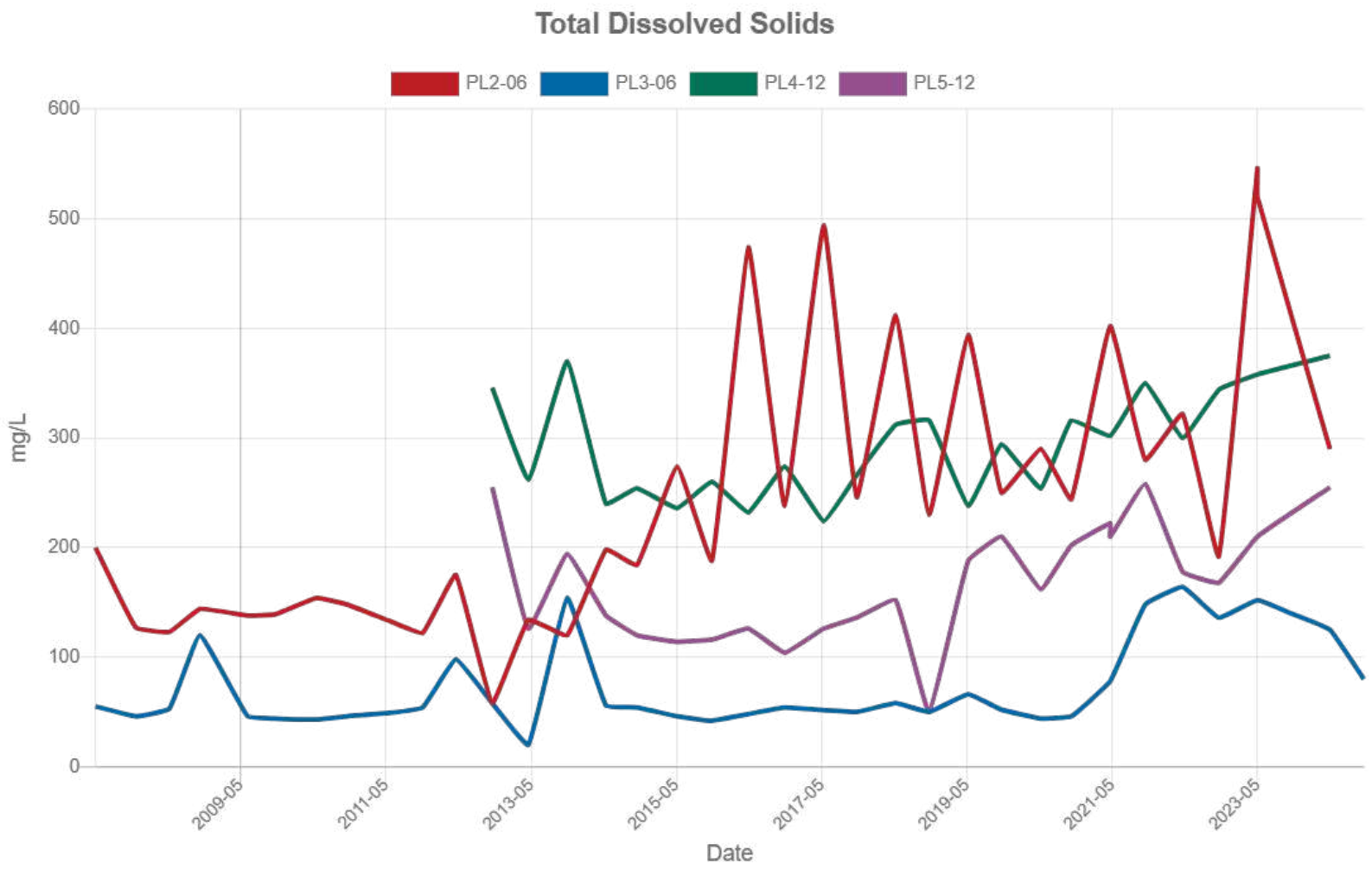
BluMetric Proj No: 240205
Date: February 12, 2025

Graph 9
Manganese in Groundwater – Upgradient Wells

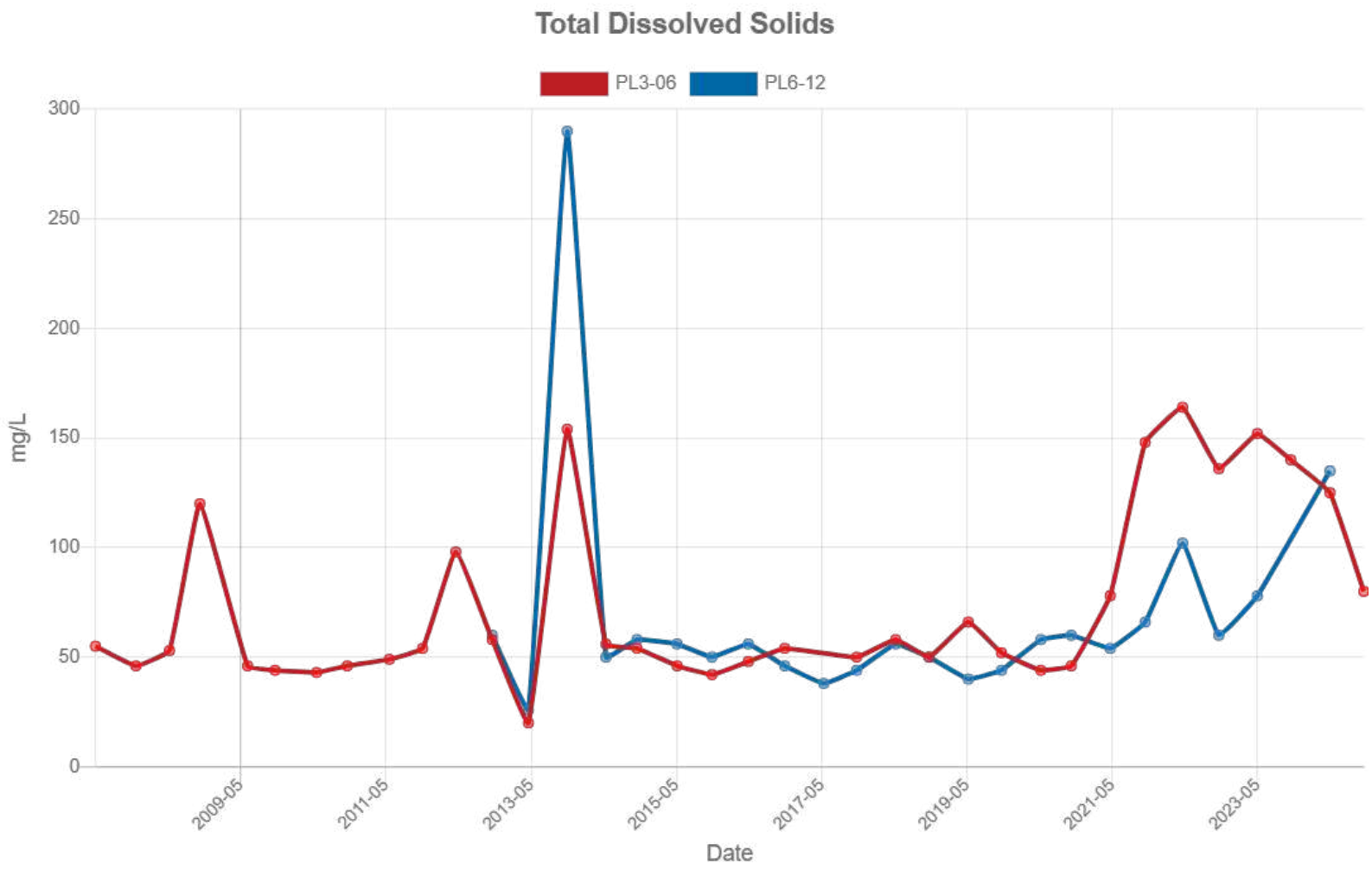
Created by: Megan Williamson



Papineau Lake WDS **Municipality of Hasting's Highlands**	**Graph 10** **TDS in Groundwater – Downgradient Wells**
BluMetric Proj No: 240205 **Date: February 12, 2025**	**Created by: Megan Williamson**



Papineau Lake WDS **Municipality of Hasting's Highlands**	**Graph 11** **TDS in Groundwater – Leachate Wells**
BluMetric Proj No: 240205 **Date: February 12, 2025**	**Created by: Megan Williamson**



Papineau Lake WDS
Municipality of Hasting's Highlands

BluMetric Proj No: 240205
Date: February 12, 2025

Graph 12
TDS in Groundwater – Upgradient Wells

Created by: Megan Williamson

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 D. Gable

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	K0L 2S0

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
A 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.

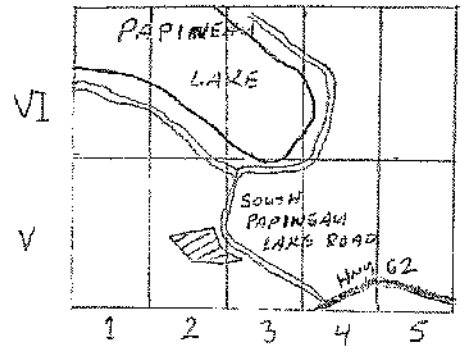
10. This permit will automatically terminate, and all rights of the permittee will expire, on the stated termination date, or on the death or bankruptcy of the permittee, or on the winding up or dissolution of the permittee's affairs. This condition cannot be waived by the Crown and, if further use of 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.

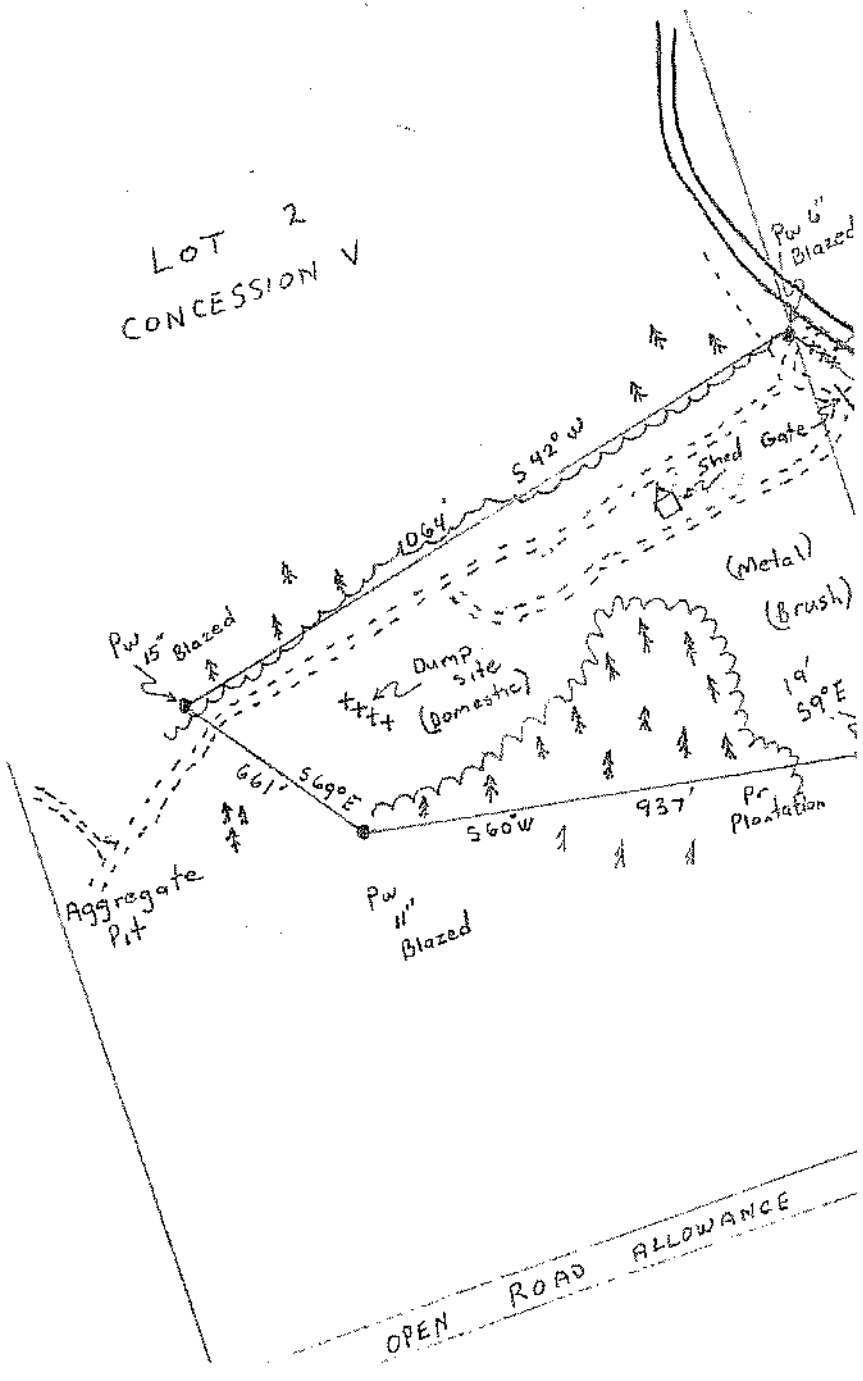
12. Upon expiry, cancellation, revocation or other termination of this Land Use Permit:
   (i) Unless an MNRF Official orders otherwise, all improvements, property or other assets remaining on the site automatically become the property of the Crown and the Crown has no obligation whatsoever to pay compensation 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



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 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/MOE)

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)	2024
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)	185	*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*	12/31/24		
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**
PL6-12, PL5-12, PL2-06	Fall water levels were not collected at these locations due to sampling error	16-Oct-2023

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**	CAZ has been accepted by the MECP and Notice No. 2 to the ECA but easement rights are being processed by MNRF.	
6) The site meets compliance and assessment criteria.	( ) **Yes** (●) **No**	The Site has exceeded capacity limits.	
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 2024 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:**	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.
◉ **No Changes to site design and operation are recommended**	
○ **The following change(s) to the site design and operation is/ are recommended:**	

Name:	S'rana Scholes, P.Eng.		
Seal:			
Signature:	S'rana Scholes	**Date:**	28-Mar-2025
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 2022 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 at Uof W.
Date:	28-Mar-2025
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

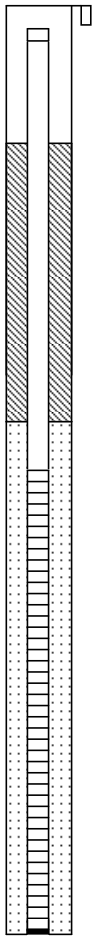
Site Coordinates: Zone 18 T North 5021302, East 281140

Log of Borehole: PL1-06

Field Personnel: B.M.

SUBSURFACE PROFILE

WELL INSTALLATION

Depth (ft)	Depth (m)	Elevation (m)	Symbol	Description	Monitor Construction	Comments
-3 to 0		89.86		Ground Surface		6" Steel locking protective casing
0 to 5	0 to 1			Brown SAND, GRAVEL, and COBBLES. Saturated.		Bentonite Quickgrout
5 to 20	1 to 6	88.34		Brown SAND, GRAVEL, Cobble, and BOULDERS. Saturated Gravel layer 19 - 20'.		# 3 Silica Sand filterpack 3.05 m Slot 10 PVC Screen
20	6	83.76		End of Borehole		Bottom depth 5.18 mbgs

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
A Better Environment For Business

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
0 – 5 / 0 – 1.5	91.71		Light Brown SAND. Hole was advanced by mud drilling technology, no comment on moisture could be made.		Bentonite Quickgrout
16 – 24 / 5 – 7.5	89.27		Dark Brown SAND. Hole was advanced by mud drilling technology, no comment on moisture could be made.		# 3 Silica Sand filterpack 4.57 m Slot 10 PVC Screen
24 – 32 / 7.5 – 9.9	86.99		Coarse GRAVEL. Hole was advanced by mud drilling technology, no comment on moisture could be made.		
32 / 9.9			End of Borehole		Bottom depth 9.906 mbgs

Drill Method: Air Rotray X Drill

Hole Size: 6"

Drill Date: May 8, 2006

Ground Elevation: 96.936 m

TPVC Elevation: 97.886 m

Checked by:

Sheet: 1 of 1

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 / 0	96.89		Ground Surface		
0 – 11 / 0 – 3.4			Brown SAND, trace Gravel. Hole was advanced by mud drilling technology, no comment on moisture could be made.		6" Steel locking protective casing Bentonite Quickgrout
26 / 8					3/8" Bentonite Holeplug
29 / 9					# 3 Silica Sand filterpack
33 – 35 / 10 – 10.7					4.57 m Slot 10 PVC Screen
35 – 42 / 10.7 – 12.8	85.92		Brown SAND and GRAVEL. Hole was advanced by mud drilling technology, no comment on moisture could be made.		
42 / 13	83.94		End of Borehole		Bottom depth 12.95 mbgs

Drill Method: Air Rotray X Drill

Hole Size: 6"

Drill Date: May 8, 2006

Ground Elevation: 96.895 m

TPVC Elevation: 98.795 m

Checked by:

Sheet: 1 of 1

WESA
A Better Environment For Business

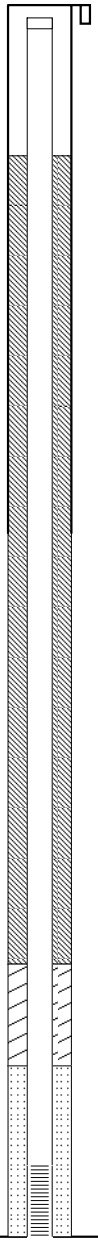
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

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 (ft / m)	Elevation	Symbol	Description	Monitor Constructio	Comments
-3 to 21 ft; 1 to 6 m	318.182		Ground Surface		6" steel locking protective casing
	0.000		SAND, STONES, COBBLE		
	315.182				
	3.000		SAND, STONES, COBBLE		Bentonite quickgrout
					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.

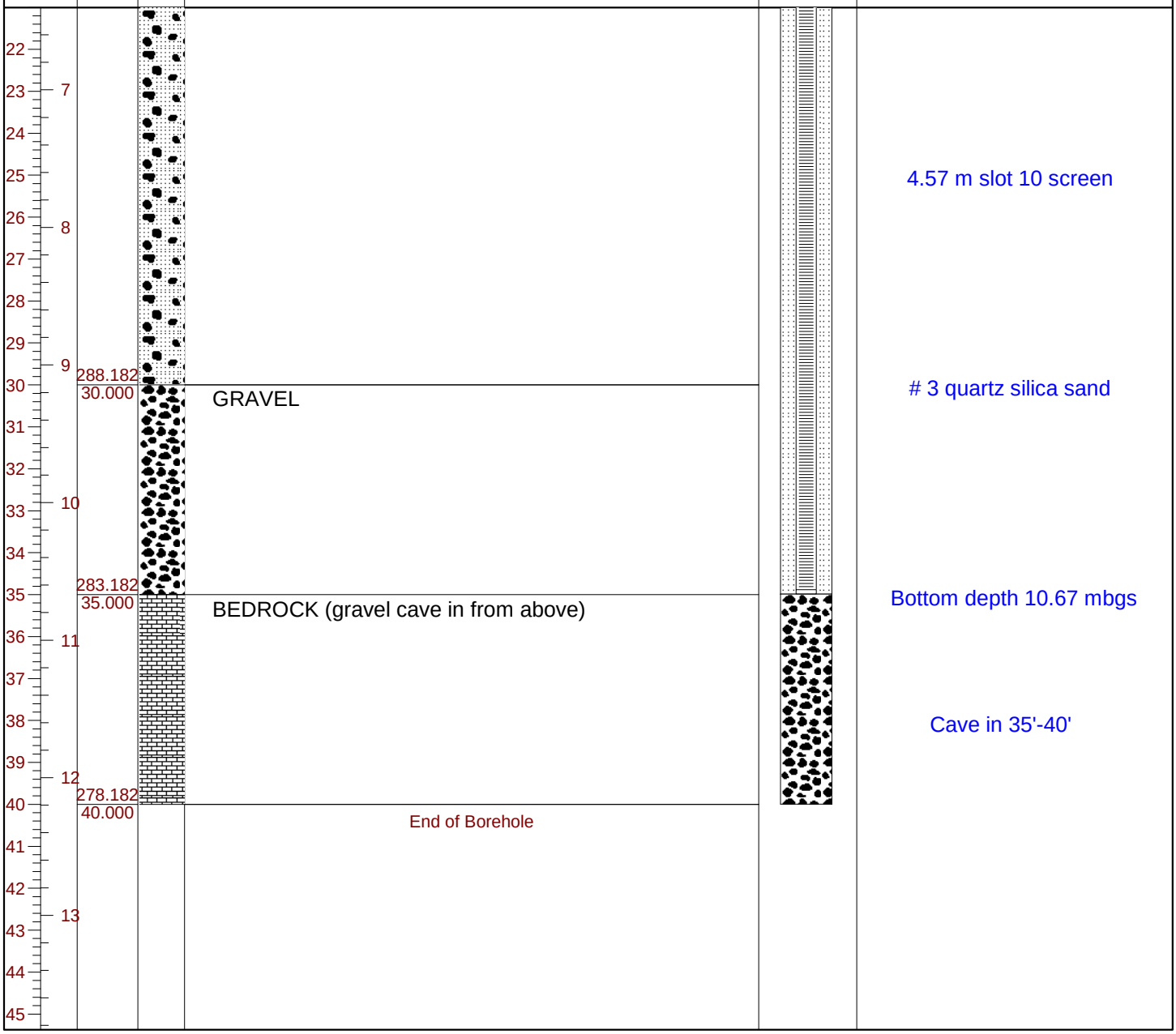
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

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	325.765		Ground Surface		6" steel locking protective casing
0 ft / 0 m	325.765		Ground Surface		
0.000	325.765		Sand, FILL (garbage, asphalt shingles)		
6 ft / 2 m	319.765				3/8 bentonite holeplug
6.000	319.765		FILL (garbage, stones)		
			Boulder from 25'-28'		
15 ft / 5 m					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.

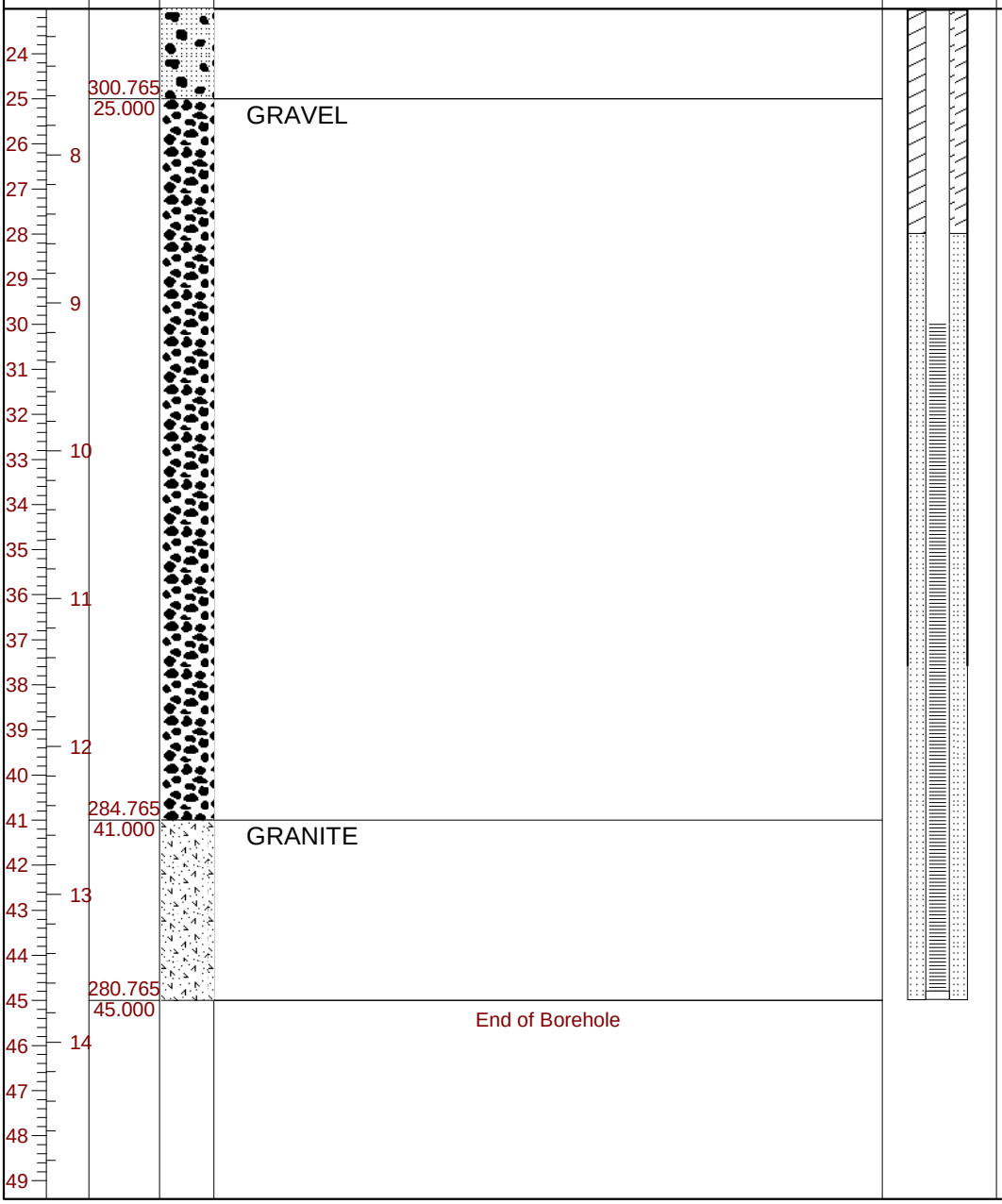
WESA Inc.
The Tower, The Woolen Mill
4 Cataraqui Street
Kingston, Ontario, Canada K7K 1Z7

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.

Depth (ft / m)	Elevation	Symbol	Description	Monitor Constructio	Comments
					6" steel locking protective casing
0	89.860		Ground Surface		
0 – 6	0.000		Coarse GRAVEL and stone		Bentonite quickgrout
6	83.860		GRANITE (dark grey)		
6 – 21	6.000		Water at 23', 27', 37'		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: PL6-12

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

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

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

Depth	Elevation	Symbol	Description	Monitor Constructio	Comments
22					
23	66.860				
	23.000		dark brown and broken from 23'-25' and 28'-29'		# 3 quatrz silica sand
24					
25					
26					
27					
28					
29					
30					4.57 m slot 10 screen
31					
32					
33					
34					
35					
36					
37					
38	51.860				
	38.000		38' - 40' light grey		
39					
40	49.860				
	40.000		End of Borehole		Bottom depth 12.19 mbgs
41					
42					
43					
44					
45					

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				
21 ft / 6 m	21.000		Brown SAND and GRAVEL Dry		

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					
10					
33					
34					
35					3.05 m slot 10 screen
36	287.229				
11	36.000		Brown Coarse SAND and GRAVEL Saturated		
37					
38					
39			PVC Monitor lifted during installation of well materials. Integrity not compromised.		
12					Bottom depth 12.19 mbgs
40					
41			Monitor estimated well yield ~ 7gpm		
42					
13			40-56 ' native material cave in.		
43					
44					
45					
14					
46					
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.

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

Borehole ID: PL8-16

Project No: 160238-03 ***Northing:*** 5021249

Client: Municipality of Hastings Highlands ***Easting:*** 231069

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

Depth (ft / m)	Elevation	Symbol	Description	Monitor Construction	Comments
					6" steel locking protective casing
	319.309		Ground Surface		2" PVC Stick-up 0.90 m TPVC Elev. - 320.35
	0.000		Brown SAND with trace small gravel Dry		
	316.309				
1 / 3	3.000		Brown SAND and GRAVEL with COBBLES Dry becoming moist near 8'		3/8 bentonite holeplug
2 / 8	310.309				
3 / 10	9.000		Brown, Coarse, SAND and GRAVEL with trace cobble throughout Water encountered at 9-10' Wet Monitor estimated well yield ~10gpm		2" pvc monitor
10 / 33	284.309				3.05 m slot 10 screen
11 / 36	35.000		End of Borehole		Bottom depth 10.67 mbgs

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

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

Drill Date: May 17, 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

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
					TPVC Elev. - 326.595
0 – 6 ft / 0 – 1 m	0.000		Brown SAND and GRAVEL with trace cobbles Dry		
	320.870				3/8 bentonite holeplug
6 – 16 ft / 1 – 5 m	6.000		Brown SAND with trace gravel Gravel Seam at 15' Dry		
	310.870				2" pvc monitor
16 – 21 ft / 5 – 6 m	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

Depth	Elevation	Symbol	Description	Monitor Construction	Comments
22					
23 – 7					
24	302.870				
	24.000		Brown, Coarse, SAND		
25			Water at 24'		
26 – 8					
27					
28					
29 – 9					#3 Silica sand
30					
31					
32					
33 – 10					
34					
35					
36 – 11					3.05 m slot 10 screen
37					
38					
39 – 12					
40					
	285.870				
41	41.000		Brown/Grey, fine to medium grain, SAND with trace silt		
	284.870				
42	42.000		BEDROCK		Bottom depth 12.80 mbgs
43 – 13					
	282.870				
44	44.000		End of Borehole		
45					

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: April 30, 2024	Weather:
Project #: 240205-03	BluMetric Staff: BM/MD	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 _	
❑ Site open under normal operating hours	Yes _	No ✓	
❑ 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 _	Designated waste area not covered on this visit

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 _	
❑ 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 _	

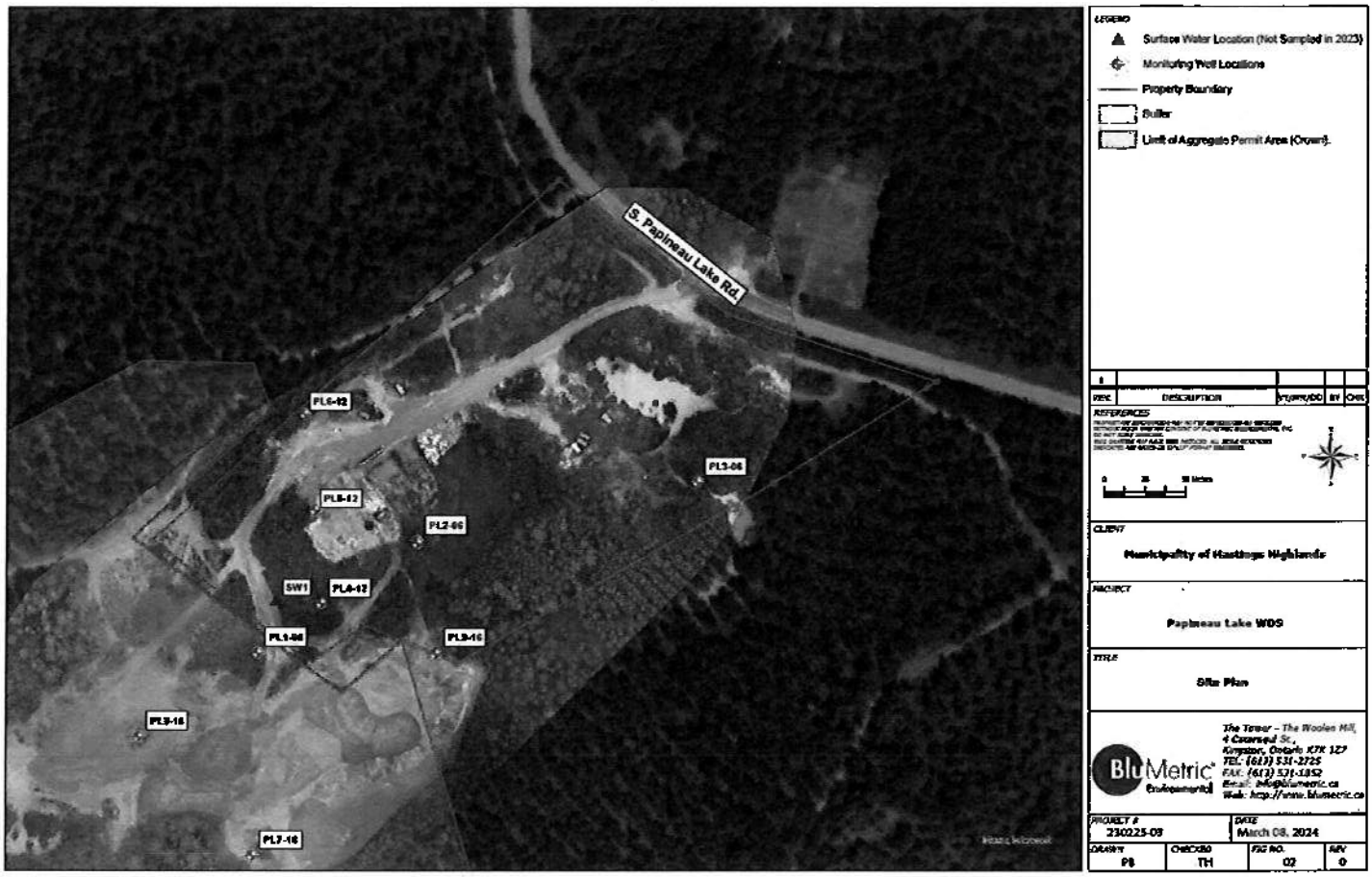
LANDFILL GAS MONITORING

❑ Conducted at structures	Yes ✓	No _	Attendant Building = 0ppm
❑ 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.)

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:

Areas that FBAL waste was placed last year should have interm cover placed over top

Backside of waste hill (by PL2-06) should have interm cover applied (See 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.

SMALL LANDFILL
OPERATION AND INSPECTION FORM

Site Name: Papineau Lake WDS, MHHs	Date: Oct 17. 2024	Weather: Sunny -3° to 8°
Project #: 240205-03	BluMetric Staff: BM/NW	

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

OVERALL INSPECTION AND OPERATION REVIEW

☐ Signage in good condition	Yes ✓	No _	Blown plastics over most of site
☐ ECA and emergency numbers on signage	Yes ✓	No _	
☐ Hour of operation observed	Yes ✓	No _	
☐ Site open under normal operating hours	Yes ✓	No _	
☐ 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 _	Metals / Bulk / Brush all fairly large piles
☐ 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 _	N/A ✓

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:

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.)

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 Project #: 240205-03
Site Location: Papineau Lake
Your C.O.C. #: 971460

Attention: MHH Distribution

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

Report Date: 2024/10/28
Report #: R8379936
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4W8619
Received: 2024/10/18, 10:08

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	6	N/A	2024/10/26	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	6	N/A	2024/10/24	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	6	N/A	2024/10/24	CAM SOP-00416	SM 24 5220 D m
Conductivity	6	N/A	2024/10/26	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	6	N/A	2024/10/24	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	6	N/A	2024/10/22	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	6	N/A	2024/10/24	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	6	N/A	2024/10/23	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	6	2024/10/22	2024/10/26	CAM SOP-00413	SM 24th - 4500H+ B
Sulphate by Automated Turbidimetry	6	N/A	2024/10/24	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	6	2024/10/22	2024/10/23	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.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Your Project #: 240205-03
Site Location: Papineau Lake
Your C.O.C. #: 971460

Attention: MHH Distribution

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

Report Date: 2024/10/28
Report #: R8379936
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4W8619

Received: 2024/10/18, 10:08

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:
Elora Di Bratto, Project Manager
Email: Elora.Di-Bratto@bureauveritas.com
Phone# (905) 817-5700

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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 #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AGHO89			AGHO89			AGHO90		
Sampling Date		2024/10/17 09:23			2024/10/17 09:23			2024/10/17 08:57		
COC Number		971460			971460			971460		
	UNITS	PL1-06	RDL	QC Batch	PL1-06 Lab-Dup	RDL	QC Batch	PL3-06	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.28	0.050	9720668				ND	0.050	9720668
Total Chemical Oxygen Demand (COD)	mg/L	4.5	4.0	9718938	12	4.0	9718938	ND	4.0	9718938
Conductivity	umho/cm	660	1.0	9716577	660	1.0	9716577	89	1.0	9716449
Total Dissolved Solids	mg/L	410	10	9716161				80	10	9716161
Dissolved Organic Carbon	mg/L	5.1	0.4	9716512				0.7	0.4	9716512
pH	pH	7.37		9716571	7.31		9716571	7.28		9716450
Dissolved Sulphate (SO4)	mg/L	34	1.0	9716531				3.2	1.0	9716522
Alkalinity (Total as CaCO3)	mg/L	190	1.0	9716574	190	1.0	9716574	25	1.0	9716440
Dissolved Chloride (Cl-)	mg/L	65	1.0	9716525				8.6	1.0	9716521
Nitrate (N)	mg/L	ND	0.10	9716498				0.31	0.10	9716501

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		AGHO91		AGHO92		AGHO93		
Sampling Date		2024/10/17 10:00		2024/10/17 10:09		2024/10/17 09:40		
COC Number		971460		971460		971460		
	UNITS	PL7-16	QC Batch	PL8-16	QC Batch	PL9-16	RDL	QC Batch
Inorganics								
Total Ammonia-N	mg/L	ND	9720668	ND	9720668	ND	0.050	9720668
Total Chemical Oxygen Demand (COD)	mg/L	ND	9718938	ND	9718938	ND	4.0	9718938
Conductivity	umho/cm	310	9716577	61	9716577	180	1.0	9716577
Total Dissolved Solids	mg/L	190	9716161	70	9716161	125	10	9716161
Dissolved Organic Carbon	mg/L	1.8	9716512	1.2	9716512	1.1	0.4	9716512
pH	pH	7.50	9716571	7.31	9716571	7.21		9716571
Dissolved Sulphate (SO4)	mg/L	17	9716531	6.5	9716531	8.9	1.0	9716531
Alkalinity (Total as CaCO3)	mg/L	95	9716574	23	9716574	32	1.0	9716574
Dissolved Chloride (Cl-)	mg/L	23	9716525	ND	9716525	23	1.0	9716525
Nitrate (N)	mg/L	0.87	9716498	0.10	9716501	0.66	0.10	9716498

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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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		AGHO93			AGHO94		
Sampling Date		2024/10/17 09:40			2024/10/17 10:00		
COC Number		971460			971460		
	UNITS	PL9-16 Lab-Dup	RDL	QC Batch	PL-QAQC-GW1	RDL	QC Batch
Inorganics							
Total Ammonia-N	mg/L	ND	0.050	9720668	ND	0.050	9720668
Total Chemical Oxygen Demand (COD)	mg/L				ND	4.0	9718938
Conductivity	umho/cm				310	1.0	9716449
Total Dissolved Solids	mg/L				200	10	9716161
Dissolved Organic Carbon	mg/L				1.8	0.4	9716512
pH	pH				7.55		9716450
Dissolved Sulphate (SO4)	mg/L				17	1.0	9716522
Alkalinity (Total as CaCO3)	mg/L				96	1.0	9716440
Dissolved Chloride (Cl-)	mg/L				23	1.0	9716521
Nitrate (N)	mg/L				0.89	0.10	9716501

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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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AGHO89	AGHO90	AGHO91	AGHO92	AGHO93		AGHO94		
Sampling Date		2024/10/17 09:23	2024/10/17 08:57	2024/10/17 10:00	2024/10/17 10:09	2024/10/17 09:40		2024/10/17 10:00		
COC Number		971460	971460	971460	971460	971460		971460		
	UNITS	**PL1-06**	**PL3-06**	**PL7-16**	**PL8-16**	**PL9-16**	**QC Batch**	**PL-QAQC-GW1**	**RDL**	**QC Batch**
Metals										
Dissolved Barium (Ba)	ug/L	52	5.6	23	4.9	12	9715510	23	2.0	9715747
Dissolved Boron (B)	ug/L	260	ND	110	ND	25	9715510	100	10	9715747
Dissolved Calcium (Ca)	ug/L	71000	6700	28000	5500	15000	9715510	27000	200	9715747
Dissolved Iron (Fe)	ug/L	ND	ND	ND	ND	ND	9715510	ND	100	9715747
Dissolved Magnesium (Mg)	ug/L	16000	2400	6400	1400	4100	9715510	6300	50	9715747
Dissolved Manganese (Mn)	ug/L	1700	ND	38	ND	ND	9715510	35	2.0	9715747
Dissolved Sodium (Na)	ug/L	32000	3600	16000	1800	7700	9715510	16000	100	9715747

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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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHO89
Sample ID: PL1-06
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716574	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716525	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716577	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715510	N/A	2024/10/22	Azita Fazaeli
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716498	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716571	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716531	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHO89 Dup
Sample ID: PL1-06
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716574	N/A	2024/10/26	Nachiketa Gohil
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716577	N/A	2024/10/26	Nachiketa Gohil
pH	AT	9716571	2024/10/22	2024/10/26	Nachiketa Gohil

Bureau Veritas ID: AGHO90
Sample ID: PL3-06
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715510	N/A	2024/10/22	Azita Fazaeli
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716501	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHO91
Sample ID: PL7-16
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716574	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716525	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716577	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715510	N/A	2024/10/22	Azita Fazaeli
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716498	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716571	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716531	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHO92
Sample ID: PL8-16
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716574	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716525	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716577	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715510	N/A	2024/10/22	Azita Fazaeli
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716501	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716571	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716531	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHO93
Sample ID: PL9-16
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716574	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716525	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716577	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715510	N/A	2024/10/22	Azita Fazaeli
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716498	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716571	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716531	N/A	2024/10/24	Alina Dobreanu

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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

TEST SUMMARY

Bureau Veritas ID: AGHO93
Sample ID: PL9-16
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

Bureau Veritas ID: AGHO93 Dup
Sample ID: PL9-16
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda

Bureau Veritas ID: AGHO94
Sample ID: PL-QAQC-GW1
Matrix: Water

Collected: 2024/10/17
Shipped:
Received: 2024/10/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9716440	N/A	2024/10/26	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9716521	N/A	2024/10/24	Alina Dobreanu
Chemical Oxygen Demand	SPEC	9718938	N/A	2024/10/24	Shivani Shivani
Conductivity	AT	9716449	N/A	2024/10/26	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9716512	N/A	2024/10/24	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9715747	N/A	2024/10/22	Nan Raykha
Total Ammonia-N	SKAL/NH4	9720668	N/A	2024/10/24	Jinal Chavda
Nitrate & Nitrite as Nitrogen in Water	LACH	9716501	N/A	2024/10/23	Chandra Nandlal
pH	AT	9716450	2024/10/22	2024/10/26	Nachiketa Gohil
Sulphate by Automated Turbidimetry	SKAL	9716522	N/A	2024/10/24	Alina Dobreanu
Total Dissolved Solids	BAL	9716161	2024/10/22	2024/10/23	Madhav Somani

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GENERAL COMMENTS

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

Package 1	5.0°C

Results relate only to the items tested.

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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

QUALITY ASSURANCE REPORT

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9715510	Dissolved Barium (Ba)	2024/10/22	94	80 - 120	95	80 - 120	ND, RDL=2.0	ug/L	2.0	20
9715510	Dissolved Boron (B)	2024/10/22	97	80 - 120	95	80 - 120	ND, RDL=10	ug/L	2.6	20
9715510	Dissolved Calcium (Ca)	2024/10/22	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L		
9715510	Dissolved Iron (Fe)	2024/10/22	91	80 - 120	95	80 - 120	ND, RDL=100	ug/L		
9715510	Dissolved Magnesium (Mg)	2024/10/22	NC	80 - 120	94	80 - 120	ND, RDL=50	ug/L		
9715510	Dissolved Manganese (Mn)	2024/10/22	95	80 - 120	97	80 - 120	ND, RDL=2.0	ug/L		
9715510	Dissolved Sodium (Na)	2024/10/22	NC	80 - 120	97	80 - 120	ND, RDL=100	ug/L	0.10	20
9715747	Dissolved Barium (Ba)	2024/10/22	96	80 - 120	97	80 - 120	ND, RDL=2.0	ug/L	3.0	20
9715747	Dissolved Boron (B)	2024/10/22	90	80 - 120	91	80 - 120	ND, RDL=10	ug/L	3.5	20
9715747	Dissolved Calcium (Ca)	2024/10/22	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L		
9715747	Dissolved Iron (Fe)	2024/10/22	98	80 - 120	100	80 - 120	ND, RDL=100	ug/L		
9715747	Dissolved Magnesium (Mg)	2024/10/22	94	80 - 120	98	80 - 120	ND, RDL=50	ug/L		
9715747	Dissolved Manganese (Mn)	2024/10/22	97	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L		
9715747	Dissolved Sodium (Na)	2024/10/22	NC	80 - 120	99	80 - 120	ND, RDL=100	ug/L	3.0	20
9716161	Total Dissolved Solids	2024/10/23			103	80 - 120	ND, RDL=10	mg/L	1.5	20
9716440	Alkalinity (Total as CaCO3)	2024/10/26			94	85 - 115	ND, RDL=1.0	mg/L	3.2	20
9716449	Conductivity	2024/10/26			100	85 - 115	ND, RDL=1.0	umho/cm	0.51	10
9716450	pH	2024/10/26			102	98 - 103			0.50	N/A
9716498	Nitrate (N)	2024/10/23	101	80 - 120	102	80 - 120	ND, RDL=0.10	mg/L	NC	20
9716501	Nitrate (N)	2024/10/23	98	80 - 120	103	80 - 120	ND, RDL=0.10	mg/L	0.47	20
9716512	Dissolved Organic Carbon	2024/10/24	NC	80 - 120	97	80 - 120	ND, RDL=0.4	mg/L	2.5	20
9716521	Dissolved Chloride (Cl-)	2024/10/24	NC	80 - 120	101	80 - 120	ND, RDL=1.0	mg/L	1.2	20
9716522	Dissolved Sulphate (SO4)	2024/10/24	92	75 - 125	95	80 - 120	ND, RDL=1.0	mg/L	5.6	20
9716525	Dissolved Chloride (Cl-)	2024/10/24	NC	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	1.2	20
9716531	Dissolved Sulphate (SO4)	2024/10/24	NC	75 - 125	94	80 - 120	ND, RDL=1.0	mg/L	3.5	20
9716571	pH	2024/10/26			102	98 - 103			0.81	N/A
9716574	Alkalinity (Total as CaCO3)	2024/10/26			96	85 - 115	ND, RDL=1.0	mg/L	0.59	20
9716577	Conductivity	2024/10/26			99	85 - 115	ND, RDL=1.0	umho/cm	0.30	10
9718938	Total Chemical Oxygen Demand (COD)	2024/10/24	104	80 - 120	101	80 - 120	ND, RDL=4.0	mg/L	NC	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9720668	Total Ammonia-N	2024/10/24	104	75 - 125	97	80 - 120	ND, RDL=0.050	mg/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.

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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Bureau Veritas Job #: C4W8619
Report Date: 2024/10/28

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: CM

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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Custody Tracking Form

T971460

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: PL1-06
Last Sample: PL-QAQC-GW1
Sample Count: 6

Relinquished By				Received By			
Nathan Wilson		Date	2024/10/17			Date	2024/10/18
		Time (24 HR)	16:20			Time (24 HR)	10:08
		Date				Date	
		Time (24 HR)				Time (24 HR)	
		Date				Date	
		Time (24 HR)				Time (24 HR)	

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): BM / NW

# of Coolers/Pkgs: 1

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

18-Oct-24 10:08
Elora Di Bratto
C4W8619

A3P env-1305

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	4	5	6

Drinking Water Metals Preservation Check Done (Circle) **YES** **NO**

COR FCD-00383/4

Page 1 of 1

Your Project #: 240205-03
Site Location: Papineau Lake
Your C.O.C. #: 880141

Attention: MHH Distribution

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

Report Date: 2025/01/06
Report #: R8466220
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C4D1257
Received: 2024/05/02, 09:11

Sample Matrix: Ground Water
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	10	N/A	2024/05/09	CAM SOP-00448	SM 24 2320 B m
Chloride by Automated Colourimetry	10	N/A	2024/05/07	CAM SOP-00463	SM 24 4500-Cl E m
Chemical Oxygen Demand	10	N/A	2024/05/08	CAM SOP-00416	SM 24 5220 D m
Conductivity	10	N/A	2024/05/09	CAM SOP-00414	SM 24 2510 m
Dissolved Organic Carbon (DOC) (1)	10	N/A	2024/05/07	CAM SOP-00446	SM 24 5310 B m
Dissolved Metals by ICPMS	10	N/A	2024/05/06	CAM SOP-00447	EPA 6020B m
Total Ammonia-N	10	N/A	2024/05/07	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	4	N/A	2024/05/04	CAM SOP-00440	SM 24 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (2)	6	N/A	2024/05/06	CAM SOP-00440	SM 24 4500-NO3I/NO2B
pH (3)	10	2024/05/03	2024/05/09	CAM SOP-00413	SM 24th - 4500H+ B
Phenols (4AAP)	8	N/A	2024/05/03	CAM SOP-00444	OMOE E3179 m
Phenols (4AAP)	2	N/A	2024/05/08	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	10	N/A	2024/05/07	CAM SOP-00464	SM 24 4500-SO42- E m
Total Dissolved Solids	10	2024/05/07	2024/05/08	CAM SOP-00428	SM 24 2540C m
Total Kjeldahl Nitrogen in Water	10	2024/05/06	2024/05/07	CAM SOP-00938	OMOE E3516 m
Total Phosphorus (Colourimetric)	1	2024/05/06	2024/05/07	CAM SOP-00407	SM 24 4500-P I
Total Phosphorus (Colourimetric)	8	2024/05/06	2024/05/08	CAM SOP-00407	SM 24 4500-P I
Total Phosphorus (Colourimetric)	1	2024/05/06	2024/05/09	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.

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.

Your Project #: 240205-03
Site Location: Papineau Lake
Your C.O.C. #: 880141

Attention: MHH Distribution

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

Report Date: 2025/01/06
Report #: R8466220
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C4D1257
Received: 2024/05/02, 09:11

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.

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:
Christine Gripton, Senior Project Manager
Email:
Phone# (519)652-9444
==========
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 #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		ZBG813			ZBG813			ZBG814		
Sampling Date		2024/04/30 14:40			2024/04/30 14:40			2024/04/30 14:22		
COC Number		880141			880141			880141		
	UNITS	PL1-06	RDL	QC Batch	PL1-06 Lab-Dup	RDL	QC Batch	PL2-06	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	0.18	0.050	9376271	0.18	0.050	9376271	1.8	0.050	9376271
Total Chemical Oxygen Demand (COD)	mg/L	ND	4.0	9375921				13	4.0	9375921
Conductivity	umho/cm	520	1.0	9373495	520	1.0	9373495	480	1.0	9373464
Total Dissolved Solids	mg/L	310	10	9374000				290	10	9374000
Total Kjeldahl Nitrogen (TKN)	mg/L	0.36	0.10	9375676				2.1	0.10	9375676
Dissolved Organic Carbon	mg/L	3.6	0.4	9375630				4.4	0.4	9375630
pH	pH	8.25		9373497	8.27		9373497	7.05		9373466
Phenols-4AAP	mg/L	ND	0.0010	9373412	ND	0.0010	9373412	ND	0.0010	9373412
Total Phosphorus	mg/L	ND	0.020	9376027	ND	0.020	9376027	1.5	0.020	9376027
Dissolved Sulphate (SO4)	mg/L	23	1.0	9373531				21	1.0	9373531
Alkalinity (Total as CaCO3)	mg/L	160	1.0	9373494	160	1.0	9373494	130	1.0	9373463
Dissolved Chloride (Cl-)	mg/L	52	2.0	9373523				53	2.0	9373523
Nitrite (N)	mg/L							ND	0.010	9373379
Nitrate (N)	mg/L	0.15	0.10	9373616				ND	0.10	9373379

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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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		ZBG815			ZBG816			ZBG816		
Sampling Date		2024/04/30 13:20			2024/04/30 14:32			2024/04/30 14:32		
COC Number		880141			880141			880141		
	UNITS	PL3-06	RDL	QC Batch	PL4-12	RDL	QC Batch	PL4-12 Lab-Dup	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9376271	ND	0.050	9376271			
Total Chemical Oxygen Demand (COD)	mg/L	ND	4.0	9375921	ND	4.0	9375921			
Conductivity	umho/cm	140	1.0	9373464	620	1.0	9373464			
Total Dissolved Solids	mg/L	125	10	9374000	375	10	9374000			
Total Kjeldahl Nitrogen (TKN)	mg/L	ND	0.10	9375676	0.11	0.10	9375676			
Dissolved Organic Carbon	mg/L	0.8	0.4	9375630	2.4	0.4	9375630	2.4	0.4	9375630
pH	pH	7.31		9373466	7.77		9373466			
Phenols-4AAP	mg/L	ND	0.0010	9373412	ND	0.0010	9373412			
Total Phosphorus	mg/L	8.7	0.020	9376027	0.29	0.020	9376027			
Dissolved Sulphate (SO4)	mg/L	2.8	1.0	9373531	41	1.0	9373531	41	1.0	9373531
Alkalinity (Total as CaCO3)	mg/L	23	1.0	9373463	230	1.0	9373463			
Dissolved Chloride (Cl-)	mg/L	26	1.0	9373523	36	1.0	9373523	36	1.0	9373523
Nitrite (N)	mg/L	ND	0.010	9373379						
Nitrate (N)	mg/L	0.17	0.10	9373379	ND	0.10	9373616			

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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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		ZBG817			ZBG818			ZBG819		
Sampling Date		2024/04/30 13:55			2024/04/30 13:40			2024/04/30 15:00		
COC Number		880141			880141			880141		
	UNITS	PL5-12	RDL	QC Batch	PL6-12	RDL	QC Batch	PL7-16	RDL	QC Batch
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	9376271	ND	0.050	9376271	ND	0.050	9376271
Total Chemical Oxygen Demand (COD)	mg/L	9.9	4.0	9375921	8.1	4.0	9375921	5.4	4.0	9375921
Conductivity	umho/cm	370	1.0	9373464	97	1.0	9373464	430	1.0	9373464
Total Dissolved Solids	mg/L	255	10	9374000	135	10	9374000	260	10	9374000
Total Kjeldahl Nitrogen (TKN)	mg/L	ND	0.10	9375676	ND (1)	0.20	9375676	0.13	0.10	9375676
Dissolved Organic Carbon	mg/L	1.8	0.4	9375630	1.7	0.4	9375630	2.9	0.4	9375630
pH	pH	7.10		9373466	7.32		9373466	7.40		9373466
Phenols-4AAP	mg/L	ND	0.0010	9373412	ND	0.0010	9373412	ND	0.0010	9381757
Total Phosphorus	mg/L	0.75	0.020	9376027	3.2	0.40	9375668	ND	0.020	9376027
Dissolved Sulphate (SO4)	mg/L	13	1.0	9373531	19	1.0	9373531	24	1.0	9373531
Alkalinity (Total as CaCO3)	mg/L	85	1.0	9373463	37	1.0	9373463	130	1.0	9373463
Dissolved Chloride (Cl-)	mg/L	54	2.0	9373523	19	1.0	9373523	40	1.0	9373523
Nitrite (N)	mg/L	ND	0.010	9373379				ND	0.010	9373379
Nitrate (N)	mg/L	0.14	0.10	9373379	ND	0.10	9373616	0.25	0.10	9373379

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		ZBG819			ZBG820		ZBG821		
Sampling Date		2024/04/30 15:00			2024/04/30 15:15		2024/04/30 14:10		
COC Number		880141			880141		880141		
	UNITS	PL7-16 Lab-Dup	RDL	QC Batch	PL8-16	QC Batch	PL9-16	RDL	QC Batch
Inorganics									
Total Ammonia-N	mg/L				ND	9376271	ND	0.050	9376271
Total Chemical Oxygen Demand (COD)	mg/L	5.4	4.0	9375921	ND	9375921	ND	4.0	9375921
Conductivity	umho/cm				55	9373464	180	1.0	9373464
Total Dissolved Solids	mg/L	260	10	9374000	10	9374000	115	10	9374000
Total Kjeldahl Nitrogen (TKN)	mg/L				ND	9375676	ND	0.10	9375676
Dissolved Organic Carbon	mg/L				1.1	9375630	1.2	0.4	9375630
pH	pH				7.23	9373466	7.11		9373466
Phenols-4AAP	mg/L				ND	9381757	ND	0.0010	9373412
Total Phosphorus	mg/L				ND	9376027	0.041	0.020	9376027
Dissolved Sulphate (SO4)	mg/L				6.9	9373531	13	1.0	9373531
Alkalinity (Total as CaCO3)	mg/L				21	9373463	48	1.0	9373463
Dissolved Chloride (Cl-)	mg/L				ND	9373523	25	1.0	9373523
Nitrate (N)	mg/L				0.16	9373616	0.45	0.10	9373616

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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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

RESULTS OF ANALYSES OF GROUND WATER

Bureau Veritas ID		ZBG821			ZBG822		
Sampling Date		2024/04/30 14:10			2024/04/30 15:00		
COC Number		880141			880141		
	UNITS	PL9-16 Lab-Dup	RDL	QC Batch	PL-QAQC-GW1	RDL	QC Batch
Inorganics							
Total Ammonia-N	mg/L				ND	0.050	9376271
Total Chemical Oxygen Demand (COD)	mg/L				ND	4.0	9375921
Conductivity	umho/cm				430	1.0	9373464
Total Dissolved Solids	mg/L				270	10	9374000
Total Kjeldahl Nitrogen (TKN)	mg/L				0.19	0.10	9375676
Dissolved Organic Carbon	mg/L				3.0	0.4	9375630
pH	pH				7.42		9373466
Phenols-4AAP	mg/L				ND	0.0010	9373412
Total Phosphorus	mg/L				ND	0.020	9376027
Dissolved Sulphate (SO4)	mg/L				24	1.0	9373531
Alkalinity (Total as CaCO3)	mg/L				130	1.0	9373463
Dissolved Chloride (Cl-)	mg/L				40	1.0	9373523
Nitrate (N)	mg/L	0.44	0.10	9373616	0.25	0.10	9373616

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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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

ELEMENTS BY ATOMIC SPECTROSCOPY (GROUND WATER)

Bureau Veritas ID		ZBG813	ZBG814	ZBG815	ZBG816	ZBG817	ZBG818	ZBG819		
Sampling Date		2024/04/30 14:40	2024/04/30 14:22	2024/04/30 13:20	2024/04/30 14:32	2024/04/30 13:55	2024/04/30 13:40	2024/04/30 15:00		
COC Number		880141	880141	880141	880141	880141	880141	880141		
	UNITS	PL1-06	PL2-06	PL3-06	PL4-12	PL5-12	PL6-12	PL7-16	RDL	QC Batch
Metals										
Dissolved Arsenic (As)	ug/L	ND	ND	ND	ND	ND	ND	ND	1.0	9374137
Dissolved Barium (Ba)	ug/L	38	100	9.1	55	36	4.7	38	2.0	9374137
Dissolved Boron (B)	ug/L	200	220	ND	150	31	ND	240	10	9374137
Dissolved Cadmium (Cd)	ug/L	ND	0.15	ND	ND	ND	ND	ND	0.090	9374137
Dissolved Calcium (Ca)	ug/L	54000	45000	11000	82000	42000	14000	43000	200	9374137
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9374137
Dissolved Copper (Cu)	ug/L	9.1	1.8	ND	ND	ND	3.3	4.4	0.90	9374137
Dissolved Iron (Fe)	ug/L	ND	1800	ND	ND	4800	ND	ND	100	9374137
Dissolved Lead (Pb)	ug/L	ND	ND	ND	ND	ND	ND	ND	0.50	9374137
Dissolved Magnesium (Mg)	ug/L	13000	8800	3600	21000	8000	1800	11000	50	9374137
Dissolved Manganese (Mn)	ug/L	1200	3500	ND	260	420	6.4	68	2.0	9374137
Dissolved Potassium (K)	ug/L	6800	9500	1700	5100	3800	1200	5500	200	9374137
Dissolved Sodium (Na)	ug/L	26000	22000	5300	11000	13000	1500	23000	100	9374137
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	ND	ND	ND	ND	5.0	9374137

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 (GROUND WATER)

Bureau Veritas ID		ZBG820	ZBG821	ZBG822		
Sampling Date		2024/04/30 15:15	2024/04/30 14:10	2024/04/30 15:00		
COC Number		880141	880141	880141		
	UNITS	PL8-16	PL9-16	PL-QAQC-GW1	RDL	QC Batch
Metals						
Dissolved Arsenic (As)	ug/L	ND	ND	ND	1.0	9374137
Dissolved Barium (Ba)	ug/L	3.9	14	38	2.0	9374137
Dissolved Boron (B)	ug/L	ND	39	240	10	9374137
Dissolved Cadmium (Cd)	ug/L	ND	ND	ND	0.090	9374137
Dissolved Calcium (Ca)	ug/L	5600	16000	43000	200	9374137
Dissolved Chromium (Cr)	ug/L	ND	ND	ND	5.0	9374137
Dissolved Copper (Cu)	ug/L	ND	ND	4.4	0.90	9374137
Dissolved Iron (Fe)	ug/L	ND	ND	ND	100	9374137
Dissolved Lead (Pb)	ug/L	ND	ND	ND	0.50	9374137
Dissolved Magnesium (Mg)	ug/L	1600	4400	10000	50	9374137
Dissolved Manganese (Mn)	ug/L	ND	ND	68	2.0	9374137
Dissolved Potassium (K)	ug/L	1100	2600	5500	200	9374137
Dissolved Sodium (Na)	ug/L	1700	7900	23000	100	9374137
Dissolved Zinc (Zn)	ug/L	ND	ND	ND	5.0	9374137

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

TEST SUMMARY

Bureau Veritas ID: ZBG813
Sample ID: PL1-06
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373494	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373495	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law
pH	AT	9373497	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

Bureau Veritas ID: ZBG813 Dup
Sample ID: PL1-06
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373494	N/A	2024/05/09	Nachiketa Gohil
Conductivity	AT	9373495	N/A	2024/05/09	Nachiketa Gohil
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
pH	AT	9373497	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

Bureau Veritas ID: ZBG814
Sample ID: PL2-06
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373379	N/A	2024/05/04	Jinal Chavda
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

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TEST SUMMARY

Bureau Veritas ID: ZBG814
Sample ID: PL2-06
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

Bureau Veritas ID: ZBG815
Sample ID: PL3-06
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373379	N/A	2024/05/04	Jinal Chavda
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

Bureau Veritas ID: ZBG816
Sample ID: PL4-12
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

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TEST SUMMARY

Bureau Veritas ID: ZBG816 Dup
Sample ID: PL4-12
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan

Bureau Veritas ID: ZBG817
Sample ID: PL5-12
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373379	N/A	2024/05/04	Jinal Chavda
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

Bureau Veritas ID: ZBG818
Sample ID: PL6-12
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9375668	2024/05/06	2024/05/07	Muskan

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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: ZBG819
Sample ID: PL7-16
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373379	N/A	2024/05/04	Jinal Chavda
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9381757	N/A	2024/05/08	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

Bureau Veritas ID: ZBG819 Dup
Sample ID: PL7-16
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh

Bureau Veritas ID: ZBG820
Sample ID: PL8-16
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9381757	N/A	2024/05/08	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

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Bureau Veritas Job #: C4D1257
Report Date: 2025/01/06

BluMetric Environmental Inc
Client Project #: 240205-03
Site Location: Papineau Lake
Sampler Initials: BM

TEST SUMMARY

Bureau Veritas ID: ZBG821
Sample ID: PL9-16
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/09	Muskan

Bureau Veritas ID: ZBG821 Dup
Sample ID: PL9-16
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law

Bureau Veritas ID: ZBG822
Sample ID: PL-QAQC-GW1
Matrix: Ground Water

Collected: 2024/04/30
Shipped:
Received: 2024/05/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	9373463	N/A	2024/05/09	Nachiketa Gohil
Chloride by Automated Colourimetry	SKAL	9373523	N/A	2024/05/07	Massarat Jan
Chemical Oxygen Demand	SPEC	9375921	N/A	2024/05/08	Neil Dassanayake
Conductivity	AT	9373464	N/A	2024/05/09	Nachiketa Gohil
Dissolved Organic Carbon (DOC)	TOCV/NDIR	9375630	N/A	2024/05/07	Gyulshen Idriz
Dissolved Metals by ICPMS	ICP/MS	9374137	N/A	2024/05/06	Prempal Bhatti
Total Ammonia-N	SKAL/NH4	9376271	N/A	2024/05/07	Yogesh Patel
Nitrate & Nitrite as Nitrogen in Water	LACH	9373616	N/A	2024/05/06	Samuel Law
pH	AT	9373466	2024/05/03	2024/05/09	Nachiketa Gohil
Phenols (4AAP)	TECH/PHEN	9373412	N/A	2024/05/03	Chandra Nandlal
Sulphate by Automated Turbidimetry	SKAL	9373531	N/A	2024/05/07	Massarat Jan
Total Dissolved Solids	BAL	9374000	2024/05/07	2024/05/08	Razieh Tabesh
Total Kjeldahl Nitrogen in Water	SKAL	9375676	2024/05/06	2024/05/07	Rajni Tyagi
Total Phosphorus (Colourimetric)	SKAL/P	9376027	2024/05/06	2024/05/08	Muskan

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GENERAL COMMENTS

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

Package 1	6.7°C
Package 2	5.0°C

Revised Report [2025/01/06]: Nitrite included in report.

Results relate only to the items tested.

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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
9373379	Nitrate (N)	2024/05/04	86	80 - 120	91	80 - 120	ND, RDL=0.10	mg/L	2.3	20		
9373379	Nitrite (N)	2024/05/04	96	80 - 120	96	80 - 120	ND, RDL=0.010	mg/L	0.87	20		
9373412	Phenols-4AAP	2024/05/03	92	80 - 120	98	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
9373463	Alkalinity (Total as CaCO3)	2024/05/09			101	85 - 115	ND, RDL=1.0	mg/L	0.28	20		
9373464	Conductivity	2024/05/09			103	85 - 115	ND, RDL=1.0	umho/cm	0.55	10		
9373466	pH	2024/05/09			102	98 - 103			0.70	N/A		
9373494	Alkalinity (Total as CaCO3)	2024/05/09			102	85 - 115	ND, RDL=1.0	mg/L	1.0	20		
9373495	Conductivity	2024/05/09			102	85 - 115	ND, RDL=1.0	umho/cm	0	10		
9373497	pH	2024/05/09			102	98 - 103			0.30	N/A		
9373523	Dissolved Chloride (Cl-)	2024/05/07	NC	80 - 120	104	80 - 120	ND, RDL=1.0	mg/L	0.42	20		
9373531	Dissolved Sulphate (SO4)	2024/05/07	NC	75 - 125	98	80 - 120	ND, RDL=1.0	mg/L	0.052	20		
9373616	Nitrate (N)	2024/05/06	92	80 - 120	90	80 - 120	ND, RDL=0.10	mg/L	0.18	20		
9374000	Total Dissolved Solids	2024/05/08			100	80 - 120	ND, RDL=10	mg/L	0	20		
9374137	Dissolved Arsenic (As)	2024/05/06	102	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	NC	20		
9374137	Dissolved Barium (Ba)	2024/05/06	103	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	1.8	20		
9374137	Dissolved Boron (B)	2024/05/06	103	80 - 120	100	80 - 120	ND, RDL=10	ug/L	2.9	20		
9374137	Dissolved Cadmium (Cd)	2024/05/06	105	80 - 120	98	80 - 120	ND, RDL=0.090	ug/L	3.5	20		
9374137	Dissolved Calcium (Ca)	2024/05/06	NC	80 - 120	100	80 - 120	ND, RDL=200	ug/L	1.5	20		
9374137	Dissolved Chromium (Cr)	2024/05/06	101	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC	20		
9374137	Dissolved Copper (Cu)	2024/05/06	101	80 - 120	98	80 - 120	ND, RDL=0.90	ug/L	1.8	20		
9374137	Dissolved Iron (Fe)	2024/05/06	104	80 - 120	100	80 - 120	ND, RDL=100	ug/L	NC	20		
9374137	Dissolved Lead (Pb)	2024/05/06	100	80 - 120	99	80 - 120	ND, RDL=0.50	ug/L	2.0	20		
9374137	Dissolved Magnesium (Mg)	2024/05/06	NC	80 - 120	99	80 - 120	ND, RDL=50	ug/L	1.2	20		
9374137	Dissolved Manganese (Mn)	2024/05/06	NC	80 - 120	100	80 - 120	ND, RDL=2.0	ug/L	1.9	20		
9374137	Dissolved Potassium (K)	2024/05/06	103	80 - 120	101	80 - 120	ND, RDL=200	ug/L	1.6	20		
9374137	Dissolved Sodium (Na)	2024/05/06	101	80 - 120	99	80 - 120	ND, RDL=100	ug/L	1.2	20		
9374137	Dissolved Zinc (Zn)	2024/05/06	101	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	0.76	20		

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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
9375630	Dissolved Organic Carbon	2024/05/07	93	80 - 120	97	80 - 120	ND, RDL=0.4	mg/L	1.1	20		
9375668	Total Phosphorus	2024/05/07	91	80 - 120	97	80 - 120	ND, RDL=0.020	mg/L	1.8	20	96	80 - 120
9375676	Total Kjeldahl Nitrogen (TKN)	2024/05/08	NC	80 - 120	104	80 - 120	ND, RDL=0.10	mg/L	7.1	20	99	80 - 120
9375921	Total Chemical Oxygen Demand (COD)	2024/05/08	113	80 - 120	101	80 - 120	ND, RDL=4.0	mg/L	0	20		
9376027	Total Phosphorus	2024/05/08	94	80 - 120	99	80 - 120	ND, RDL=0.020	mg/L	NC	20	97	80 - 120
9376271	Total Ammonia-N	2024/05/07	96	75 - 125	98	80 - 120	ND, RDL=0.050	mg/L	0.44	20		
9381757	Phenols-4AAP	2024/05/08	105	80 - 120	107	80 - 120	ND, RDL=0.0010	mg/L	9.5	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).

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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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IMMEDIATE

Custody Tracking Form

T880141

Please use this form for custody tracking when submitting the work instructions via eCOC (electronic Chain of Custody). Please ensure your form has a barcode or a Bureau Veritas eCOC confirmation number in the top right hand side. This number links your electronic submission to your samples. This form should be placed in the cooler with your samples.

First Sample: PL1-06
Last Sample: PL-QAQC-GW1
Sample Count: 10

Relinquished By				Received By			
Brad M'Callum	Brad M'Cal	Date	2024/05/01			Date	2024/05/02
		Time (24 HR)	08:00			Time (24 HR)	09:11
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Unless otherwise agreed to, submissions and use of services are governed by Bureau Veritas' standard terms and conditions which can be found at www.bvna.com.

Triage Information

Sampled By (Print): Brad M'Callum / Matthew DeGeer

# of Coolers/Pkgs: 2

Rush ☐ Immediate Test ☐ Food Residue ☐

Micro ☐ Food Chemistry ☐

*** LABORATORY USE ONLY ***

Received At

Labeled By

Verified By

Lab Comments:

02-May-24 09:11
Christine Gripton
C4D1257
JDK ENV-915

Custody Seal		Cooling Media	Temperature °C		
Present (Y/N)	Intact (Y/N)	Present (Y/N)	1	2	3
Y	Y	Y	6	7	7
Y	Y	Y	5	4	6

Drinking Water Metals Preservation Check Done (Circle) YES NO

COR FCD-00383/4

Page 1 of 1

Appendix D

D-3 QAQC Comparisons

2023 Groundwater Sampling Quality Assurance and Quality Control
(Spring)

Parameter	Unit	RDL	PL7-16	PL-QAQC-GW1 (PL7-16)	Relative Percent Difference
			2024-Apr-30	2024-Apr-30	
Chloride	mg/L	0.10	40.00	40.00	0%
Nitrate as N	mg/L	0.05	0.25	0.25	N/A
Nitrite as N	mg/L	0.05	<0.01	-	N/A
Sulphate	mg/L	0.10	24.00	24.00	0%
Calcium (diss)	mg/L	0.05	43	43	0%
Magnesium (diss)	mg/L	0.05	11	10	-2%
Potassium (diss)	mg/L	0.50	5.50	5.50	0%
Sodium (diss)	mg/L	0.05	23	23	0%
Alkalinity (as CaCO3)	mg/L	5	130	130	0%
Ammonia as N	mg/L	0.02	<0.05	<0.05	N/A
Chemical Oxygen Demand	mg/L	5	5.4	<4	N/A
Dissolved Organic Carbon	mg/L	0.5	2.9	3	-1%
Electrical Conductivity	uS/cm	2	430	430	0%
pH	pH units	0.01	7.4	7.42	0%
Phenols-4AAP	mg/L	0.0010	<0.001	<0.001	N/A
Total Dissolved Solids	mg/L	10	260	270	-1%
Total Kjeldahl Nitrogen	mg/L	0.10	0.13	0.19	-9%
Total Phosphorus	mg/L	0.02	<0.02	<0.02	N/A
Arsenic (diss)	mg/L	0.001	<0.001	<0.001	N/A
Barium (diss)	mg/L	0.002	0.038	0.038	0%
Boron (diss)	mg/L	0.010	0.240	0.240	0%
Cadmium (diss)	mg/L	0.0001	<0.00009	<0.00009	N/A
Chromium (diss)	mg/L	0.002	<0.005	<0.005	N/A
Copper (diss)	mg/L	0.001	0.0044	0.0044	0%
Iron (diss)	mg/L	0.010	<0.1	<0.1	N/A
Lead (diss)	mg/L	0.0005	<0.0005	<0.0005	N/A
Manganese (diss)	mg/L	0.002	0.068	0.068	0%
Zinc (diss)	mg/L	0.005	<0.005	<0.005	N/A

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 nt 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)

2024 Groundwater Sampling Quality Assurance and Quality Control
(Fall)

Parameter	Unit	RDL	PL7-16	PL-QAQC-GW1 (PL7-16)	Relative Percent Difference
			2024-Oct-17	2024-Oct-17	
Chloride	mg/L	0.10	23.00	23.00	0%
Nitrate as N	mg/L	0.10	0.87	0.89	1%
Sulphate	mg/L	1.00	17.00	17.00	0%
Calcium (diss)	mg/L	0.2	28	27	-1%
Magnesium (diss)	mg/L	0.05	6.4	6.3	0%
Sodium (diss)	mg/L	0.1	16	16	0%
Alkalinity (as CaCO3)	mg/L	1	95	96	0%
Ammonia as N	mg/L	0.05	<0.05	<0.05	N/A
Chemical Oxygen Demand	mg/L	4	<4	<4	N/A
Dissolved Organic Carbon	mg/L	0.4	1.8	1.8	0%
Electrical Conductivity	uS/cm	1	310	310	0%
pH	pH units	0.01	7.5	7.55	0%
Total Dissolved Solids	mg/L	10	190	200	-1%
Barium (diss)	mg/L	0.002	0.023	0.023	0%
Boron (diss)	mg/L	0.010	0.110	0.100	-2%
Iron (diss)	mg/L	0.10	<0.1	<0.1	N/A
Manganese (diss)	mg/L	0.002	0.038	0.035	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 nt 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 2023)

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL1-06	PL1-06
						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	PL1-06	PL1-06
						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	2015-Oct-27
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number																				
						Lab Sample ID																				
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	-	-	25	25	18	26	15	27	22	35	16	32	18	37	17	32.6	16.3	33	28.5	35.4
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	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	0.18
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 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	49.3
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	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	58
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	14.4
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	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	101	200	-	-	0.05, 0.1	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	30
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	135	141	128	133	140	132	118	138	132	142	118	149	135	144	123	161	127	169	149	170
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	-	-	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	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	-	-	<5	<5	<5	13	10	18	8	10	10	12	12	<10	<5	13	<5	<5	<5	13
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	-	-	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	6.1
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	394	424	394	432	391	446	336	462	416	504	346	522	439	516	357	512	360	519	455	550
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	204.1
pH	pH units	6.7 - 7.7	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	6.66
Phenols	mg/L	-	-	0.001	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	-	-	256	281	254	290	218	300	270	328	225	339	276	310	194	278	204	314	252	320
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	0.31	-	0.32	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<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	0.0036	0.01	-	0.005	0.001, 0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	-	<0.003	-	-	-
Barium (diss)	mg/L	0.3	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	0.04
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	1.3	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	0.403
Cadmium (diss)	mg/L	0.0013	0.005	-	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	<0.0001	<0.002	-	<0.002	-	<0.002	-
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	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	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	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, 0.1	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	<0.01
Lead (diss)	mg/L	0.0029	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	<0.001	<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	1.1
Mercury (diss)	mg/L	0.0003	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	2.5	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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate manually.

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL2-06	PL2-06
						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	PL2-06	PL2-06
						Sample Date	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	2006-May-09	2006-Nov-21
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number											21T737457	21P816525	22T887348	22T960247	23T020440	C3W4742	C4D1257	C4W8619		
						Lab Sample ID											2380164	3096760	3778657	4443084	4958096	XIG925	ZBG813			
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	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	2.7	10	-	-	0.05, 0.1	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	2.69	6.37
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	-	-	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	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	95	44
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	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	20	27
Magnesium (diss)	mg/L	-	-	-	-	0.05	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	5	8
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	10.7	-	5.28	-	6	-	5.9	-	5.41	-	6.24	-	6.29	-	5.82	-	6.8	-	3	5
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	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	28	10
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	122	215	114	208	145	160	147	198	110	179	130	184	153	220	132	240	160	190	24	70
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	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, 5	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, 0.5	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, 2	337	575	375	529	413	590	468	576	488	511	465	584	492	694	447	710	520	660	309	279
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		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	-	-	-	-	70.5	100.4
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		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	6.49	6.46
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, 20	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, 0.2	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, 0.4	<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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.03
Arsenic (diss)	mg/L	0.0036	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	0.3	1	-	-	0.002	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	0.04	0.05
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	0.157	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	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	0.05	0.04
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.00009	-	0.0001	<0.0001
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.003	-	<0.003	-	<0.003	-	0.01	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.005	-	<0.001	0.001
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.0008
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	0.005	-	0.004	-	0.005	-	0.005	-	0.005	-	0.005	-	0.006	-	0.005	-	0.0091	-	0.006	0.002
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	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	0.73	<0.03
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	-	<0.0005	-	<0.001	<0.001
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	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	0.3	0.1
Mercury (diss)	mg/L	0.0003	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.012	<0.005
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.6	6.6
Silver (diss)	mg/L	-	-	0.0001	-	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Strontium (diss)	mg/L	-	-	-	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.135	0.177
Thallium (diss)	mg/L	-	-	-	0.0003	0.0001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0001	<0.0001
Titanium (diss)	mg/L	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.04	<0.01

-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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL2-06	PL2-06	PL2-06	PL2-06
						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	PL2-06	PL2-06	PL2-06	PL2-06
						Sample Date	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	2015-Oct-27	2016-Apr-27	2016-Oct-27
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number																			
						Lab Sample ID																			
Anions						Detection Limit																			
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	11	6	4	7	5	6	6	6	9	7	6	7	13.7	13.4	25.1	16.9	49.2	16.8	68.5	25.7
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	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	5.55	3.14	4.15	1.89	1.16
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	29	19	20	24	22	23	29	28	18	19	25	22	25.5	22.4	45.2	23.3	33.1	21.2	107	31.6
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	30	20	20	23	22	20	26	26	20	18	22.4	13.8	39	25.8	33.9	31.4	48.8	32.7	78.1	39.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	8	6	5	6	6	6	6	7	5	4	6.2	5.8	9.64	6.29	7.9	7.46	11.9	7.6	18.7	8.61
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	5	4	5	4	5	4	4	4	3	4	4.05	4.9	6.02	-	5.48	-	6.8	-	10.7	-
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	7	5	5	5	5	4	5	5	4	3	5.2	5.5	6.66	6.45	10.8	8.73	13.1	12.9	53.9	19.6
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	88	55	46	53	58	55	55	57	55	54	50	52	76	50	59	74	104	89	216	130
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	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	0.14	<0.02	<0.02	0.58	0.35
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	<5	<5	<5	10	10	6	8	<5	13	8	12	<10	<5	<5	<5	<5	5	9	33	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	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	2	4.8	3.9	16.3	3.8
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	307	195	190	222	212	214	237	228	204	187	256	197	294	220	333	300	472	313	780	404
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		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	109.1	170.9	112.9	272	135.1
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		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	7.87	7.26	6.64	7.38	7.5
Phenols	mg/L	-	-	0.001	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	200	127	123	144	138	139	154	148	133	122	175	58	134	120	198	184	274	188	474	238
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	-	-	-	-	-	-	-	-	-	-	-	0.18	-	0.52	-	0.42	-	2.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	-	-	-	-	-	-	-	-	-	-	-	**1.03**	-	**1.84**	-	**0.79**	-	**0.92**	-
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	0.007	0.006	-	-	-	-	0.016	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	-	<0.003	-	-	-	-	-
Barium (diss)	mg/L	0.3	1	-	-	0.002	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	0.062	0.134	0.072	0.153	0.083
Beryllium (diss)	mg/L	-	-	Calculated	-	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	1.3	5	-	0.2	0.01	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	0.306	0.371	0.223	0.656	0.22
Cadmium (diss)	mg/L	0.0013	0.005	-	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	<0.002	-	<0.002	-	<0.002	-	<0.002	-
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 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	<0.003	-	<0.003	-	<0.003	-	<0.003	-
Cobalt (diss)	mg/L	-	-	-	0.0009	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	0.5004	1	-	Calculated	0.0009, 0.001, 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	-	0.005	-	0.02	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	<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	<0.01	0.114	0.039
Lead (diss)	mg/L	0.0029	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	<0.0001	0.0006	<0.002	-	<0.002	-	<0.002	-	<0.002	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	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	-	1.58	0.889	4.55	3.6
Mercury (diss)	mg/L	0.0003	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	<0.0005	<0.0005	-	-	-	-	-	-	-	-
Nickel (diss)	mg/L	-	-	0.025	-	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	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	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	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	0.0002	<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	<0.005	<0.005	-	-	-	-	-	-	-	-
Vanadium (diss)	mg/L	-	-	-	0.006	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	2.5	5	-	0.02	0.005	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	-	0.007	-

-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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06
						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	PL-QAQC-GW1 (PL2-06)	PL2-06	PL3-06	PL3-06	PL3-06	PL3-06	PL3-06
						Sample Date	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	2024-Apr-30	2006-May-09	2006-Nov-21	2007-May-02	2007-Nov-21	2008-May-08
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number									21T737457	21P816525	22T887348	22T960247	23T020440	23T020440	C4D1257					
						Lab Sample ID									2380202	3096763	3779268	4443085	4958100	4958108	ZBG814					
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	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	53	-	-	3	3	<1
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	<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	<0.1	0.3	0.47	0.61	0.45	1.55
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	<0.05	-	<0.05	<0.05	<0.01	-	-	-	-	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	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	21	87	12	6	6	7
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	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	45	8	8	9	6	6
Magnesium (diss)	mg/L	-	-	-	-	0.05	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	8.8	2	3	3	3	2
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	11.2	-	11.3	-	11.1	-	10	-	10.7	-	9.11	-	11.9	11.7	9.5	2	3	2	2	7
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	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	22	42	2	<2	<2	<2
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	314	161	242	121	302	156	180	154	197	153	177	127	316	313	130	12	37	37	26	27
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	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	1.8	-	-	0.03	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	49	14	13	<5	44	8	23	<5	<5	<5	25	17	65	<5	13	-	-	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	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	4.4	-	-	2.4	2.2	1.2
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	926	413	663	422	737	446	675	444	635	483	573	413	922	928	480	292	87	85	71	82
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		295.6	147.3	240.4	127.2	231.1	154.3	163.5	145.5	200.3	147.8	170.8	118	-	-	-	28.2	32.3	34.8	27.3	23.2
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		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	7.05	6.64	6.83	6.54	7.3	7.12
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	0.001	-	**0.005**	-	**0.002**	-	**0.013**	-	**0.047**	-	**0.0012**	**0.0011**	<0.001	-	-	-	-	-
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	494	246	412	230	394	250	290	244	402	280	322	192	546	520	290	-	-	55	46	53
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	2.97	-	2.66	-	2.96	-	2.77	-	2.62	-	1.86	-	5.02	4.05	2.1	-	-	-	-	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	**0.75**	-	**0.12**	-	**0.6**	-	**0.56**	-	**0.36**	-	**3.31**	-	**1.66**	**1.2**	**1.5**	-	-	-	-	-
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	0.01	0.02	0.01	0.01
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	0.001	0.001	<0.001	-	-	-	-	-
Barium (diss)	mg/L	0.3	1	-	-	0.002	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	0.1	0.02	<0.01	<0.01	<0.01	<0.01
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	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	0.22	0.01	<0.01	0.01	<0.01	0.01
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	0.00015	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.003	-	<0.003	-	0.012	-	<0.003	-	<0.003	-	<0.003	-	<0.002	<0.002	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0086	0.0002	<0.0002	<0.0002	<0.0002
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	0.012	-	0.004	-	0.006	-	0.004	-	0.004	-	0.004	-	0.007	0.007	0.0018	0.004	0.001	0.001	<0.001	<0.001
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	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	1.8	0.06	<0.03	<0.03	<0.03	<0.03
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	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	3.5	0.17	0.01	<0.01	<0.01	<0.01
Mercury (diss)	mg/L	0.0003	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel (diss)	mg/L	-	-	0.025	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.007	<0.005	<0.005	<0.005	<0.005
Silicon (diss)	mg/L	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	5.2	6.3	6	7.4
Silver (diss)	mg/L	-	-	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
Thallium (diss)	mg/L	-	-	-	0.0003	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
Vanadium (diss)	mg/L	-	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	<0.005	0.01	<0.01	0.01	<0.01	<0.01

-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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL3-06
						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	PL3-06
						Sample Date	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	2015-Oct-27	2016-Apr-27	2016-Oct-27	2017-May-11	2017-Oct-24	2018-May-08
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number																			
						Lab Sample ID																			
Anions						Detection Limit																			
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	5	57	6	5	5	5	7	3	6	2.69	2.94	0.72	1.42	2.12	2.49	0.77	2.97	0.5	5.51	1.87
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	3.46	0.4	0.41	0.31	0.33	0.31	0.37	0.4	0.3	0.46	0.28	0.36	0.17	0.19	0.29	0.5	0.25	0.28	0.18	0.19
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	22	5	4	3	4	5	4	3	4	3.85	3.2	3.81	3.77	4.19	3.49	3.07	3.24	2.51	3.28	3.7
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	16	6	6	6	6	7	6	7.4	4.5	7.28	7.46	6	6.57	5.94	5.96	5.63	6.29	5.7	6.68	5.21
Magnesium (diss)	mg/L	-	-	-	-	0.05	5	2	2	2	2	2	2	2.03	<0.005	2.48	2.49	2.11	2.22	1.97	2.14	2.02	2.26	2.18	2.39	1.91
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	6	1	2	1	1	1	1	1.2	1.3	1.51	-	1.32	1.62	1.3	-	1.5	-	1.49	-	1.25
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	4	3	2	3	<2	<2	2	1.8	1.9	1.97	1.95	1.42	1.24	1.77	1.97	1.64	1.68	1.31	1.69	1.56
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	40	30	24	23	23	32	33	21	20	22	24	28	28	20	22	25	26	25	22	25
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.04	0.06	<0.01	<0.02	<0.02	0.08	0.16	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	0.07
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	8	<5	<5	<5	<5	8	8	30	11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	1.3	0.9	1.5	1.2	0.9	4.2	0.9	1.7	1	0.6	0.8	1.2	1	0.7	1.8	1.8	1.4	0.6	1.7	1
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	184	71	68	66	71	76	83	74	73	64	68	76	68	61	63	57	68	61	63	56
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		60.5	23.2	23.2	23.2	23.2	25.7	23.2	26.8	11.2	28.4	28.9	23.7	25.5	22.9	23.7	22.4	25	23.2	26.5	20.9
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		7.35	7.25	7.08	7.18	7.1	7.12	6.34	6.9	6.6	7.3	6.93	7.44	7.57	7.17	6.42	7.06	7.12	7.19	6.86	6.58
Phenols	mg/L	-	-	0.001	-	0.001	-	-	-	-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	120	46	44	43	46	49	54	98	58	20	154	56	54	46	42	48	54	<20	50	58
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	-	-	-	-	-	-	-	-	<0.1	-	0.2	-	<0.1	-	0.8	-	<0.1	-	0.22
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	-	-	-	-	-	-	-	-	**0.93**	-	**4.28**	-	**3**	-	**1.9**	-	**0.92**	-	**1.86**
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.001	0.002	-	-	-	-	0.005	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	-	-	-	-	-	-	-	-	-	<0.003	-	<0.003	-	-	-	<0.003	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.3	1	-	-	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.005	0.006	0.005	0.006	0.005	0.005	0.005	0.005	0.005	0.006	0.004	0.005	0.005
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	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	0.012	0.01	<0.01	<0.01	<0.01	<0.01	0.012	0.016
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 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	-	<0.002	-	<0.001	-	<0.0001
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0005	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	<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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 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	-	<0.002	-	<0.002	-	<0.001
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.002	-	<0.002	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0003	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	<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	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-
Silicon (diss)	mg/L	-	-	-	-	0.1	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	-	-	-	-	-	-	-	-	-	-	-
Strontium (diss)	mg/L	-	-	-	-	0.001	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	-	-	-	-	-	-	-	-	-	-	-
Titanium (diss)	mg/L	-	-	-	-	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	<0.0005	<0.0005	-	-	-	-	-	-	-	-	-	-	-
Zinc (diss)	mg/L	2.5	5	-	0.02	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12
						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	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12	PL4-12
						Sample Date	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	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12	2014-Oct-15	2015-May-05	2015-Oct-27
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number						21T737457	21P816525	22T887348	22T960247	23T020440	C3W4742	C4D1257	C4W8619							
						Lab Sample ID						2380227	3096764	3779269	4443086	4958101	XIG926	ZBG815								
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	5.54	3.31	8.65	1.79	14.1	17.1	35.2	48.4	49.2	36.1	52	26	8.6	15	16.1	13.5	13.2	13.4	10.9	12.8
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.19	0.35	0.22	0.16	0.21	0.2	0.28	0.24	0.29	0.27	0.26	0.17	0.31	1.2	0.32	0.16	0.15	0.07	0.14	0.38
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.01	-	-	<0.1	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	3.52	2.65	3.03	3.12	2.44	2.38	2.5	7.32	2.63	3.28	2.4	2.8	3.2	95	52.2	50.9	48.4	45.7	46.7	39.9
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	6.15	6.57	7.99	5.14	8.36	9.01	14.3	17.6	16.7	12.9	22	11	6.7	34.3	66	69.9	53.5	57.4	55.8	63.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	2.13	2.27	2.85	1.82	2.9	3.22	5.08	5.99	5.91	3.93	7.2	3.6	2.4	9.1	17.8	17.4	13.2	13.6	13.1	15.8
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	-	1.49	-	1.17	-	1.63	-	2.1	-	1.58	-	1.7	-	6.2	5.87	-	5.3	-	5.04	-
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	1.8	1.86	1.86	1.62	2.44	2.77	3.11	4.77	5.16	4.58	5.8	5.3	3.6	88.8	19.3	13.5	12	8.09	7.99	8.26
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	17	30	21	23	21	18	21	9	17	12	16	23	25	175	184	182	157	164	149	180
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	<0.02	<0.02	0.04	0.05	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.05	<0.05	<0.05	0.04	<0.02	<0.02	0.12	0.14	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	<5	<5	<5	<5	<5	<5	<5	<5	12	<5	<4	<4	<4	88	<5	<5	11	-	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	0.7	1.5	0.5	0.9	0.6	<0.5	4.1	0.9	0.5	0.7	1.2	0.8	0.7	5	2.6	1.3	1.8	1.3	1.3	2.2
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	72	69	77	71	90	104	162	203	214	176	250	140	89	577	501	453	439	454	421	476
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		24.1	25.8	31.7	20.3	32.8	35.8	56.6	68.6	66	-	-	-	-	123.1	238.1	246.2	187.9	199.3	193.3	224.6
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		6.91	6.6	6.86	6.79	6.57	6.93	6.82	6.52	6.91	6.64	6.93	7.31	7.28	7.4	7.78	7.84	7.72	8.08	7.88	7.25
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, 20	50	66	52	44	46	78	148	164	136	152	140	125	80	346	262	370	240	254	236	260
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	<0.1	-	0.21	-	<0.1	-	<0.1	-	<0.1	-	<0.1	-	-	<0.1	-	0.9	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	**3.11**	-	**2.17**	-	**1.97**	-	**1.28**	-	**2.38**	-	**8.7**	-	-	**3.51**	-	**3.23**	-	**0.63**	-
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	0.065	-	-	-	-	0.02	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.001	-	<0.001	-	-	<0.003	-	<0.003	-	-	-
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.006	0.006	0.006	0.004	0.007	0.008	0.011	0.014	0.014	0.01	0.018	0.0091	0.0056	0.08	0.066	0.064	0.058	0.051	0.053	0.052
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.011	<0.01	0.014	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.077	0.064	0.065	0.059	0.068	0.041	0.069
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.00009	-	<0.0001	<0.002	-	<0.002	-	<0.002	-
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.005	-	<0.001	<0.003	-	<0.003	-	<0.003	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0035	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.0009	-	0.0016	<0.003	-	<0.003	-	<0.003	-
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	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	-	<0.0005	-	<0.0001	<0.002	-	<0.002	-	<0.002	-
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	0.199	0.582	-	0.288	-	0.147	0.162
Mercury (diss)	mg/L	0.0003	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	2.5	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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL4-12	PL4-12	PL5-12	PL5-12	PL5-12	PL5-12
						Sample ID	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	PL4-12	PL4-12	PL5-12	PL5-12	PL5-12	PL5-12
						Sample Date	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	2012-Oct-17	2013-Apr-17	2013-Oct-29	2014-May-12
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number											21T737457	21P816525	22T887348	22T960247	23T020440	C4D1257				
						Lab Sample ID											2380254	3096765	3779270	4443087	4958102	ZBG816				
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	13.8	14.9	13.6	15.6	22.3	22.7	15	22.7	18.8	26.1	20.1	29	29.9	37.4	42.4	36	12	10	4.85	4.51
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.13	0.21	0.11	0.19	0.1	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	1.1	0.11	0.05	0.12
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05	-	<0.05
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	48.1	45.9	48.6	43.8	48.9	43.2	46.2	42	46.5	42.9	43.8	44.5	43.8	42	37.2	41	67	34.5	10.8	15.6
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	56.2	63.6	53.8	64.6	64.6	70.1	56.9	71.6	58.4	58.9	62.5	74.5	66.3	76.8	74.3	82	11.1	30.8	26.1	24.9
Magnesium (diss)	mg/L	-	-	-	-	0.05	12.7	15.7	12.7	16	16.3	17.1	12.6	18	13.7	14.7	15.2	18.8	16.9	21.1	19.6	21	4.2	6.46	5.74	4.99
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	4.8	-	4.27	-	4.7	-	4.01	-	4.17	-	4.34	-	4.48	-	4.79	5.1	4.4	4.52	-	3.57
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	7.4	6.86	6.71	7.01	7.51	8.2	6.6	9.13	6.97	7.37	7.75	9.05	9.69	11.4	10.6	11	74	29.3	10.1	7.98
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	158	179	148	193	195	181	190	203	161	220	171	203	189	235	205	230	115	114	96	81
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	0.05	<0.02	<0.02	<0.02	0.08	<0.02	<0.02	0.03	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	0.03	<0.02	<0.02	0.11
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	8	<5	<4	73	<5	5	20
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	2.2	1.6	1.3	1.7	1.9	3.2	3.9	1.6	1.5	1.9	<0.5	36.4	2.1	2.5	2.1	2.4	3.6	1.6	1.3	1.5
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	397	477	464	441	466	562	438	500	565	512	471	560	530	646	603	620	423	317	217	210
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		192.6	223.5	186.6	227.2	228.4	245.5	194	252.9	202.2	207.6	218.7	263.4	235.1	278.7	-	-	45	103.5	88.8	82.7
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		8.08	8.14	8.25	7.7	7.72	7.9	7.48	7.93	7.15	7.66	7.5	7.7	7.3	7.75	7.37	7.77	6.7	7.53	7.08	7.08
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	**0.003**	-	**0.006**	-	<0.001	<0.001	-	<0.001	-	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	232	274	224	266	312	316	238	294	254	316	302	350	300	344	358	375	255	126	194	138
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	0.14	-	<0.1	-	0.4	-	<0.1	-	0.25	-	<0.1	-	<0.1	-	<0.1	0.11	-	<0.1	-	0.5
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	**1.4**	-	**0.64**	-	**1.48**	-	**0.67**	-	**0.97**	-	**1.3**	-	**0.59**	-	**0.64**	**0.29**	-	**5.02**	-	**2.31**
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.037	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.001	<0.001	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.054	0.047	0.044	0.047	0.051	0.053	0.045	0.051	0.043	0.056	0.049	0.051	0.049	0.058	0.052	0.055	0.046	0.03	0.031	0.027
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0005	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.068	0.056	0.058	0.065	0.084	0.138	0.069	0.103	0.061	0.121	0.102	0.103	0.108	0.149	0.132	0.15	0.043	0.048	0.043	0.039
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.00009	<0.0001	<0.002	-	<0.002
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.003	-	<0.003	-	<0.003	-	0.005	-	-	-	<0.003	-	<0.003	-	<0.002	<0.005	<0.001	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.017	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	<0.0009	0.0016	<0.003	-	<0.003
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	0.028	0.161	<0.01	0.048	0.039	0.011	<0.1	<0.1	2.23	7.62	1.95
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.0005	<0.0005	<0.0001	<0.002	-	<0.002
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.23	0.139	0.177	0.125	0.195	0.148	0.164	0.125	0.141	0.169	0.162	0.172	0.236	0.192	0.205	0.26	0.169	0.541	-	0.57
Mercury (diss)	mg/L	0.0003	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	2.5	5	-	0.02	0.005	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	0.011	0.007	-	<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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12
						Sample ID	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12	PL-QAQC GW-S21 (PL5-12)	PL5-12	PL5-12	PL5-12	PL5-12	PL5-12
						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-Apr-21	2021-Oct-14	2022-Apr-20	2022-Oct-19	2023-May-01	2024-Apr-30
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number														21T737457	21T737457	21P816525	22T887348	22T960247	23T020440	C4D1257
						Lab Sample ID														2380255	2380266	3096766	3779271	4443088	4958103	ZBG817
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	4.5	4.82	4.92	12.6	10.4	24.5	16.9	29.6	0.4	54.7	50.2	42.8	61.6	48.6	48	59	51.6	50.4	48	54
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	<0.05	0.08	<0.05	<0.05	0.06	0.24	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
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	<0.05	-	<0.05	<0.01
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	12.2	12.8	12	11.8	9.7	13.5	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
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	23.2	24.3	23.1	24.6	20.1	26	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
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.72	5.28	4.63	4.91	4.25	5.62	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
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	-	3.49	-	4	-	3.79	-	3.51	-	3.9	-	3.72	-	3.63	3.62	-	3.55	-	3.04	3.8
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	5.97	6.1	6.25	8	5.84	8.07	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
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	80	78	79	87	64	71	78	73	24	76	64	61	66	56	62	62	58	59	70	85
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	0.16	<0.02	<0.02	0.08	<0.02	<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
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	9	<5	<5	<5	<5	<5	<5	<5	9.9
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	1.2	1.1	1.9	2.9	1.8	1.2	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
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	201	201	199	220	187	273	207	235	83	340	306	346	322	290	286	344	301	313	323	370
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		77.4	82.4	76.7	81.6	67.7	88.1	89.9	90.4	30.5	107.3	118.9	92.6	100.9	111.7	110.7	126.9	110.1	99.4	-	-
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		7.68	7.32	6.83	7.32	7.41	7.83	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
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	-	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	**0.003**	**0.003**	-	**0.003**	-	<0.001	<0.001
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	120	114	116	126	104	126	136	152	50	188	210	162	202	222	210	258	178	168	210	255
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	<0.1	-	1	-	<0.1	-	0.25	-	<0.1	-	0.27	-	<0.1	<0.1	-	<0.1	-	<0.1	<0.1
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	**1.6**	-	**1.1**	-	**0.65**	-	**0.92**	-	**0.31**	-	**0.14**	-	**0.09**	**0.08**	-	**0.19**	-	**0.23**	**0.75**
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	0.009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	<0.003	-	<0.003	-	<0.001	<0.001
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.026	0.026	0.025	0.029	0.02	0.023	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
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.044	0.039	0.037	0.05	0.027	0.04	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
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	-	<0.002	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	<0.0001	-	<0.0001	-	<0.0001	<0.00009
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	-	<0.003	-	<0.002	-	<0.003	-	<0.003	-	0.005	-	<0.003	-	<0.003	<0.003	-	<0.003	-	<0.002	<0.005
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.002	-	<0.002	-	<0.002	<0.002	-	<0.002	-	<0.001	<0.0009
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	4.23	3.09	4.95	4.63	2.13	1.25	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
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	<0.001	-	<0.0005	<0.0005
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	-	0.373	0.404	0.44	0.335	0.286	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
Mercury (diss)	mg/L	0.0003	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	2.5	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	<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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	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	PL6-12
						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	PL6-12
						Sample Date	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	2020-May-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2022-Apr-20
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number																		21T737457	21P816525	22T887348
						Lab Sample ID																		2380259	3096767	3779272
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	3	0.95	0.97	0.63	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
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.1	<0.05	<0.05	<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
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	12	14.9	11.6	14.1	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
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	6.6	14.7	11.8	10.3	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
Magnesium (diss)	mg/L	-	-	-	-	0.05	2.6	2.34	1.37	1.75	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
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	2.2	1.33	-	1.23	-	1.34	-	1.31	-	1.34	-	1.25	-	1.06	-	1.07	-	4.37	-	4.73
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	4.1	1.71	3.09	1.42	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
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	30	31	29	28	23	31	25	25	26	24	26	35	24	31	33	34	34	32	29	31
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	<0.001	<0.02	<0.02	0.07	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
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	80	<5	<5	20	<5	<5	<5	<5	<5	<5	<5	33	<5	<5	<5	6	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	3.3	2.2	1.4	1.7	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
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	100	99	91	74	75	106	74	74	79	90	70	90	83	84	77	119	80	94	92	83
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		27.2	46.3	35.1	32.9	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
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		6.2	7.12	6.92	7.05	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
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, 20	60	26	290	50	58	56	50	56	46	38	44	56	50	40	44	58	60	54	66	102
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	<0.1	-	0.47	-	0.25	-	1	-	<0.1	-	0.15	-	<0.1	-	0.25	-	0.12	-	<0.1
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	**0.45**	-	**1.02**	-	**2.19**	-	**1.94**	-	**1.15**	-	**1.2**	-	**1.63**	-	**1.4**	-	**1.23**	-	**1.15**
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	0.021	-	-	-	-	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	-	<0.003	-	<0.003	-	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.049	0.014	0.006	0.006	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
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	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	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	<0.01
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.0001	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.001	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	0.0027	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	0.0015	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	0.005	-	<0.002	-	0.008	-	0.011
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 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	<0.01	<0.01	1.26	<0.01	2.54
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.0001	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	0.005	-	0.009
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	0.107	0.054	-	0.014	-	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
Mercury (diss)	mg/L	0.0003	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	2.5	5	-	0.02	0.005	0.006	<0.005	-	<0.005	-	<0.005	-	<0.005	-	0.045	-	<0.005	-	0.006	-	<0.005	-	0.006	-	0.008

-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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	PL6-12	PL6-12	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	PL7-16	PL7-16	PL7-16	PL7-16	PL7-16
						Sample ID	PL6-12	PL6-12	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	PL7-16	PL7-16	PL-QAQC-GW1-F22 (PL7-16)	PL7-16	PL7-16
						Sample Date	2022-Oct-19	2023-May-01	2024-Apr-30	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
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number	22T960247	23T020440	C4D1257											21T737457	21P816525	22T887348	22T960247	22T960247	23T020440	C3W4742
						Lab Sample ID	4443047	4958104	ZBG818											2380261	3096768	3779273	4443080	4443083	4958105	XIG927
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	0.61	1.59	19	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
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.06	<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
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	-	<0.05	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	9.51	10.8	19	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
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	9.14	10.6	14	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
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.24	1.41	1.8	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
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	-	0.98	1.2	3.58	-	3.68	-	5.26	-	4.36	-	4.71	-	4.68	-	4.93	-	-	4.43	-
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	2.12	1.22	1.5	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
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	31	30	37	84	80	82	86	127	78	108	78	99	88	101	96	110	100	98	115	87
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	0.03	0.08	<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
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	7	<5	8.1	<5	<5	<5	6	<5	<5	<5	<5	7	10	<5	<5	<5	7	7	<5	7.7
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	1.9	1.5	1.7	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
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	80	80	97	266	237	302	257	382	305	356	253	478	274	361	337	406	344	340	392	290
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		27.9	-	-	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	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		6.86	6.89	7.32	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
Phenols	mg/L	-	-	0.001	-	0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	**0.003**	-	**0.005**	-	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	60	78	135	146	132	140	164	248	174	186	140	214	164	206	204	218	156	164	230	130
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	-	<0.1	<0.2	0.1	-	<0.1	-	0.55	-	<0.1	-	0.29	-	0.17	-	<0.1	-	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	-	**0.72**	**3.2**	<0.05	-	<0.05	-	**0.04**	-	<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	0.0036	0.01	-	0.005	0.001, 0.003	-	<0.001	<0.001	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	-	<0.001	-
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.003	0.003	0.0047	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
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	<0.01	<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
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	-	<0.0001	<0.00009	<0.001	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	0.0001	-	<0.0001	-	-	<0.0001	-
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	-	<0.002	<0.005	<0.003	-	<0.003	-	<0.003	-	0.005	-	<0.003	-	<0.003	-	<0.003	-	-	<0.002	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	-	<0.001	0.0033	<0.003	-	<0.003	-	0.004	-	0.003	-	0.004	-	<0.002	-	0.003	-	-	0.002	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	<0.01	<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
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	-	<0.0005	<0.0005	<0.002	-	<0.002	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	<0.0001	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	<0.002	<0.002	0.0064	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
Mercury (diss)	mg/L	0.0003	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	2.5	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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	PL7-16	PL7-16	PL7-16	PL7-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16
						Sample ID	PL7-16	PL-QAQC-GW1 (PL7-16)	PL7-16	PL-QAQC-GW1 (PL7-16)	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16	PL8-16
						Sample Date	2024-Apr-30	2024-Apr-30	2024-Oct-17	2024-Oct-17	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
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number	C4D1257	C4D1257	C4W8619	C4W8619											21T737457	21P816525	22T887348	22T960247	23T020440	C3W4742
						Lab Sample ID	ZBG819	ZBG822													2380263	3096769	3779274	4443081	4958106	XIG928
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	40	40	23	23	0.76	0.66	0.73	0.58	6.17	0.51	0.63	0.52	0.57	0.69	0.71	0.78	0.61	0.63	0.57	<1
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.25	0.25	0.87	0.89	0.2	0.15	0.41	0.13	0.27	0.17	0.29	0.1	0.14	0.14	0.65	0.39	0.51	0.22	0.53	0.1
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	<0.01	-	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-	<0.05	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	24	24	17	17	9.6	9	9.12	8.86	8.18	8.3	6.49	8.37	7.52	8.24	6.82	7.81	7.44	7.75	6.72	6.6
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	43	43	28	27	4.7	5.4	5.47	4.89	6.13	4.63	4.29	4.43	4.19	4.91	5.74	5.52	5.89	5.54	6.43	5.2
Magnesium (diss)	mg/L	-	-	-	-	0.05	11	10	6.4	6.3	1.58	1.71	1.76	1.47	1.91	1.34	1.25	1.3	1.28	1.46	1.81	1.64	1.76	1.68	1.78	1.4
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	5.5	5.5	-	-	1.17	-	1.12	-	1.19	-	0.97	-	0.86	-	1.09	-	1.08	-	1.1	-
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	23	23	16	16	2.33	2.07	1.97	2.14	2.02	1.83	1.47	2.35	1.58	2.16	1.89	2.11	1.72	2.01	1.7	1.9
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	130	130	95	96	18	18	18	15	15	12	15	13	12	17	18	23	17	23	23	16
Ammonia as N	mg/L	-	-	-	-	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	0.06	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	5.4	<4	<4	<4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5	6.4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	2.9	3	1.8	1.8	1.1	1.4	0.9	1.5	1.1	1.2	0.9	0.9	1.1	1.5	<0.5	6.6	1.4	1	0.9	1.5
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	430	430	310	310	61	59	66	50	68	57	46	48	60	51	61	60	64	63	63	55
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	22	20.8	-	-
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		7.4	7.42	7.5	7.55	6.67	7.09	7.34	6.67	6.48	6.93	6.38	6.9	6.73	6.52	6.83	6.79	6.65	6.98	6.83	6.85
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, 20	260	270	190	200	40	52	24	40	50	40	28	32	32	38	40	54	28	36	48	20
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	0.13	0.19	-	-	<0.1	-	<0.1	-	0.22	-	<0.1	-	0.24	-	0.1	-	<0.1	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	<0.02	<0.02	-	-	**0.77**	-	**0.94**	-	**0.63**	-	**0.12**	-	**1.77**	-	**0.1**	-	**0.65**	-	**0.05**	-
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	<0.001	<0.001	-	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.001	-
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.038	0.038	0.023	0.023	0.009	0.007	0.006	0.005	0.006	0.006	0.005	0.006	0.004	0.004	0.005	0.004	0.004	0.005	0.005	0.0041
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.24	0.24	0.11	0.1	<0.01	<0.01	<0.01	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.00009	<0.00009	-	-	<0.001	-	<0.001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-	<0.0001	-
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.005	<0.005	-	-	<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	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	0.0044	0.0044	-	-	<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, 0.1	<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	<0.01	<0.01	<0.01	<0.1
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.0005	<0.0005	-	-	<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	0.068	0.068	0.038	0.035	0.006	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	0.0003	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	2.5	5	-	0.02	0.005	<0.005	<0.005	-	-	<0.005	-	0.077	-	<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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	PL8-16	PL8-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16
						Sample ID	PL8-16	PL8-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16-QAQC GW-S19 (PL9-16)	PL9-16	PL9-16-QAQC- GW-F19 (PL9-16)	PL9-16	PL9-16-QAQC- GW-S20 (PL9-16)	PL9-16	PL-QAQC-GW-F20 (PL9-16)	PL9-16	PL9-16	PL-QAQC-GW-F21 (PL9-16)	PL9-16
						Sample Date	2024-Apr-30	2024-Oct-17	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	2020-May-07	2020-Oct-07	2020-Oct-07	2021-Apr-21	2021-Oct-14	2021-Oct-14	2022-Apr-20
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number	C4D1257	C4W8619															21T737457	21P816525	21P816525	22T887348
						Lab Sample ID	ZBG820																2380264	3096770	3096771	3779275
Anions						Detection Limit																				
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	<1	<1	20.6	14.9	16.3	12.5	18.3	13	17.4	17.4	17.5	17.5	27.8	27.8	21.9	22	25.1	23.1	23.3	24.2
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.16	0.1	0.97	0.88	0.8	0.63	0.71	0.65	0.7	0.72	0.76	0.76	0.57	0.54	0.56	0.56	0.56	0.57	0.58	0.54
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	-	-	<0.05	-	<0.05	-	<0.05	-	<0.05	<0.05	-	-	<0.05	<0.05	-	-	<0.05	-	-	<0.05
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	6.9	6.5	15.9	15.4	18.4	14.8	18.2	11.6	10.5	10.4	11.6	11.6	13.9	13.8	11	11.1	12	11	10.8	11
Cations																										
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	5.6	5.5	18.1	15.9	15.1	15.7	14.6	13.1	14.7	14.9	16.8	17.1	15.9	16	16.1	16.4	14.9	14.5	14.6	13.7
Magnesium (diss)	mg/L	-	-	-	-	0.05	1.6	1.4	5.53	4.61	4.41	4.58	4.31	3.67	4.15	4.2	4.95	5.05	4.57	4.62	4.7	4.76	4.46	4.43	4.43	3.96
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	1.1	-	2.79	-	2.38	-	2.5	-	2.36	2.38	-	-	2.53	2.55	-	-	2.49	-	-	2.33
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	1.7	1.8	5.67	5.48	5.41	5.95	6.18	5.78	6.09	6.15	6.83	6.98	6.49	6.5	6.29	6.39	6.97	6.63	6.55	7.05
General Chemistry																										
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	21	23	53	41	35	42	36	36	49	44	42	42	29	29	37	38	29	34	34	27
Ammonia as N	mg/L	-	-	-	-	0.02, 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	0.11	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	<4	<4	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	7	<5	<5	<5	<5
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	1.1	1.2	1.6	1.5	0.8	1.8	1.3	2.2	0.9	1.6	1	1.1	1.1	1.2	1.2	1	<0.5	12.1	14.3	1.1
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	55	61	215	175	187	150	158	158	166	166	165	166	233	233	165	165	173	169	170	167
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		-	-	68	58.7	55.9	58.1	54.2	47.8	53.8	54.5	62.3	63.5	58.5	59	59.6	60.6	55.6	54.4	54.7	50.5
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		7.23	7.31	7.11	7.36	7.66	6.95	6.74	7.32	6.64	6.73	7.24	7.18	6.35	6.52	6.62	6.62	6.75	6.82	6.93	6.63
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	<0.001	<0.001	-	-	**0.002**	-	-	0.001
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	10	70	124	108	80	92	102	82	90	94	100	100	114	112	100	102	96	124	112	98
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	<0.1	-	0.2	-	<0.1	-	0.22	-	<0.1	<0.1	-	-	0.22	0.35	-	-	<0.1	-	-	<0.1
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	<0.02	-	**4.48**	-	**0.07**	-	**0.17**	-	**0.1**	**0.09**	-	-	**0.15**	**0.2**	-	-	**0.05**	-	-	**0.04**
Metals																										
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	<0.001	-	<0.003	-	<0.003	-	<0.003	-	<0.003	<0.003	-	-	<0.003	<0.003	-	-	<0.003	-	-	<0.003
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.0039	0.0049	0.047	0.018	0.014	0.014	0.014	0.014	0.015	0.014	0.014	0.014	0.014	0.014	0.015	0.013	0.013	0.012	0.012	0.012
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	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	0.026	0.034	0.034	0.031	0.027	0.027	0.031
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.00009	-	<0.001	-	<0.001	-	<0.0001	-	<0.0001	<0.0001	-	-	<0.0001	<0.0001	-	-	<0.0001	-	-	<0.0001
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.005	-	<0.003	-	<0.003	-	<0.003	-	0.004	0.004	-	-	<0.003	<0.003	-	-	<0.003	-	-	<0.003
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	<0.0009	-	<0.003	-	<0.003	-	<0.003	-	<0.002	<0.002	-	-	<0.002	<0.002	-	-	<0.002	-	-	<0.002
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	<0.1	<0.1	<0.01	<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
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.0005	-	<0.002	-	<0.002	-	<0.001	-	<0.001	<0.001	-	-	<0.001	<0.001	-	-	<0.001	-	-	<0.001
Manganese (diss)	mg/L	0.0255	0.05	-	-	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	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0003	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	2.5	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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.	
Result	Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Hastings Highlands Analytical Chemistry Results: Anions, Cations, GenChem, Met in Well Screen						Site Name	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake	Papineau Lake
						Location	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16
						Sample ID	PL-QAQC-GW-S22 (PL9-16)	PL9-16	PL9-16	PL9-16	PL9-16	PL9-16
						Sample Date	2022-Apr-20	2022-Oct-19	2023-May-01	2023-Oct-16	2024-Apr-30	2024-Oct-17
Parameter	Units	RUV-PL	ODWQS-ALL-MERGED	PWQO-GENERAL	PWQO-INTERIM	Lab Job Number	22T887348	22T960247	23T020440	C3W4742	C4D1257	C4W8619
						Lab Sample ID	3779276	4443082	4958107	XIG929	ZBG821	
Anions						Detection Limit						
Chloride	mg/L	127.5	250	-	-	0.1, 0.12, 0.2, 1, 2	24.1	22.5	25.1	20	25	23
Nitrate as N	mg/L	2.7	10	-	-	0.05, 0.1	0.54	0.54	0.54	0.7	0.45	0.66
Nitrite as N	mg/L	0.3	1	-	-	0.01, 0.05, 0.1	<0.05	-	<0.05	-	-	-
Sulphate	mg/L	251.8	500	-	-	0.1, 0.2, 1	11	11.2	8.99	9.3	13	8.9
Cations												
Calcium (diss)	mg/L	-	-	-	-	0.05, 0.2	14.1	14.6	14	16	16	15
Magnesium (diss)	mg/L	-	-	-	-	0.05	4.06	4.05	3.75	4.4	4.4	4.1
Potassium (diss)	mg/L	-	-	-	-	0.05, 0.2, 0.5	2.37	-	2.26	-	2.6	-
Sodium (diss)	mg/L	101	200	-	-	0.05, 0.1	7.21	7.55	6.78	7.7	7.9	7.7
General Chemistry												
Alkalinity (as CaCO3)	mg/L	26.5 - 261.5	30 - 500	See Factsheet	-	1, 5	26	35	29	38	48	32
Ammonia as N	mg/L	-	-	-	-	0.02, 0.05	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05
Chemical Oxygen Demand	mg/L	-	-	-	-	4, 5	<5	5	<5	<4	<4	<4
Dissolved Organic Carbon	mg/L	3	5	-	-	0.4, 0.5	1.1	1.1	0.9	1.4	1.2	1.1
Electrical Conductivity	uS/cm	-	-	-	-	1, 2	166	177	166	180	180	180
Hardness (as CaCO3)	mg/L	-	80 - 100	-	-		51.9	53.1	-	-	-	-
pH	pH units	6.7 - 7.7	6.5 - 8.5	6.5 - 8.5	-		6.66	7.06	6.75	6.93	7.11	7.21
Phenols	mg/L	-	-	0.001	-	0.001	<0.001	-	<0.001	-	<0.001	-
Total Dissolved Solids	mg/L	277	500	-	-	10, 20	94	84	118	80	115	125
Total Kjeldahl Nitrogen	mg/L	-	-	-	-	0.1, 0.2	<0.1	-	<0.1	-	<0.1	-
Total Phosphorus	mg/L	-	-	0.03	-	0.02, 0.4	**0.04**	-	**0.15**	-	**0.041**	-
Metals												
Aluminum (diss, 0.45 µm)	mg/L	-	0.1	-	Calculated	0.01	-	-	-	-	-	-
Arsenic (diss)	mg/L	0.0036	0.01	-	0.005	0.001, 0.003	<0.003	-	<0.001	-	<0.001	-
Barium (diss)	mg/L	0.3	1	-	-	0.002	0.012	0.012	0.011	0.013	0.014	0.012
Beryllium (diss)	mg/L	-	-	Calculated	-	0.001	-	-	-	-	-	-
Boron (diss)	mg/L	1.3	5	-	0.2	0.01	0.031	0.027	0.028	0.03	0.039	0.025
Cadmium (diss)	mg/L	0.0013	0.005	-	Calculated	0.00009, 0.0001	<0.0001	-	<0.0001	-	<0.00009	-
Chromium (diss)	mg/L	0.0129	0.05	-	-	0.002, 0.003, 0.005	<0.003	-	<0.002	-	<0.005	-
Cobalt (diss)	mg/L	-	-	-	0.0009	0.0002	-	-	-	-	-	-
Copper (diss)	mg/L	0.5004	1	-	Calculated	0.0009, 0.001, 0.002	<0.002	-	<0.001	-	<0.0009	-
Iron (diss)	mg/L	0.1525	0.3	0.3	-	0.01, 0.1	<0.01	0.013	<0.01	<0.1	<0.1	<0.1
Lead (diss)	mg/L	0.0029	0.01	-	Calculated	0.0005, 0.001	<0.001	-	<0.0005	-	<0.0005	-
Manganese (diss)	mg/L	0.0255	0.05	-	-	0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002
Mercury (diss)	mg/L	0.0003	0.001	0.0002	-	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	2.5	5	-	0.02	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

- FOR REVIEWER -

*Please double check with Factsheet for all Calculated criteria/guidelines.

Result Calculated Criteria result could not be determined. Please see Factsheet and calculate ma

Appendix F

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.

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